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ACCOUNTING (ACCT)

ACCT 202. Accounting for Non-business Majors. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The course is open only to non-business students. A nontechnical introduction to the principles of financial and managerial accounting with emphasis on the use and interpretation of financial reports, managerial planning and control. The course is for the individual who seeks a basic knowledge of accounting and its uses. It is designed for the user of accounting information rather than the preparer. This course cannot be substituted for ACCT 203, 204 or 205. Students graduating with a major in the School of Business cannot receive credit for this course.

ACCT 203. Introduction to Accounting I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Theoretical and technical facets of financial and managerial accounting for business. Accumulation, analysis, interpretation and uses of accounting information. Course will focus on financial accounting.

ACCT 204. Introduction to Accounting II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 203 with a minimum grade of C. Theoretical and technical facets of financial and managerial accounting for business. Accumulation, analysis, interpretation and uses of accounting information. Course will focus on managerial accounting.

ACCT 205. Introductory Accounting Survey. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to students in the post-baccalaureate undergraduate certificate programs in accounting and information systems, students seeking a B.S. in Financial Technology, students enrolled in the School of Engineering, or by permission of instructor. An accelerated course covering theoretical and technical facets of financial and managerial accounting for business. Accumulation, analysis, interpretation and uses of accounting information. May not be counted toward any of the B.S. programs offered by the School of Business other than the B.S. in Financial Technology.

ACCT 291. Topics in Accounting. 1-3 Hours.
Semester course. 1-3 credits. Prerequisite: permission of instructor. An in-depth study of selected accounting topics. Graded as pass/fail.

ACCT 303. Intermediate Accounting I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 203 or ACCT 205 with a minimum grade of C. Restricted to students who have completed at least 54 credit hours (junior standing) or 24 credits with minimum cumulative GPA of 2.5. Focuses on financial accounting and accounting standards, including the conceptual framework for financial accounting. Includes an in-depth study of the income statement, the balance sheet and an introduction to the statement of cash flows. Also covers valuation of inventories.

ACCT 304. Intermediate Accounting II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 303 with a minimum grade of C. Restricted to students who have completed at least 54 credit hours (junior standing). Continues the study of financial accounting, covering accounting for acquisition and disposition of property, plant and equipment, intangible assets, contingencies, long-term liabilities, stockholders' equity, earnings-per-share, and investments.

ACCT 305. Intermediate Accounting III. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 304 with a minimum grade of C. Restricted to students who have completed at least 54 credit hours (junior standing). Continues the study of financial accounting, covering accounting for income taxes, accounting for pensions and post-retirement benefits, accounting for leases, accounting changes and error analysis, statement of cash flows, full disclosure in financial reporting and International Financial Reporting Standards.

ACCT 306. Cost Accounting. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 204 or ACCT 205 with a minimum grade of C. This course is restricted to students who have completed at least 54 credit hours (junior standing). Cost accumulation for inventory pricing and income determination. Cost behavior concepts for planning and control. Job order and process cost systems, standard costs, budgets and special topics in relevant costs for managerial decisions.

ACCT 307. Accounting Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 303 with a minimum grade of C. This course is restricted to students who have completed at least 54 credit hours (junior standing). Examines design and evaluation of manual and computerized accounting information systems. Emphasis on the system of internal controls and the impact of computers on those controls.

ACCT 401. Governmental and Not-for-profit Accounting. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ACCT 304 with a minimum grade of C. This course is restricted to students who have completed at least 54 credit hours (junior standing). The role of accounting in the management of resources entrusted to government and nonprofit entities, including accounting and reporting standards. Accounting in municipalities and nonprofit entities such as hospitals, charitable and health organizations, and colleges and universities.

ACCT 402. Advanced Cost Accounting. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ACCT 303 and ACCT 306, each with a minimum grade of C. This course is restricted to students who have completed at least 54 credit hours (junior standing). An advanced conceptual cost/managerial course designed to familiarize students with the more complex aspects of cost/managerial accounting concepts including process costing, standard costing, activity-based costing, Just-in-Time inventory systems, enterprise resource planning and issues relating to the relative strengths and limitations of managerial accounting.

ACCT 403. Management Control Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ACCT 303 and ACCT 306, each with a minimum grade of C. This course is restricted to students who have completed at least 54 credit hours (junior standing). An advanced conceptual management control systems course designed to expose students to the theoretical and conceptual foundations of management control systems and to integrate accounting into the managerial decision/control process. Uses a predominantly case-oriented approach. While primary emphasis will be on integrating accounting into the management control process, significant attention also will be devoted to the behavioral issues involved in management control system design and implementation. Students also will receive hands-on experience in structuring and formulating control systems in an Enterprise Resource Planning system environment.

ACCT 404. Introduction to Forensic Accounting and Fraud Examination. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 304 with a minimum grade of C. Introduction to the area of forensic accounting. Topics include the detection of fraudulent financial reporting, employee fraud, money laundering, digital forensic analysis and electronic evidence, evidence management, computer forensics, and an introduction to business valuation.

ACCT 405. Tax Accounting Principles. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 204 or ACCT 205 with a minimum grade of C. Restricted to students who have completed at least 54 credit hours (junior standing). Income tax legislation and the concept of taxable income; federal income tax law applicable to individuals.

ACCT 406. Auditing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ACCT 304 and 307 with a minimum grade of C. This course is restricted to students who have completed at least 54 credit hours (junior standing). A study of the conceptual, theoretical and practical procedures applicable to auditing — both external and internal. Primary emphasis is placed upon the theory of audit evidence; the objectives, techniques and procedures for financial and operational audit reports.

ACCT 408. Accounting Decision Analytics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ACCT 307 with a minimum grade of C; and MGMT 301, SCMA 301, STAT 210 or STAT 212. Restricted to students who have completed at least 54 credit hours (junior standing). The spreadsheet analysis and written communication of data relating to accounting-focused business problems.

ACCT 409. Research and Communication for Accountants. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 304 with a minimum grade of C. Restricted to students who have completed at least 54 credit hours (junior standing). Focuses on the research of accounting issues and preparation of technical reports relating to that research. Leadership and team dynamics are explored using group projects.

ACCT 410. Advanced Tax Accounting. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ACCT 303 and ACCT 405, each with a minimum grade of C. This course is restricted to students who have completed at least 54 credit hours (junior standing). Complex tax problems of the trust, partnership and corporation. Particular emphasis is given to tax planning.

ACCT 413. Advanced Accounting. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 304 with a minimum grade of C. Financial accounting for complex business relationships, including business combinations, consolidated financial statements, restatement of foreign financial statements, foreign currency transactions, derivative instruments, partnership 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 491. Topics in Accounting. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Prerequisites vary by topic. Study of current topics. Topics may vary by semester. See the Schedule of Classes for specific topics to be offered.

ACCT 492. Independent Study. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Restricted to accounting majors who have completed at least 54 credit hours (junior standing). The purpose of this course is to allow international students to take advantage of an internship work experience. Graded as pass/fail.

ACCT 493. Internship in Accounting. 3 Hours.
Semester course; 3 credits. Prerequisites: ACCT 304 with a minimum grade of B; senior standing in accounting and permission of the department chair. Intention to enroll must be indicated to the instructor prior to or during advance registration for semester of credit. Involves students in a meaningful experience in a setting appropriate to the major. A structured course in which the first three weeks are spent in the classroom, followed by 11 weeks at a workplace. The last week of the semester students return to the classroom for discussion and reflection on the work experience. An internship portfolio is required at the end of the course. Graded as pass/fail.

ACCT 497. Guided Study in Accounting. 1-3 Hours.
Semester course; variable hours. 1-3 credits. Maximum total of three credits. Prerequisites: junior standing in accounting and approval of adviser and department chair prior to course registration. Intensive study under supervision of a faculty member in an area not covered in-depth or contained in the regular curriculum.

ACCT 507. Fundamentals of Accounting. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Theoretical and technical aspects for accumulating and reporting financial information for business. Emphasis on current financial accounting issues confronting businesses and interpretation of financial information reported by business. This is a graduate foundation course.

ACCT 513. Advanced Accounting. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 305 with a minimum grade of C. Financial accounting for complex business relationships, including business combinations, consolidated financial statements, restatement of foreign financial statements, foreign currency transactions, derivative instruments, partnership 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 604. Advanced Auditing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 406 with a minimum grade of C. Development of auditing theory, special disclosure issues, statistical sampling, and ethical, legal and social responsibilities of external and internal auditors. Emphasis on contemporary topics in auditing.

ACCT 606. International Accounting. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 304 with a minimum grade of C. International dimensions of accounting; national differences in accounting thought and practice; problems and issues.

ACCT 608. Managerial Accounting Concepts. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 507. The use of accounting information contained in reports to management. The functions of planning, decision making, and control are studied as accounting data are reported through the firm's information system and in special analyses.

ACCT 610. Forensic Accounting. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 406 with a minimum grade of C. Study of forensic accounting topics, including fraudulent financial reporting, employee fraud, money laundering, litigation services, evidence management, computer forensics and business valuation.

ACCT 662. Advanced Topics in Accounting Information Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 307 with a minimum grade of C. 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 680. Tax Research and Planning. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 405 with a minimum grade of C. Tax research methodology; the sources of tax law and their relationship to tax research.

ACCT 681. Tax Administration. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 405 with a minimum grade of C. The Internal Revenue Service and the practices and procedures involved and/or available for the settlement of tax controversies and common elections of accounting methods.

ACCT 682. Corporate Taxation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 405 with a minimum grade of C. Corporate tax laws as related to the corporations involved and to individual shareholders; tax aspects of the creation, operation, reorganization, and partial liquidation of corporations; corporate distributions.

ACCT 684. Partnership Taxation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ACCT 405 with a minimum grade of C. Tax problems related to organization, operation, and liquidation of a partnership. Also, tax problems of Subchapter S corporations, tax-exempt organizations, private foundations and other special corporate forms.

ACCT 697. Guided Study in Accounting. 1 Hour.
Semester course; 1 lecture hours. 1 credit. Prerequisite: Approval of proposed work is required by Graduate Studies office in the School of Business. This course is restricted to accounting majors. The primary purpose of this course is to allow international students to take advantage of an internship work experience. This course may also be used by accounting graduate students to do research on problems in accounting. Students will be assigned reading and will prepare a written report. Graded as pass/fail.

ACCT 790. Research Methods Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Open only to Ph.D. students in business. Analyzes and critiques general theories, practices and functions in a specialized area of accounting research.

ACCT 791. Managerial Accounting Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Open only to Ph.D. students in business. Presents contemporary issues in managerial accounting and auditing research.

ACCT 792. Financial Accounting Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Open only to Ph.D. students in business. Presents and analyzes contemporary issues in financial accounting.

ACCT 793. International Accounting Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Open only to Ph.D. students in business. Presents contemporary issues and research in international accounting.

ACCT 794. Behavioral Research Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Open only to Ph.D. students in business. Provides knowledge and skills for advanced accounting research.

ACCT 795. Auditing Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Open only to Ph.D. students in business. Presents contemporary issues in auditing research.

ACCT 797. Guided Study in Accounting. 6 Hours.
Year course; 6 credits. Graduate students will work under supervision in outlining a graduate thesis and in carrying out the thesis.

ACCT 898. Dissertation Research. 1-12 Hours.
Semester course; variable hours.1-12 credits. Enrollment restricted to Ph.D. in Business students.

ADMINISTRATION AND SUPERVISION (ADMS)

ADMS 500. Workshops in Education. 1-3 Hours.
Semester course; 1-3 credits, repeatable for maximum of six 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.

ADMS 600. Public School Administration. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An overview of the theory and practice of public school administration. Emphasis on the governance of education and leadership roles of school boards, superintendents, principals and supervisors. Leadership theories and characteristics of effective management systems related to student discipline and academic performance, school safety, internal and external communications, and coordination with outside agencies. Appropriate field-based project relating theory to practice will be required.

ADMS 601. Processes of Instructional Leadership. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines processes of instructional leadership in schools. Primary focus on developing school leadership skills necessary to provide a positive working environment through collaboration and team-building, as well as professional opportunities including supervision and evaluation of instruction. Focus will be on best practices that lead to school cultures that build communities of learning. Appropriate field-based project relating theory to practice will be required.

ADMS 602. Seminar in Elementary School Administration. 3 Hours.
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. 3 Hours.
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 605. Organizational Theory, Structure and Culture in Educational Settings. 3 Hours.
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. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Develop understandings for school leaders 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides a conceptual and philosophical framework for evaluation and development of practices invovled in implementing desirable school and community relations programs that focus on unique needs of communities. Special emphasis given to skills necessary to identify significant issues, assess current practice and engage in the processes involved in building and maintaining exemplary school-community programs. Appropriate field-based project relating threory to practice will be required.

ADMS 611. School Law. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Legal aspects of school administration that include constitutional and statutory provisions and court decisions. Relationship of legal aspects to governance of schools in Virginia will be emphasized. Appropriate field-based project relating theory to practice will be required.

ADMS 618. Leadership for Educational Change and Improvement. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Students will reflect on the past, critically review current reality in schools and creatively predict the nature of schooling in the future in light of the responsive role of the school leader. Other constructs presented include change as an educational paradigm, the use of data to inform changes needed, the leader as change agent and 21st-century learning as a catalyst for 22nd-century learning. In addition, students will assess their school/organization for change readiness.

ADMS 620. Improving School Programs and Performance. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Introduction to principles of leadership for the improvement of school programs and performance. Participants discuss current literature and models of school improvement with an emphasis on identification, selection and measurement of appropriate student and school performance indicators. An understanding of school culture and change, the importance of planning for change, and the role of data in the process of change are topics included. Appropriate field-based project relating theory to practice will be required.

ADMS 621. Management of School Operations and Support Programs. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Developing understanding and practices of the school principal 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 622. Understanding Diversity and Leading for Social Justice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. In this course, participants will engage in conversations related to diversity in schools and explore the critical role of education (and leadership) in a democratic society that is rapidly changing and becoming increasingly complex. Participants will reflect on how culture impacts leadership beliefs and practice and explore strategies for building schools that are equitable environments that support the needs of all stakeholders.

ADMS 623. Schooling as a Complex System. 1 Hour.
Semester course; 1 lecture hour. 1 credit. This course introduces students to a critical understanding of the politics of education through a systems thinking or systems theory perspective. After critical examination of systems thinking theory and complex systems, the remainder of the course offers an exploration of the interaction of federal, state and local governments within the complex, multilayered political structure of education.

ADMS 624. Principals as Human Resource Agents. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The course examines the management of human resources in schools and school divisions. Legal issues, division policies, ethical considerations and professional interpersonal relationships are explored, along with evaluation of personnel. Students will participate in problem-solving in specific human resources cases and will critically examine human resource situations in their own contexts.

ADMS 625. Leadership for Individualized Learning. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course represents a holistic approach to leadership for meeting needs of learners across the continuum with a focus on students with disabilities and to include gifted students and English-language learners. The constructs presented include legal and historical frameworks, equity issues, traditional and emerging policies and practices, models of instructional delivery, and roles and responsibilities of personnel.

ADMS 626. Internal/External Relations and Communications. 2 Hours.
Semester course; 2 lecture hours. 2 credits. This course provides students with the knowledge and skills essential for school leaders to relate and communicate effectively with the community in its broadest sense. Emphasis is on building relationships and communicating effectively with internal and external publics face-to-face, online and in print.

ADMS 627. Enhancing and Supporting Instruction. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The focus is to learn ways to enhance and support instruction that improves student achievement. The content includes effective instruction, supervision, evaluation, professional development, diverse learners and capacity-building through the development of professional learning communities, as well as using data and curriculum alignment strategies to improve student performance.

ADMS 628. Cultural Inheritance of Schools. 1 Hour.
Semester course; 1 lecture hour. 1 credit. This course explores the engines that drive public education. Particular attention is paid to macro-level social, economic, political and demographic shifts that have transformed metropolitan school systems over the past half century. Evaluation of historical and contemporary law, policies, practices and dispositions inherent to our system of education is embedded, especially as each relates to the distribution of equal educational opportunity across urban/suburban/exurban lines.

ADMS 629. The Business of Schools. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course presents financial considerations such as funding, revenue and expenditure audits; maintenance of a safe and productive learning environment; crisis management and media relations; physical plant management; meeting management; communication with internal and external publics; time management; and the ability to effectively navigate political waters. The approach to these constructs will be both diagnostic and prescriptive.

ADMS 630. Understanding and Engaging School Communities. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Students will explore the broad social, economic, political and demographic shifts that have transformed metropolitan school communities over the past half century. Based on a deeper understanding of the complex forces that influence public education, students will develop leadership skills that focus on building relationships and communicating effectively with internal and external school communities.

ADMS 631. Evidence-based Decision-making. 1 Hour.
Semester course; 1 lecture hour. 1 credit. The purpose of this course is to prepare students to be critical consumers of research and to develop individual and group research skills. Students will learn to evaluate research quality, find available data within their schools and divisions, and collect and use new data. Students will learn to evaluate research quality in both single and synthesis studies. Additionally, students will be introduced to the action research cycle, be able to recognize and develop research questions, and determine an appropriate action research design.

ADMS 632. Administration and Supervision of Special Education. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examination of instructional practices and legal issues related to providing school programs for students with special needs. Appropriate field-based project relating theory to practice will be required.

ADMS 633. Multiple Dimensions of Leadership. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course provides participants with the opportunity to understand their own unique beliefs and dispositions regarding teaching, learning and leading as well as to understand the roles and responsibilities of educational leaders, including the Virginia Performance Standards for School Leaders and the ethical dimensions of leadership and policymaking. Various leadership models/theories are presented and explored.

ADMS 640. Human Resource and Fiscal Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of theories and policies related to resource projection and management in schools and school divisions. Finance topics include budget, purchasing and accounting, and procedures for obtaining equipment and materials. Human resource topics include staffing requirements, hiring, evaluation and dismissal procedures, and staff-personnel relationships. Appropriate field-based project relating theory to practice will be required.

ADMS 641. School Personnel Administration. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The development and utilization of the community school concept will be examined. Communitywide 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 647. Educational Technology for School Leaders. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides an overview of the impact of technology -- particularly Web-based technologies -- on K-12 instruction, from pedagogical considerations and associated tool choices to more pragmatic leadership issues of planning, funding and faculty development. This course is designed for administrators, teacher leaders and other interested professionals who are or intend to be leaders in technology. Crosslisted as: TEDU 647.

ADMS 651. Topics in Education. 1-3 Hours.
Semester course; 1-3 credits, repeatable for maximum of nine credits. Prerequisite: Check with department for specific prerequisites. A course for examination of specialized issues, topics, readings or problems in education.

ADMS 670. Administrative Internship I. 1 Hour.
Semester course; 1 lecture hour. 1 credit. On-campus course. This course must be taken as one of the first courses in the first semester of enrollment. The course serves as an orientation to the internship experience, which is an integral component throughout the master's and/or post-master's program of studies. Students will learn the specifics of the entire internship component of the program, such as the 320 internship hours required, the scope of internship work, and the variety of experiences needed and means by which all internship experiences are to be documented throughout the program. Students will develop their individual internship plans, which will guide them through their internship experiences throughout their entire program. This plan will include specific field experiences in each required course as well as plans that will be executed in Administrative Internship II and Administrative Internship III, such that a total of 320 hours of experiences are accrued and documented by the end of the program. Graded as S/U/F.

ADMS 671. Administrative Internship II. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisites: full admission status; no grades of Incomplete; evidence provided of meeting technology standards and completing child abuse/neglect recognition training; meet university's Graduate School academic requirements for graduation; adviser/department head approval of internship application; successful completion of ADMS 670. This course is to be taken in the semester immediately before Internship III. This course focuses on emerging topics from the students' internship experiences with emphases on leadership skills, professional dispositions and management. Field-based internship experiences developed in ADMS 670 are continued such that a total of 320 hours of experiences will be accrued and documented by the end of the entire program. A culminating experience taken at the end of the program, this course is designed for students to have opportunities to synthesize the essential knowledge and skills necessary to be a school leader. Reflection and refinement of skills and knowledge will be part of student-developed professional portfolio that could be used in securing a leadership position in a school system. Integration of theory and practice will take place in the internship as evidenced by documented experiences in a school/school district setting supervised by an approved professional and university instructor. Course will include seminars, selected readings, projects, discussion and other culminating activities. Graded as S/U/F.

ADMS 672. Principalship Seminar and Internship. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: Full admission status; no grades of Incomplete; evidence provided of meeting technology standards and completing child abuse/neglect recognition training; meet university's Graduate School academic requirements for graduation; adviser/department head approval of internship application. A culminating experience taken at the end of program designed for students to have opportunities to synthesize the essential knowledge and skills necessary to be a school leader. Reflection and refinement of skills and knowledge will be part of student-developed professional portfolio that could be used in securing a leadership position in a school system. Integration of theory and practice will take place in internship of at least 120 hours in a school/school district setting supervised by an approved professional and university instructor. Course will include seminars, selected readings, projects, discussion and other culminating activities.

ADMS 675. Administrative Internship III. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: successful completion of ADMS 670 and 671. This course is continuation of the experiences in ADMS 670 and 671 and of seminar topics related to developing a personal portfolio and resume as well as interviewing skills. It provides a culminating review and professional reflection of the internship experiences. As part of successful completion of this course, 320 hours of documented internship experiences must be completed by the end of the program. Graded as S/U/F.

ADMS 700. Externship. 1-6 Hours.
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. Education Policy Research. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines a set of applied research practices undertaken within a diverse community of scholars and analysts and that have implications for education. Explores processes involved in developing and implementing educational policy. Emphasis is given to the roles of federal and state governments in policymaking with attention to problems encountered in implementing educational policies. Focuses on research approaches relevant to policy research.

ADMS 702. Educational Administration: Contemporary Theory and Practice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Study of recent developments in administrative theory and the application of these theories to contemporary and future educational issues and problems.

ADMS 703. Leadership for Social Justice and Equity in Education. 3 Hours.
Semester course; 3 lecture/seminar hours. 3 credits. Students will study and engage in dialogue related to the critical role of education in a democratic society in a rapidly changing and increasingly complex world. Through a focused discussion of theories and concepts such as democratic schools, social justice, critical theory and power, feminism, critical race theory, and difference/normalization, students come to understand the possible roles education can play in society and their need to continuously reflect on their own vision for leadership in public schools.

ADMS 704. Education Finance Policy and the Equitable Distribution of Resources. 3 Hours.
Semester course; 3 lecture hours. 3 credits. In addition to a traditional examination of some of the aspects of the economic, legal, financial and budgeting policies affecting the equitable distribution of education resources in the U.S., the social justice implications associated with several established theories and policies in the field of education finance are examined. Specific topics include the historical and philosophical perspectives of U.S. education finance; education finance reform litigation; conceptions and measurements of equity, adequacy and efficiency in school finance designs; the role of federal, state and local governance in equitable education finance in the U.S.;, and the resource needs and organizational and fiscal implications of serving special populations in U.S. schools.

ADMS 705. Planning Educational Facilities. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Study of the theory, principles, criteria, procedures and practices of planning educational facilities and the modernization, maintenance and operation of existing facilities.

ADMS 706. Leadership Perspectives on Learning. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Explores contemporary leadership perspectives on learning. This general theme is refined into three focus areas of current theory and practice: perspectives on what it means to learn, the ways in which digital technology factors into teaching and learning, and perspectives on the future of the formal K-12 learning enterprise.

ADMS 707. The Politics of Education. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examination of how the political structure of public education determines the nature of schooling. Study of political theory of education, macropolitics of education and schooling from micropolitical perspective leading to synthesis and development of critical understanding of the politics of education.

ADMS 708. Equal Educational Opportunity in the 21st Century Metropolis: Toward a Policy Framework. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course provides an overview of the economic, political and demographic shifts that have transformed metropolitan school systems over the past half century. Emphasis is given to the trajectory of education policy and leadership in light of these altered metropolitan spaces. Participants will evaluate the successes and pitfalls of contemporary and historical reforms as they relate to the distribution of educational opportunity across the urban/suburban/exurban divide. Culminating activities help students develop a framework for future policy efforts with a focus on the Richmond metro area.

ADMS 709. U.S. Educational Policy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course will promote a critical examination and evaluation of the major strands of educational policy over the past half century.

ADMS 710. Current Topics in Educational Leadership and Policy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides advanced study on selected topic or emerging issue in U.S. educational policy or leadership.

ADULT EDUCATION (ADLT)

ADLT 402. How Adults Learn. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Overview of the adult as a learner. Topics include how and what adults learn, why adults participate in learning and major barriers to learning for adults. Implications for teachers/trainers of adults are explored.

ADLT 600. Adult Education Perspective. 3 Hours.
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 adult education programs. Examines selected processes and procedures used by adult educators and current issues impacting adult education.

ADLT 601. Adult Learning and Development. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An examination of the research findings from the applied behavioral sciences that affect adult learning throughout the lifespan, including psychological, social and physical attributes of adults as learners. Explores the philosophical and theoretical foundations of the field, including schools of thought and associated theorists. Emphasis on the effects of age on learning, the importance of self-image and factors affecting adult motivation for learning. Addresses different learning styles, application of adult learning theories to practice and the relationship of adult learning to adult development.

ADLT 606. Design and Delivery of Adult Learning Programs. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides a comprehensive understanding of the design, development and delivery process necessary to create a program, course or workshop for adult learners. Emphasis is on actual design of an adult learning experience from initial stages of needs assessment to concluding evaluation and assessment of effectiveness, including development of instructional strategies and methods for delivery.

ADLT 607. Writing Instruction for Adult Learners. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Designed for individuals interested in teaching adult literacy learners. Course participants will study and practice methods for the teaching of writing. This course is designed to provide an overview of the practices, research and application of instructional techniques for effectively working with adult learners in the writing classroom. Participants will be introduced to these techniques through readings from various websites, online documents and a required textbook.

ADLT 608. Adult Education Practicum. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Designed for individuals interested in teaching adult literacy learners. This 120-hour field-based capstone experience for adult education students is an integral component of the professional preparation of adult education educators. The practicum must be supervised jointly by the adult education adviser at VCU's School of Education and the field supervisor in the adult education program in which the experience is being conducted.

ADLT 610. Consulting Skills In Adult Learning Environments. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introduction to the consultation skills necessary to effect change when the educator is in a position of influence, rather than direct control or management responsibility. Presents historical and theoretical models of change, facilitation skills necessary for introducing and sustaining change, strategies for dealing with resistance, and ethical issues involved in consultation. Students gain practical experience by conducting an intervention as the major project assignment in the course.

ADLT 612. Learning in Groups and Teams. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Explores fundamentals of learning in groups and teams, including effects of leadership, group member roles and processes, performance, development, goals, and culture. Examines group theory, models and practices of collective learning. Addresses the situated nature of learning, effects of social context and the concepts inherent in sustaining communities of practice.

ADLT 614. Curriculum Development for Adult Educators. 3 Hours.
Semester course delivered online; 3 lecture hours. 3 credits. Those wishing to apply this course to the five-course endorsement in adult literacy must be licensed to teach in Virginia, however a teaching license is not a prerequisite of the course. Designed to provide an overview of research and practice related to effective curriculum design. The course introduces models of program planning, curriculum development and evaluation appropriate for a variety of adult learners, including those requiring accommodations for disability, literacy, non-native English-speaking ability and multicultural backgrounds.

ADLT 620. Human Resource Development Overview. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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 623. Organizational Learning. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines the theoretical basis for organizational learning and the practices inherent in developing a learning organization. Examines organizational culture and socialization; systems thinking; organizations as interpretative systems; the leader's role in creating, sustaining and changing culture; strategies for enhancing collective learning; distributed cognition; and strategies for knowledge management.

ADLT 625. Change Strategies for HRD Practitioners. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Develops skills in change intervention strategies by employing the theoretical frameworks of organization development and organization transformation to address critical organizational issues and problems. Explores the HRD practitioner's role in facilitating organizational change through action research, action science, action learning and large-scale, whole-system interventions. Examines the differing roles and ethical issues for improving organizational effectiveness with special attention to organizational culture and a systems perspective of change.

ADLT 632. The Changing Face of Higher Education. 3 Hours.
Semester course; 3 lecture hours. 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. Crosslisted as: EDUS 632.

ADLT 636. Capstone Seminar in Action Learning. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: Restricted to students who have completed all other foundation and core courses or are taking this course in conjunction with the final specialty track courses in the M.Ed. in Adult Learning program; permission of adviser required. An integrative end-of-program course that utilizes skills and knowledge gained in all earlier courses, including philosophical and theoretical assumptions of adult learning and strategies for creating effective individual and collective learning environments. Students consult with a community-based, educational, nonprofit or for-profit organization using action learning methods of inquiry to solve a real organizational problem. Requires synthesis of knowledge and expertise in all aspects of adult learning and demonstrated proficiency in research and evaluation skills appropriate for the master's degree level. An end-of-semester presentation and consulting report are provided to the organization's leaders.

ADLT 640. Theory and Practice of eLearning Integration Into Adult Learning Environments. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides learners with a theoretical foundation and rationale for the successful integration of eLearning into formal and informal adult learning environments. This course begins with an overview of educational theory and social constructivist teaching philosophy before addressing the fundamental issues that instructional designers should consider when designing, delivering and assessing eLearning in adult learning environments. Note: This is a hybrid course.

ADLT 641. Exploration of Digital Media for Adult Learning. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Designed to engage students in an exploration of digital media to enhance adult learning. Through hands-on experience with tools, examination of emerging media formats and the evaluation of course learning products, students will learn to create, critique and explore a variety of digital media to support learning in a variety of instructional contexts. Special emphasis will be placed on using digital technology tools to support communication, knowledge building and learning in both formal and informal adult learning settings.

ADLT 642. Design Challenges in Creating eLearning for Adults. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides learners who have developed a deep understanding of the theoretical and philosophical underpinnings of instructional design in eLearning environments through ADLT 640 and who have developed fluency in developing content using new freely available digital media tools in ADLT 641 with an opportunity to undertake a major project in eLearning design. Note: This is a hybrid course.

ADLT 650. Adult Literacy and Diversity. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Surveys the field of adult literacy and its many purposes, definitions, contexts and ideologies by exploring relationships between literacy and learning in numerous contexts, from corporate HRD programs to refugee communities. By applying analytical tools of critical theorists to raise awareness of the ideological nature of adult learning, and by examining contexts and foundations of adult literacy, the course takes up epistemological, ethical and instructional issues that relate to all aspects of adult learning.

ADLT 670. Curriculum Design in Medical Education. 2 Hours.
Hybrid course; 2 credits Restricted to faculty in the School of Medicine. Introduces adult learning principles and practices for the design and assessment of courses, units and individual lessons within a medical education curriculum in both preclinical and clinical settings.

ADLT 671. Theory and Practice of Adult Learning for Medical Educators. 2 Hours.
Hybrid course; 2 credits. Restricted to faculty in the School of Medicine. Provides an overview of the major adult learning theories that are applicable to medical education and explores how these form the basis for teaching and learning in medicine. Examines behavioral, cognitive, social, experiential and transformative learning orientations for relevance in medical education. Emphasis is on how knowledge is constructed and organized in the development of expertise.

ADLT 672. Instructional Strategies for Teaching in Medicine. 2 Hours.
Hybrid course; 2 credits. Restricted to faculty in the School of Medicine. Designed to provide medical educators with knowledge and skills practice in teaching effectively in large and small groups using discussion-based strategies, team-based learning, process-oriented guided inquiry learning and problem-based learning, as well as other active learning methods. Learners design and implement a small-group learning strategy appropriate for a medical education setting.

ADLT 673. Teaching as Scholarship in Medical Education. 2 Hours.
Semester course; 30 contact hours. 2 credits. Restricted to faculty in the School of Medicine. Orients the medical educator to basic design principles for conducting research that contributes to the scholarship of teaching and learning in medical education using qualitative, quantitative or mixed methods. Examines basic research paradigms, problem identification, question development, selection of methodology, IRB preparation and requirements for journal submission and publication.

ADLT 674. Performance Feedback and Simulation in the Medical Education Curriculum. 2 Hours.
Semester course; 30 contact hours. 2 credits. Restricted to faculty in the School of Medicine. Introduces medical educators to the use of simulated learning experiences in preparing health care professionals for patient care. The emphasis is on acquiring skills to develop and lead simulation exercises and on developing facilitation skills needed to provide effective feedback to debrief the activity. Requires hands-on observation and participation in simulation at the VCU Center for Human Simulation and Safety.

ADLT 675. Group and Team Facilitation for Medical Educators. 2 Hours.
Semester course; 30 contact hours. 2 credits. Restricted to faculty in the School of Medicine. An introduction to the nature of learning in groups and teams. The course explores basic issues fundamental to all groups such as leadership, goals, group member roles, stages of group and team development, issues in team performance and an understanding of how institutional culture shapes group behavior.

ADLT 676. Digital Media Technologies for Teaching in Medicine. 2 Hours.
Semester course; 30 contact hours. 2 credits. Restricted to faculty in the School of Medicine. Introduces digital media technologies to bring state-of-the art teaching and learning strategies into the medical education curriculum. Explores Web 2.0 tools including wikis, blogs, podcasts and other emerging media, as well as the evaluation of digital media technologies to support learning in the preclinical or clinical curriculum. Emphasis is on building student engagement and community through participatory strategies for learning.

ADLT 677. Reflective Practice in Medical Education. 2 Hours.
Semester course; 30 contact hours. 2 credits. Restricted to faculty in the School of Medicine. Introduces the concept of reflective practice for medical educators, including the educator's role in developing trainees as reflective practitioners and the role of reflection in one's own professional development. Includes the concept of narrative medicine as a reflective practice that enables a more holistic understanding of patients and their illnesses, with application for the education of medical professionals.

ADLT 688. Lifespan Issues for Adults with Learning and Behavioral Disabilities. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Explores the literature, research, issues and best practices for the population of individuals with learning disabilities and behavior disorders (including ADHD) beyond the school-age years. Focus on disabilities as they are manifested in a variety of settings and contexts in which adults with learning and behavior disorders function. These include areas such as employment, post-secondary education, community, family and leisure. In addition, social-emotional functioning and daily living challenges will be interspersed in the course material. Course goal is to develop understanding and the skill of critical reflection about persons with learning disabilities and behavior disorders in their adult years.

ADLT 702. Seminal Readings in Adult Learning Literature. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A seminal readings course to explore some of the prominent classics in adult learning literature. Designed for doctoral students in adult learning and other disciplines in which knowledge and understanding of the theoretical underpinnings of adult education is desirable as a foundation for effective pedagogy/andragogy. While prior participation in a master's-level adult learning theories class may be beneficial, it is not a prerequisite.

ADVANCED MEDIA PRODUCTION TECHNOLOGY (AMPT)

AMPT 401. Listen and Capture. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Foundational studio course in audio production that covers acoustics, audio physics and history, and equipment and technologies used in recording and editing.

AMPT 402. Editorial Storytelling. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Introductory studio course on motion visual editing techniques, exploring non-linear editing software, film editing history, color techniques, and basic visual effects including animation.

AMPT 403. Emerging Digital Cinema. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Studio course that explores how traditional film and video production has been transformed by new technologies, including DSLR and high resolution RED cameras, teleprompting, green screen techniques.

AMPT 404. Script. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Studio course on screen writing and story development, exploring traditional linear and non-linear plot development.

AMPT 422. Audio for Gaming. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Studio course that focuses on proper recording and formatting of music and sound effects within the context of video game production.

AMPT 423. Motion Graphics. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Studio course that focuses on visual effects including titles, preparing clips for a video editor, and generating computer based animation.

AMPT 424. Music Production Techniques. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Studio course that explores music production for modern styles of popular and alternative acoustic music, particularly virtual instruments, loops and vocal production techniques.

AMPT 425. Light. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Studio course that examines lighting requirements for digital media, exploring lighting design and techniques in the context of video production.

AMPT 426. Foley and Sound Design. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Studio course that explores adding sound created by actors and audio engineers to picture, focusing on the use of both traditional techniques and current digital audio workstation software.

AMPT 495. Sound Manipulation. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: AMPT 401. Studio course that focuses on the live audio recording process, covering sound design, foley techniques, and use and maintenance of relevant sound equipment.

AMPT 496. Finishing the Story. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: AMPT 402. Studio course that expands on the concepts previously covered in prerequisite course for students concentrating in video post-production, further exploring the technology of high-definition and digital cinema.

AMPT 497. Mastering Digital Cinema. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: AMPT 403. Studio course that builds on concepts explored in prerequisite course for students in the production concentration, further exploring how traditional film and video production has been transformed by new technologies.

AFRICAN AMERICAN STUDIES (AFAM)

AFAM 104. Sociology of Racism. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The course will explore the direct and indirect ways in which racial attitudes are acquired, their effect on individuals and society, and the institutional and ideological manifestations of racism as a "faith system," as exploitation and as a form of human conflict. The central focus of interest will be on black-white relationships. Crosslisted as: SOCY 104.

AFAM 105. Survey of African History. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of African civilizations from prehistory to the present, emphasizing the events, ideas and institutions that have shaped, influenced and defined Africa's place in the world. First semester: to 1800. Second semester: 1800 to the present. Crosslisted as: HIST 105.

AFAM 106. Survey of African History. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of African civilizations from prehistory to the present, emphasizing the events, ideas and institutions that have shaped, influenced and defined Africa's place in the world. First semester: to 1800. Second semester: 1800 to the present. Crosslisted as: HIST 106.

AFAM 111. Introduction to Africana Studies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Using a multidisciplinary approach, this course will familiarize students with important events developments, personalities and other phenomena that help facilitate the study and understanding of peoples of African descent dispersed throughout the world from their early continental African past to their present existence.

AFAM 121. Tap Technique I. 2 Hours.
Semester course; 1 lecture and 2 studio hours. 2 credits. Beginning study and training in the principles of tap technique with emphasis upon style, body alignment, spatial patterning, flexibility, strength and kinesthetic awareness to move the body in the style required for tap dancing. Crosslisted as: DANC 121.

AFAM 122. Tap Technique I. 2 Hours.
Semester course; 1 lecture and 2 studio hours. 2 credits. Beginning study and training in the principles of tap technique with emphasis upon style, body alignment, spatial patterning, flexibility, strength and kinesthetic awareness to move the body in the style required for tap dancing. Crosslisted as: DANC 122.

AFAM 126. African-Caribbean Dance I. 2 Hours.
Semester course; 1 lecture and 2 studio hours. 2 credits. Dance based on the movements and rhythms of Africa and the Caribbean. Crosslisted as: DANC 126.

AFAM 127. African-Caribbean Dance I. 2 Hours.
Semester course; 1 lecture and 2 studio hours. 2 credits. Dance based on the movements and rhythms of Africa and the Caribbean. Crosslisted as: DANC 127.

AFAM 151. Jazz Dance Technique I. 2 Hours.
Semester course; 1 lecture and 2 studio hours. 2 credits. Prerequisite: DANC 102 or permission of instructor. Study and training in the principles and concepts of jazz technique. Emphasis on body alignment, flexibility, balance, rhythmic awareness and mastery of isolated movements of body parts. The course includes the exploration of the relationship between jazz music and jazz dance. Crosslisted as: DANC 151.

AFAM 152. Jazz Dance Technique I. 2 Hours.
Semester course; 1 lecture and 2 studio hours. 2 credits. Prerequisite: DANC 102 or permission of instructor. Study and training in the principles and concepts of jazz technique. Emphasis on body alignment, flexibility, balance, rhythmic awareness and mastery of isolated movements of body parts. The course includes the exploration of the relationship between jazz music and jazz dance. Crosslisted as: DANC 152.

AFAM 200. Introduction to African Societies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course introduces the student to the African continent, its peoples and cultures. It covers such general characteristics as the physical and geographical features, climate, topography, traditional economies, languages, religions, social systems and other cultural features that are traditional to its people. Crosslisted as: ANTH 200/INTL 200.

AFAM 204. Africa in Transition. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: AFAM/ANTH/INTL 200 or permission of instructor. The impact of modern social change upon the traditional aspects of African life. Various aspects of social change as it applies to Africa today will be explored.

AFAM 206. African American Family Relationships. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Focuses on the African-American family from the 1940s to the present. Examines the values and the interpersonal/role relationships that are involved in forming and maintaining African-American families in the contemporary United States. Topics include dating and sexual relationships, marital relationships, parent-child relationships and relationships with members of the extended family. Crosslisted as: SOCY 206/GSWS 206.

AFAM 211. Africana Social and Political Thought. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Guides students in identifying and mapping the continuities and discontinuities in political and social thought of the African world. Through an exploration of the various works of scholars, activists and artists, this course will expose students to nondominant narratives in an effort to expand the breadth and depth of interdependence in Africana contributions to ideas such as, but not limited to, the arts, justice, equality and human emancipation.

AFAM 250. Introduction to African-American Music. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introductory survey of black involvement with the development of music in America from 1607 to the present. African-American musical styles will be studied from many aspects, including their African roots and contemporary popular expression. Performance practices will be analyzed and active cognitive listening skills developed through guided listening to selected recordings. Crosslisted as: MHIS 250.

AFAM 302. Politics of the Civil Rights Movement. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The main objectives of the course are to introduce and examine the personalities and activities of the modern Civil Rights Movement. The course provides the historical background leading up to the peak years of the struggle for racial equality in America. It has special focus on the events of the 1960s and particularly their implication for the current state of U.S. Civil Rights. Crosslisted as: POLI 302.

AFAM 303. Black Theatre. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the major developments in the evolution of black theatre through readings and studio performances in black-related and black theatre dramaturgy. Crosslisted as: THEA 303.

AFAM 305. African American Family in Social Context. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 101. A socio-historical examination of the development of the family system of Americans from Africa. Focuses on large-scale (macro level) processes such as changes in the major mode of economic production and in political systems and the corresponding changes in black family structure and functioning. Presents the theoretical material on African-American families and social change that prepares students for further study of the family as a social institution and for the study of family policy. This course is designed to meet the needs of upper-division social science majors. Crosslisted as: GSWS 305/SOCY 305.

AFAM 307. Black Religion. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An analysis of the role of religion in the lives of blacks with an emphasis on African religions and philosophies, the black church in America, and the roles of the various faiths, sects and cults. Crosslisted as: RELS 307/INTL 307.

AFAM 309. Global Women's Health. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Explores issues in women's health from a national and international perspective with an emphasis on the experiences of women in the African diaspora. Theories in medical anthropology are employed to examine key themes. Crosslisted as: ANTH 309/INTL 309/GSWS 309.

AFAM 310. African American Health: Health Disparities. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines health and health disparities among African-Americans in the U.S. Explores the primary health concerns and issues in the African-American community. Topics include impacts of infant mortality, cardiovascular disease, AIDS, violence and cancer on the overall health status of African-Americans.

AFAM 311. African Diaspora Experiences. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Traces the geography and history of dispersed African peoples from their motherland to all parts of the world and reveals the cultural, social, political and economic developments of peoples of African descent worldwide. Surveys the evolution and implication of the trans-Atlantic, trans-Saharan, and trans-Indian Ocean slave trade, in particular the dimensions of experiences of African-descended peoples with emphasis not only on North and South America but also the Caribbean, Europe, Asia, Papua New Guinea and Australia.

AFAM 315. Economic Development. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ECON 203 with a minimum grade of B and ECON 211; or ECON 210 and ECON 211. An introduction to the process of economic development. Surveys development theory and experiences of underdeveloped countries of Africa, Asia, Latin America and the Caribbean and of developed countries. Explores obstacles to development and policies and tools for stimulating economic development. Crosslisted as: ECON 315/INTL 315.

AFAM 318. Politics of Race, Class and Gender. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the racial, class and gender influences on the history and development of political values, conflicts, processes, structures and public policy in the United States. Crosslisted as: POLI 318/GSWS 318.

AFAM 322. Personality and Behavior of the African American. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PSYC 101. A study of personality factors such as motivation, ego-functioning and the socialization processes, with special emphasis on living conditions of African-Americans. Crosslisted as: PSYC 322.

AFAM 333. Geography of Africa. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the land forms, climate, peoples, livelihoods, settlement patterns and cultural groupings of sub-Saharan Africa. Crosslisted as: URSP 333/INTL 333.

AFAM 342. African-American Art. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTH 104 and UNIV 200 or HONR 200, both with a minimum grade of C. A study of the art forms produced by Americans of African origin from the 17th century to the present with an emphasis on contemporary trends in black art. Crosslisted as: ARTH 342.

AFAM 343. Black Political Thought. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An historical and sociological perspective on the political and social ideas of black thinkers from David Walker to the present. Crosslisted as: POLI 343.

AFAM 345. African-American Politics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. In this course, students will discuss and analyze the dynamics of the black experience in the American political system. The status of African-Americans in the United States and the struggle for racial equality will be examined, as will the manner in which American institutions have responded to these phenomena. Students will examine the race/class metric in African-American politics, particularly policies of Affirmative Action as a black progress strategy. Crosslisted as: POLI 345.

AFAM 346. Mental Health Across the African Diaspora. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Surveys theory and research on the interaction of culture and mental illness focusing primarily on populations of African descent in a seminar format. Topics to be addressed, through the lens of the Africana world, include epidemiological and ethnographic research on major psychiatric disorders, culture-bound syndromes and idioms of distress, mental health of immigrants and refugees, and cross-cultural competence in clinical practice.

AFAM 347. African American Children and Families. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Reviews cultural variations in the physical, cognitive, emotional and social development of African American children. Addresses historical and contemporary frameworks of child development and highlights the strengths and limitations of extant research paradigms in the study of African American children. Considers integrity-based approaches that explain the developmental competencies of African American children in response to environmental risks that exceed normative expectations.

AFAM 350. Studies in the Music of the African Continent and Diaspora. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 6 credits. Prerequisite: MHIS 243 or MHIS/AFAM 250. An in-depth examination of selected topics and issues in African-derived musical and cultural traditions. See the Schedule of Classes for specific topics to be offered each semester. Crosslisted as: MHIS 350/INTL 370.

AFAM 356. Government and Politics of Africa. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course will introduce students to the basic outlines of government and politics in Africa. The course will consider such topics as colonialism, elitism, and nationalism and modernization strategies. Using the comparative approach, the course will primarily focus on West, East and Central Africa. Crosslisted as: POLI 356/INTL 356.

AFAM 357. Politics of Southern Africa. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An examination of racial and political developments in the southern tip of Africa. While South Africa will be the primary focus of analysis, other countries in the region such as Zimbabwe, Angola and Mozambique will be studied. Crosslisted as: POLI 357/INTL 357.

AFAM 358. African Art and Architecture. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 200 or HONR 200. A study of African art and architecture from prehistoric times to the present. Special emphasis is placed on form, content, function and meaning, as well as the impact of African art on modern and African-American art. Crosslisted as: ARTH 358.

AFAM 361. Americans from Africa. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the history and culture of blacks in the United States, designed to analyze some of the most important aspects of black life and the attitudes of the dominant society within which blacks lived. The second semester emphasizes the changing status, expectations and ideologies of black Americans in the 20th century. First semester: to 1877. Second semester: since 1877. Crosslisted as: HIST 361.

AFAM 362. Americans from Africa. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the history and culture of blacks in the United States, designed to analyze some of the most important aspects of black life and the attitudes of the dominant society within which blacks lived. The second semester emphasizes the changing status, expectations and ideologies of black Americans in the 20th century. First semester: to 1877. Second semester: since 1877. Crosslisted as: HIST 362.

AFAM 363. African Literature. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. A survey of the literature of Africa with particular emphases on fiction and on West Africa. Some attention also will be given to orature. Crosslisted as: ENGL 363/INTL 366.

AFAM 365. Caribbean Literature. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. A survey of West Indian writings. Attention will be given to African, European and Amerindian influences, as well as to the emergence of a West Indian literary tradition. Crosslisted as: ENGL 365/INTL 367.

AFAM 379. African-American Literature: Beginnings Through the Harlem Renaissance. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. An examination of the culture and literature of African Americans from their roots in Africa and the African Diaspora to the Harlem Renaissance. Authors may include Wheatley, Douglass, DuBois, Hurston, Hughes and Cullen. Crosslisted as: ENGL 379.

AFAM 387. History of West Africa to 1800. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the transformation of West African societies from early times to 1800, with emphasis on the rise of states and empires, the introduction, spread and impact of Islam, the Atlantic slave trade and its effects, and colonialism. Crosslisted as: HIST 381.

AFAM 388. Africa: Social, Cultural and Economic History. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of economic, social and cultural developments in Africa from the beginning of the 19th century to the present, with emphasis on agricultural and industrial development, trade, Africa's involvement in the world economy, changes in labor systems, racial dominance, African initiatives and resistance, religion and social evolution, and Africa in world affairs. Crosslisted as: HIST 384.

AFAM 389. History of Southern Africa. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the history and culture of the peoples of southern Africa. Deals with the areas that presently are the Republic of South Africa, Lesotho, Swaziland, Botswana, Namibia and Zimbabwe. Emphasizes the interaction among the various communities and ethnolinguistic groups in southern Africa. Crosslisted as: HIST 383.

AFAM 390. Africa and the Americas: Slavery, Gender and Race. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines various aspects of slavery in Africa and selected parts of the African diaspora, including the United States, Canada and the Caribbean, with special emphasis on the role played by race and gender. Topics will include African conditions of servility, the trans-Atlantic trade in enslaved Africans, and chattel slavery, demography, labor, law, discipline, abuse, resistance and status. Crosslisted as: HIST 380/GSWS 390.

AFAM 392. Caribbean History to 1838. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An exploration of changes in the structure of Caribbean society from the late 15th century to 1838, with emphasis on the development of plantation slavery, social stratification, race, slave resistance, the Haitian Revolution, African cultural patterns and abolition. Crosslisted as: HIST 376.

AFAM 393. Akhenaten to Cleopatra. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of Egyptian history from the period of the Empire (New Kingdom, c. 1570 B.C.) through the Ptolemaic Age of Cleopatra (c. 30 B.C.). Particular areas of concentration will include the Amarna Period of Akhenaten and various aspects of Egyptian daily life.

AFAM 394. Service-learning in African American Health. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: AFAM 310. Open to African-American studies majors only. Provides an overview of critical public health issues and intervention strategies that may influence life chances and disease susceptibility among African-Americans through a service-learning format.

AFAM 399. Interdisciplinary Research Methods. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Introduces students to the interdisciplinary processes whereby those working in the field develop their arguments and interpretations concerning the black experience. Students will develop increased skills in library research and an awareness of the importance of such methodologies as archaeology, oral history, case studies, participant observations, experiments and surveys. Students will be introduced to the need for critical analysis, the role of biases and frames of references and the reason why scholars working in the field often reach different conclusions with reference to issues of fact, interpretation and significance.

AFAM 401. African-Americans and the U.S. Health Care System. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: AFAM 103, AFAM/SOCY/WMNS/GSWS 305 or permission of the instructor. Explores issues surrounding the disparity in health status and health outcomes between African-Americans and other groups in the United States. Students are required to participate in an experiential exercise designed to enhance learning. Crosslisted as: SOCY 401.

AFAM 411. Applied Concepts in Africana Studies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: AFAM 111 with a minimum grade of C. Pre- or corequisite: AFAM 399. Explores the processes and challenges involved in studying the experiences of African-descended peoples, with a focus on the development of an idea or observation into a finished and well-executed research product. Investigates how these processes unfold in the works of specific black studies researchers, as they capture the varied consciousnesses, histories and social forces surrounding black life in America, Africa and throughout the diaspora.

AFAM 413. African and Oceanic Art. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 200 or HONR 200 with a minimum grade of C. A study of the architecture, painting, sculpture and civilizations of the major art-producing tribes of West Africa and Oceania from the 13th century to the present. Crosslisted as: ARTH 350.

AFAM 416. The Origin and Evolution of the Idea of Race. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ANTH/INTL 103 or AFAM 103 or permission of instructor. This course is an exploration of the origins and social history of the "idea" of race from the Middle Ages to the end of the 20th century. Using both historical and anthropological scholarship, the course presents an analytical framework for race as a sociocultural phenomenon. Crosslisted as: ANTH 416.

AFAM 420. Women of Africa. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ANTH/INTL 103 or AFAM 103. This course looks at the traditional roles of women in African societies and examines how women have coped in different environments. It focuses on the institutionalized aspects of similarities and differences in women's lives in pastoral and horticultural societies and those with mixed economies, and will contrast these with women's roles in large state societies of Africa and in the modern urbanized context. Crosslisted as: ANTH 420/INTL 420.

AFAM 440. Contemporary Art and Architecture of Africa. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ARTH 390 with a minimum grade of C. A study of the impact on African art and architecture of Colonialism, urbanization and modernization. Special emphasis is placed on the search for a new identity by contemporary African artists. Crosslisted as: ARTH 440.

AFAM 451. Religion, Racism and Social Justice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: RELS 340/INTL 341, WLRD 210 or WRLD 220; UNIV 200 or HONR 200. Explores the complex history and contemporary relationships between religion, racism and social justice. Crosslisted as: INTL 451/RELS 451.

AFAM 491. Topics in African-American Studies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with different topics for a maximum of 9 credits; 3 credits may be applied to the African-American studies minor. An in-depth study of specialized areas of African-American studies.

AFAM 492. Independent Study. 1-4 Hours.
Semester course; variable hours. Variable credit. Maximum 4 credits per semester. Maximum total of 4 credits in all independent study courses. Prerequisites: completion of 12 credits in African-American studies courses; junior or senior standing.

AFAM 493. Internship in Africana Studies. 1,3 Hour.
Semester course; variable hours. 1, 2 or 3 credits. May be repeated for a maximum total of 6 credits. A minimum of 50 hours of work per credit. Permission from the department chair or internship coordinator required. Determination of the amount of credit (based on hours or effort required) and permission of departmental internship coordinator must be obtained prior to registration for the course. Internship credit is restricted to students with a minimum grade point average of 2.5 and junior or senior status. Through a directed internship with a nonprofit organization, business, industry, government or university, the student will serve as an intern in a position that provides a real-life experience working with a population of African descent with the goal of defining, improving, affirming and/or validating black experiences in the African diaspora. Graded pass/fail.

AFAM 494. Internship in African American Health. 3 Hours.
Semester course; 150 clock hours in appropriate organization. 3 credits. Prerequisites: AFAM 310, either AFAM/ANTH/INTL/WMNS/GSWS 309 or AFAM/PSYC 322, and AFAM 394. Applicants must be approved by the internship coordinator. Open to African-American studies majors of senior standing only. Students are placed in organizations that offer supervised work or research experience in a health setting appropriate to their interests. A final report must be submitted upon completion of the internship.

AFAM 499. Capstone Seminar in Africana Studies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: AFAM 111, AFAM 211, AFAM 311, AFAM 399 and AFAM 411; and senior standing. Involves the planning and execution of a major research project demonstrating the interdisciplinary processes through which those working in the field of Africana studies use diverse sources to develop their arguments and interpretations.

ALLIED HEALTH PROFESSIONS (ALHP)

ALHP 391. Special Topics. 1-4 Hours.
Semester course; 1-4 credits. Prerequisite: permission of instructor. Offered for undergraduate level. Interdisciplinary study through lectures, tutorial study or independent research of selected topics not provided in other courses.

ALHP 573. Teaching in Health Professional Schools. 3 Hours.
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. 3 Hours.
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. 1-4 Hours.
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. Graded as Pass/Fail.

ALHP 594. Health Education Practicum. 1-6 Hours.
Semester course; 1 lecture and 4 laboratory hours. 1-6 credits. Preparation, presentation and evaluation of selected educational experiences in the appropriate graduate program. Section 801: general; Section 802: nurse anesthesia; Section 803: clinical laboratory science.

ALHP 596. Supervisory and Administrative Practicum in Allied Health Clinics. 1-9 Hours.
Semester course; 60 clinical hours per credit. 1-9 credits. Prerequisite: Permission of instructor. The 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 implementation of quality control programs. Section 01: Clinical Laboratory Sciences Section 02: Physical Therapy.

ALHP 701. Health Services Delivery Systems. 3 Hours.
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. 3 Hours.
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. 3 Hours.
Semester course; 3 credits. Applies the principles of biomedical 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. 3 Hours.
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. 3 Hours.
Semester course; 3 credits. Examines fundamentals of allied health grant writing and proposal preparation in the health related sciences, including funding source determination, responding to an RFP, basic elements of a proposal, proposal review procedures and allocation processes. Requires development of a complete proposal and critique of existing proposals.

ALHP 718. Health Informatics. 3 Hours.
Semester course; 3 credits. Analyzes 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. 3 Hours.
Semester course; 3 credits. Examines basic concepts and techniques of statistical methods, enabling individuals to conduct scientific inquiry as well as critical appraisal of the scientific literature. Includes 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 761. Health Related Sciences Research Design. 3 Hours.
Semester course; 3 credits. Covers the design of experimental and quasi-experimental studies in the health-care field. Emphasizes issues related to measurement, validity of designs, sampling and data collection. Focuses on the logic of causal inference, including formulation of testable hypotheses, and the design, methods and measures that facilitate research.

ALHP 762. Multivariate Statistical Methods for Health Related Sciences Research. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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. 1-6 Hours.
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. 3 Hours.
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. 3 Hours.
Semester course; 3 credits. Deals with general purpose, content and functions of the dissertation process related to the student's specialty track. Leads to the preparation of dissertation proposal.

ALHP 899. Dissertation Research. 1-9 Hours.
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.

AMERICAN STUDIES (AMST)

AMST 195. Richmond. 1 Hour.
15 contact hours. 1 credit. A series of mini-courses dealing with aspects of Richmond's literary and historical importance from the city's beginning to the present.

AMST 391. Topics in American Studies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated once for credit. Selected issues or problems in American civilization with materials drawn from such areas as history, the social sciences, philosophy, literature, the arts and mass communications.

AMST 394. Perspectives in American Studies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: 6 credits in American-related courses. An introduction to the methods, significant works and major trends in American studies. May be taken for American literature credit by English majors. May not be used to satisfy the literature requirement of the College of Humanities and Sciences.

ANATOMY AND NEUROBIOLOGY (ANAT)

ANAT 301. Head and Neck Anatomy for Dental Hygienists. 3 Hours.
2 lecture and 1 seminar hours. 3 credits. 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). 2 Hours.
8-week course; 3 lecture and 1 laboratory hours. 2 credits. A lecture course in the microscopic anatomy of the cells and tissues relevant to the oral cavity.

ANAT 501. Dental Gross Anatomy. 6.5 Hours.
Semester course; 4 lecture and 3 laboratory hours. 6.5 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). 5 Hours.
Semester course; 44 lecture and 88 laboratory hours. 5 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. Dental Neuroanatomy. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Through this course, students will develop broad-level knowledge of neuroanatomical structures and principles and the role of the nervous system. Dental clinical correlations will be used to illustrate the future clinical necessity for and application of this scientific background.

ANAT 505. Principles of Human Anatomy (Pharmacy). 3 Hours.
Semester course; 2.5 lecture and 1.5 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 525. Advanced Functional Anatomy (Occupational Therapy). 5 Hours.
Semester course; 3 lecture and 4 laboratory hours. 5 credits. 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. Enrollment requires admission to the M.S.O.T. program.

ANAT 608. Functional and Clinical Neuroanatomy. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Survey of the basic morphological and functional aspects of the mammalian nervous system, with emphasis on functionally and clinically relevant neuroanatomical concepts.

ANAT 609. Gross Anatomy. 5 Hours.
Semester course; 3 lecture and 4 laboratory hours. 5 credits. Macroscopic study of the human body, with clinical correlations, dissection and pro-section sessions.

ANAT 610. Systems Neuroscience. 4 Hours.
Semester course; 4 lecture hours. 4 credits. A study the neural circuits and function of systems in the central nervous system. Topics include sensory perception and integration, neural control of reflexes and voluntary movement, as well as a neural-systems approach to understanding certain diseases.

ANAT 611. Histology. 5 Hours.
Semester course; 4 lecture and 2 laboratory hours. 5 credits. A study of the basic light and electron microscopic structure of cells, tissues, and organs. Emphasis on correlating structure with function.

ANAT 612. Human Embryology. 2 Hours.
3-week course. 2 credits. Lectures present an overview of human embryology covering fertilization, implantation and the early stages of embryogenesis. Major organ systems including the gastrointestinal, cardiovascular and urogenital are covered, as well as the development of the limbs, pharynx, face and skull. In addition, students prepare a report on a selected topic in embryology affecting human health.

ANAT 613. Advanced Studies in Anatomy. 1-6 Hours.
1-6 credits. An in-depth study in specific areas of anatomy: histology, gross anatomy, and neuroanatomy.

ANAT 615. Techniques in Neuroscience and Cell Biology. 3 Hours.
Semester course; 4 lecture/lab hours. 3 credits. Recommended preparation: BIOC 503-504 or equivalent. Designed to provide in-depth coverage of techniques commonly used in neuroscience and cell biology. Topics include tissue processing for light and electron microscopy, immunocytochemistry, laser confocal microscopy, protein purification and analysis, molecular approaches to the study of the nervous system, genetic manipulation of protein expression, gene arrays, transgenic and knockout animal modes, and electrophysiological techniques including single and multi-unit extracellular recording, sharp intracellular recording and patch clamp recording. Consists of one two-hour meeting per week. Graded as Pass/Fail.

ANAT 617. Developmental Neurobiology. 4 Hours.
Semester course; 4 lecture hours. 4 credits. Prerequisite: permission of instructor. Designed to expose students to the fundamental mechanisms underlying the development of the central nervous system, including patterning, birth and death of neurons, axon guidance, formation, maintenance and plasticity of synaptic connections, and glial biology. Emphasis will be on the cellular and molecular aspects of these topics. The course consists of one meeting a week devoted to lectures (two one-hour lectures) and a second meeting devoted to a student-led discussion of scientific papers (two one-hour discussion meetings).

ANAT 620. Scientific Writing and Grantsmanship. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Lectures present an overview of preparation for writing scientific manuscripts and grant proposals. Emphasis is placed on putting methods of writing into practice. Students will submit written samples to be discussed and critiqued each week. Special sessions on manuscript and grant review processes are included, as well as instruction on how to best utilize electronic and library resources. Graded as Pass/Fail.

ANAT 630. Research Presentations. 1 Hour.
Semester course. 1 credit. Weekly research presentations by master's and doctoral students that focus on the students' ongoing research. Course provides a weekly forum for students to develop presentation skills and foster scientific discussion among students and faculty. Graded as Pass/Fail.

ANAT 690. Anatomy and Neurobiology Seminar. 1 Hour.
1 lecture hour. 1 credit. A course consisting of faculty and student-led seminars presenting current research in neurobiology, immunobiology, and reproductive biology. Graded as S/U/F.

ANAT 691. Special Topics in Anatomy. 1-4 Hours.
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 concentrated emphasis on a particular area of research.

ANAT 697. Directed Research. 1-15 Hours.
1-15 credits. Research leading to the M.S. or Ph.D. degree and elective research projects for other students.

ANTHROPOLOGY (ANTH)

ANTH 103. Introduction to Anthropology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A general survey of anthropology with emphasis on learning about and from global cultures, and on the four fields of anthropology. Crosslisted as: INTL 103.

ANTH 105. Introduction to Archaeology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of archaeological sites, methods and theories from around the world, from the earliest human cultures, to the rise and spread of civilizations, to the modern era. Crosslisted as: INTL 104.

ANTH 200. Introduction to African Societies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course introduces the student to the African continent, its peoples and cultures. It covers such general characteristics as the physical and geographical features, climate, topography, traditional economies, languages, religions, social systems and other cultural features that are traditional to its people. Crosslisted as: AFAM 200/INTL 200.

ANTH 210. Biological Anthropology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ANTH/INTL 103. Explores the disciplinary subfield of biological anthropology. Emphasis on the history and study of humans as biological organisms. Topics include genetic, social and ecological determinants of variation in human growth and biological diversity, as well as human adaptation and adaptability, disease, diet, and nutrition.

ANTH 220. Cultural Anthropology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ANTH/INTL 103. Explores the disciplinary subfield of social and cultural anthropology. Provides an overview of key themes and theories in the subject, as well as the analytical and methodological tools to critically consider cultural difference, social organization and social change, with reference to a representative range of culture areas and the empirical fields studied by cultural anthropologists.

ANTH 230. Anthropological Linguistics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ANTH/INTL 103. Explores the disciplinary subfield of anthropological linguistics. Emphasis is on the interactions between language and culture from a comparative perspective, as well as the relationship between language and social identities and relationships. Also an introduction to the field's methodology, research techniques, analytical tools and their applications.

ANTH 301. Human Evolution. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 200 or HONR 200 with a minimum grade of C. Introduces the range of human diversity as well as a broad understanding of evolution and evolutionary biology, particularly as it applies to hominid evolution. Specific topics include basic genetics, primatology, paleontology, and growth and development. Crosslisted as: BIOL 341.

ANTH 302. Archaeological Theory. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ANTH 105/INTL 104 and UNIV 200 or HONR 200 with a minimum grade of C. Covers the basic theoretical perspectives and tools of archaeology, including analysis and interpretation of archaeological materials. Students will review the intellectual history of archaeology, applying a variety of theoretical approaches to archaeological data sets and sites.

ANTH 303. Archaeological Methods and Research Design. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ANTH 105/INTL 104 and UNIV 200 or HONR 200 with a minimum grade of C. Introduces the basic practices of archaeology, including planning, excavation, artifact analysis, documentary research, mapping, dating sites and artifacts, and interpretation and presentation of findings. Students will participate in an active field research program and will apply methods at an active site and lab.

ANTH 304. Sociology of Families. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 101 or ANTH 103/INTL 103. The family in its social and cultural context. Analysis of child rearing, marriage, kinship, family crises and family change in various societies around the world. Crosslisted as: SOCY 304/GSWS 304.

ANTH 307. Human Osteology. 4 Hours.
Semester course; 3 lecture and 2 laboratory hours. 4 credits. Prerequisite: ANTH 210. Corequisite: ANTZ 307. Emphasizes human skeletal development and the identification of specific bones and their anatomical landmarks, including the determination of side for paired bones. Also discussed are methods of estimating age, sex and stature from human skeletal remains and application of human skeletal data to broader anthropological questions.

ANTH 309. Global Women's Health. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Explores issues in women's health from a national and international perspective with an emphasis on the experiences of women in the African diaspora. Theories in medical anthropology are employed to examine key themes. Crosslisted as: AFAM 309/INTL 309/GSWS 309.

ANTH 310. Forensic Anthropology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ANTH 210 with a minimum grade of C. A comprehensive overview of forensic anthropology including its development and the theory and methodology on which it is based. Crosslisted as: FRSC 310.

ANTH 312. History of Human Settlement. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A cultural and historical geography of human migration and settlement over the earth. Topics may include agricultural and urban systems, exploration, colonization and imperialism, and changing relationships with the environment, during and since the Middle Ages. Crosslisted as: URSP 312.

ANTH 315. Field Methods and Research Design in Cultural Anthropology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ANTH/INTL 103, and ANTH 220 or ANTH 230. Overview of quantitative and qualitative anthropological field techniques as well as the ethical dimension of anthropological fieldwork. Basics of research design, effective methodology and writing grant proposals.

ANTH 328. Language, Culture and Cognition. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ANTH 220 or 230. Introduces theoretical and methodological foundations for the study of language from sociocultural perspectives. The perspectives include linguistic, philosophical, psychological, sociological and anthropological contributions to the understanding of verbal and nonverbal communication as a social activity embedded in cultural contexts. No prior training in linguistics is presupposed. Crosslisted as: FRLG 328/ENGL 392/LING 392.

ANTH 330. Language and Prehistory. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ANTH 230, ANTH/ENGL/LING 390 or ANTH/ENGL 392. Considers the basic principles of diachronic linguistics in terms of the questions that historical linguists ask and the kinds of data they have at their disposal to answer them. Discusses uses of linguistic data in the reconstruction of prehistory in different parts of the world, analyzing strengths and weaknesses of such data and suggesting ways in which it can be usefully combined with data from other disciplines.

ANTH 331. Public Culture: Anthropology Through Film. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ANTH/INTL 103; WRLD 230. Explores how anthropology can contribute to a critical analysis of films as cultural representations. Class discussion will relate particular films both to the cultural context they depict and to the cultural context in which they were produced. Will also examine films as images that produce cultural meanings with the potential to affect the viewer's understanding of the world and comprehension of self.

ANTH 348. South American Ethnography. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ANTH/INTL 103 and UNIV 200 or HONR 200 with a minimum grade of C. General ethnographic survey of both highland and lowland indigenous cultures of South America and cultural changes as a result of European contact. Crosslisted as: INTL 348.

ANTH 349. Rethinking a Continent: Latin America. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ANTH/INTL 103 and UNIV 200 or HONR 200 with a minimum grade of C. This course surveys contemporary cultures of Latin America. It addresses historical sociocultural developments from an anthropological perspective and introduces concepts from social justice studies, development anthropology and applied anthropology. Crosslisted as: INTL 349.

ANTH 350. Rethinking a Continent: Europe. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ANTH/INTL 103 and UNIV 200 or HONR 200 with a minimum grade of C. A survey of historical sociocultural developments from an anthropological perspective with an emphasis on integrative and disintegrative forces that have shaped cultures and identities in Europe. Introduces concepts from sociocultural anthropology, social justice studies and applied anthropology. Crosslisted as: INTL 350.

ANTH 355. Death and Burial. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ANTH 103 or ANTH 105. Explores beliefs about the dead across time and space, the transformations physical bodies undergo after death and how archaeologists investigate human remains to interpret the beliefs and social practices of past cultures.

ANTH 364. Mythology and Folklore. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. A study of one or more forms of folklore, such as folktales, fairy tales, legends, myths, proverbs, riddles, ballads and/or games, with some attention to literary, social or historical significance and contexts. This course may also include approaches to collecting material or to examining later literary forms and texts inspired by folklore. Crosslisted as: ENGL 364.

ANTH 375. Field Archaeology. 6 Hours.
Semester course; 3 lecture and 8 field and laboratory hours. 6 credits. Introduction to archaeological field and basic laboratory techniques. Archaeological data collection (excavation or survey) forms the core of the course.

ANTH 380. Medical Anthropology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ANTH 210 or 220. An introduction to the biological and cultural anthropological study of global health and well-being, including healing processes, the biosocial relations of healing management and relationships between biomedicine and pluralistic medical systems.

ANTH 381. Modern Identities: Nation Building. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Critically explores how nation building and national identities have developed over the past two centuries among peoples across the globe. Class discussions will examine theoretical perceptions of these processes and focus on how they shaped and shape realities in different times and places. Crosslisted as: INTL 381.

ANTH 383. Evolutionary Medicine and Anthropology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ANTH 210, BIOL 101 or BIOL 151. Explores how modern human health and disease have been shaped by evolutionary processes. Particular emphasis is placed on examining health-related traits that are adaptive in one context but maladaptive in others, and why attempts to eliminate some of these traits can have deleterious effects on other aspects of our health. Specific diseases to be addressed include hypertension, diabetes, clinical depression, reproductive disorders, gastrointestinal disorders and drug addiction, among many others.

ANTH 387. Environmental Archaeology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ANTH 103 or ANTH 105. Provides an introduction to the kinds of environmental evidence archaeologists access and the kinds of questions they investigate using that evidence. Explores a variety of ways in which archaeologists examine the relationship between humans and the environment and the sorts of effects that different environmental conditions and changes have had on ancient societies.

ANTH 388. African Archaeology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ANTH 103 or ANTH 105. Surveys the range of archaeological knowledge currently available about the African continent, highlighting the major interrelated social, economic/technological and cultural transformations in the African past and the most important archaeological sites and discoveries there. Addresses themes of Africa’s enduring connections with the rest of the world, unique patterns of social and cultural development found on the continent, relations between African societies and their environments, and the contemporary significance of the continent’s cultural heritage.

ANTH 389. World Archaeology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ANTH 103 or ANTH 105. Examines the diversity and evolution of human cultures through archaeological practices and techniques.

ANTH 390. Introduction to Linguistics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. An introduction to methods of language analysis, emphasizing the study of sounds and sound patterns, and units of meaning and their arrangements. Crosslisted as: ENGL 390/LING 390.

ANTH 391. Topics in Anthropology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Maximum 6 credits per semester; maximum total of 18 credits in departmental topics courses that may be applied to the major. Prerequisite: ANTH/INTL 103. Seminar on current specialized areas of anthropological interest. See the Schedule of Classes for specific topics to be offered each semester.

ANTH 394. Historical Archaeology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ANTH/INTL 103 or ANTH 105/INTL 104, and any history course. A review of historical archaeology, recognizing its contemporary emphasis on the spread of European cultures across the globe beginning in the 15th century. Methods and findings of archaeological research from the United States, Europe and Africa will be covered with special emphasis on the study of documents and artifacts related to the emergence and present state of the modern world. Students will participate in field research.

ANTH 398. Field Investigations in Anthropology. 1-8 Hours.
Semester course; variable hours. 1-8 credits. May be repeated for a maximum of 8 credits. Permission of instructor required. A course involving travel and/or study in an off-campus context. Intended primarily for students participating in directed study abroad programs, the course meets the experiential learning requirement for the anthropology major.

ANTH 399. Junior Seminar. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisites: ANTH 210, 220 or 230; and junior standing. Focuses on self-assessment, compilation of a portfolio and curriculum vitae, career and graduate school preparation, and lifelong application of skills and knowledge acquired in the program. Students will critically assess their experience in the anthropology program.

ANTH 403. Primatology. 4 Hours.
Semester course; 3 lecture and 2 laboratory hours. 4 credits. Prerequisite: ANTH 210 or ANTH 301/BIOL 341. Primatology investigates the taxonomic relationships among primates through comparative anatomy, comparative behavior and comparative biochemistry. Study of primate evolution, demography, subsistence, reproduction, social organization, communication systems and ecology. Crosslisted as: BIOL 403.

ANTH 415. Economic Anthropology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides an overview of the anthropological approach to the "economic" in social life. Analyzes the role played by systems of reciprocity and exchange in ethnographic contexts. Concepts employed by anthropologists in the study of traditional subsistence economies are used to examine modern industrialized societies. Crosslisted as: INTL 415.

ANTH 416. The Origin and Evolution of the Idea of Race. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ANTH/INTL 103 or AFAM 103 or permission of instructor. This course is an exploration of the origins and social history of the "idea" of race from the Middle Ages to the end of the 20th century. Using both historical and anthropological scholarship, the course presents an analytical framework for race as a sociocultural phenomenon. Crosslisted as: AFAM 416.

ANTH 420. Women of Africa. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ANTH/INTL 103 or AFAM 103. This course looks at the traditional roles of women in African societies and examines how women have coped in different environments. It focuses on the institutionalized aspects of similarities and differences in women's lives in pastoral and horticultural societies and those with mixed economies, and will contrast these with women's roles in large state societies of Africa and in the modern urbanized context. Crosslisted as: AFAM 420/INTL 420.

ANTH 425. Religion, Magic and Witchcraft. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ANTH/INTL 103 and UNIV 200 or HONR 200 with a minimum grade of C. A survey of the nature and variety of beliefs outside of the major streams of religious thought. Among topics considered are myth, totemism, taboo and sorcery. Emphasis on understanding supernatural beliefs and practices in relation to culture and society. Crosslisted as: RELS 425/INTL 425.

ANTH 430. Visualizing and Exhibiting Anthropology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ANTH 103 and 105; and ANTH 302, ANTH 303, ANTH 355 or ANTH 389. Addresses the ability to visualize the knowledge gathered by anthropologists through forms of technology such as three-dimensional artifact scanning and 3D printing. Students will use the hundreds of objects scanned by archaeologists and ethnographers across the globe, including in VCU's Virtual Curation Laboratory, to design dynamic hands-on and virtual exhibits and activities that communicate multiple perspectives on the human condition and that are designed to stimulate and provoke multiple reactions and encourage discussion.

ANTH 450. Cross-cultural Communication. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. A study of the dynamics of cross-cultural communication that applies linguistic tools to understanding cultural issues and solving communication problems. Crosslisted as: ENGL 454/INTL 454.

ANTH 454. Theory in Cultural Anthropology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ANTH 220 or ANTH 230, and at least one 3-credit 300-level ANTH course . A study of the connections between theoretical work that addresses understandings of culture and methodological practice centered on creating ethnography.

ANTH 455. Anthropology of Development and Globalization. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: INTL 101. May be taken for a maximum of nine credit hours in three different world areas. Consists of a global study of the developing Third World with particular emphasis on rural populations, subsistence farmers, indigenous groups and small entrepreneurs. Focuses on development and globalization while providing insights into the peasantry as a class, women in peasant societies, changes in peasant societies and the peasantry as a player in the policies of the modern state. Crosslisted as: INTL 455.

ANTH 457. Comparative Perspectives on Cultures and Societies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ANTH/INTL 103; UNIV 200 or HONR 200. Examination of the theoretical, methodological and ethical problems that arise from anthropological comparisons of cultures. Crosslisted as: INTL 457.

ANTH 469. Human Dentition: ID and Anthropology. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Prerequisites: ANTH 103 and ANTH 210; or ANTH 301; or BIOL 318. Focuses on the evolutionary anthropology of human dentition. Topics include evolution, genetics and ontogeny of the dentition; functional aspects of tooth size and shape; dental asymmetry; dental morphology and population affinities; dental pathology and subsistence; and dental markers of physiological stress. Students will explore within- and between-group variation, as well as the relationship between dental size and shape and behavior, relatedness and nutrition.

ANTH 490. Anthropology Senior Capstone. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: completion of 15 credits in anthropology at the 300 and 400 level or the equivalent; senior standing. Open only to anthropology majors. Explores current research that transects more than one subfield of anthropology. Research foci will be at the discretion of the instructor, but students will explore how the anthropological subfields influence and speak to each other in new translational research, and will assess the emerging literature and scientific questions with a critical and scientific perspective.

ANTH 491. Advanced Topics in Anthropology. 1-3 Hours.
Semester course; variable hours. 1-3 credits. Maximum 6 credits per semester with different topics.Prerequisites: ANTH/INTL 103; ANTH 210, 220, or 230; and UNIV 200 or HONR 200. Seminar on current specialized areas of anthropological interest. See the Schedule of Classes for specific topics to be offered each semester. A maximum total of 18 credits in departmental topics courses (including ANTH 391 and 491) may be applied to the major.

ANTH 492. Independent Study. 1-6 Hours.
Semester course; variable hours. Variable credit. Maximum of 6 credits per semester; maximum total of 12 credits for all independent study and internship courses. Prerequisites: determination of the amount of credit and permission of the instructor and the group coordinator must be procured prior to enrollment in the course; a minimum GPA of 3.0 in the major. Generally open only to students of junior or senior standing who have acquired at least 12 credits in the anthropology program.

ANTH 493. Anthropology Internship. 1-3 Hours.
Semester course; variable hours. 1-3 credits (40 clock hours per credit). May be repeated for a maximum of 6 credits for majors and 3 credits for minors. Prerequisites: completion of 9 credits in anthropology courses at the 300 level or above, and permission of the internship coordinator. Student must be in good academic standing with a minimum major GPA of 2.25. Designed for the advanced student to gain workplace experience in a local, national or international business or agency offering opportunities in anthropological field methods or research.

ANTH 497. Honors in Anthropology. 3 Hours.
Continuous courses; 3 lecture hours. 3-3 credits. ANTH 497 is a prerequisite for ANTH 498. Design and completion of a long-term research project in the major. The thesis project is the culmination of an advanced course of study within the anthropology program. Under the supervision of a faculty mentor, students must demonstrate a thorough understanding and use of anthropological research techniques and analysis, a knowledge of relevant literature, and sophisticated writing and research abilities. Students must apply to program for participation in honors thesis work. See Bulletin for eligibility criteria and application procedure.

ANTH 498. Honors in Anthropology. 3 Hours.
Continuous courses; 3 lecture hours. 3-3 credits. ANTH 497 is a prerequisite for ANTH 498. Design and completion of a long-term research project in the major. The thesis project is the culmination of an advanced course of study within the anthropology program. Under the supervision of a faculty mentor, students must demonstrate a thorough understanding and use of anthropological research techniques and analysis, a knowledge of relevant literature, and sophisticated writing and research abilities. Students must apply to program for participation in honors thesis work. See Bulletin for eligibility criteria and application procedure.

ANTH 551. Anthropology for the Museologist. 3 Hours.
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. Historical and Cultural Landscapes. 3 Hours.
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. Crosslisted as: ENVS 556.

ANTHROPOLOGY LAB (ANTZ)

ANTZ 301. Human Evolution Lab. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Corequisite: BIOL 341/ANTH 301. Laboratory exercises correlated with BIOL 341/ANTH 301. Exercises emphasize comparative primate and fossil anatomy, morphology and behavior, as well as practice in recognizing and applying evolutionary principles in human evolution. Crosslisted as: BIOZ 341.

ANTZ 303. Archaeological Methods and Research Design Lab. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Corequisite: ANTH 303. Laboratory exercises correlated with ANTH 303. Exercises emphasize practical applications of describing, cataloging and analyzing artifacts and faunal and floral remains from archaeological excavations.

ANTZ 307. Human Osteology Lab. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Corequisite: ANTH 307. Laboratory exercises correlated with ANTH 307. Exercises will emphasize practical description and identification of human bones and bony morphology, as well as associated soft tissue structures.

ANTZ 403. Primatology Lab. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Corequisite: ANTH 403/BIOL 403. Laboratory exercises correlated with ANTH 403/BIOL 403. Exercises will emphasize comparative studies of morphology, behavior and social systems between and among primate groups, as well as the evolution of these characteristics in extant species and populations.

APPLIED LESSONS (APPL)

APPL 200. Applied Lessons. 1 Hour.
Semester course; half-hour weekly private lesson plus daily practice. 1 credit. May be repeated for a total of 8 credits. Previous experience and ability to read music required. Additional fee for course required. Private applied lessons for musical instruments. Consult the music department for appropriate section.

APPL 310. Applied Lessons. 2 Hours.
Semester course; one-hour weekly private lesson plus daily practice. 2 credits. May be repeated for a total of 8 credits. For music majors only. Permission of chair required. Applied lessons for principal performing medium. Consult the music department for appropriate section.

APPL 311. Applied Lessons. 2 Hours.
Semester course; one-hour weekly private lesson plus daily practice. 2 credits. For music majors only. Corequisite: APPM 299 (excpet jazz studies majors). Applied lessons for principal performing medium proficiency Level I. Jury required. Consult adviser for appropriate course and section.

APPL 312. Applied Lessons. 2 Hours.
Semester course; one-hour weekly private lesson plus daily practice. 2 credits. For music majors only. Prerequisite: APPL 311 with a minimum grade of C. Corequisite: APPM 299 (except jazz studies majors). Applied lessons for principal performing medium proficiency Level II. Jury required. Consult adviser for appropriate course and section.

APPL 313. Applied Lessons. 2 Hours.
Semester course; one-hour weekly private lesson plus daily practice. 2 credits. For music majors only. Prerequisite: APPL 312 with a minimum grade of C. Corequisite: APPM 299 (except jazz studies majors). Applied lessons for principal performing medium proficiency Level III. Jury required. Consult adviser for appropriate course and section.

APPL 314. Applied Lessons. 2 Hours.
Semester course; one-hour weekly private lesson plus daily practice. 2 credits. For music majors only. Prerequisite: APPL 313 with a minimum grade of C. Corequisite: APPM 299 (except jazz studies majors). Applied lessons for principal performing medium proficiency Level IV. Jury required. Consult adviser for appropriate course and section.

APPL 320. Applied Lessons Secondary Instrument. 1 Hour.
Semester course; half-hour weekly private lesson plus daily practice. 1 credit. May be repeated for a total of 4 credits. Open to music majors only. Private applied lessons for secondary instrument requirement. Consult music department for appropriate section.

APPL 321. Applied Lessons Secondary Instrument. 2 Hours.
Semester course; one-hour weekly private lesson plus daily practice. 2 credits. Open to music majors only. Corequisite: APPM 299. Applied lessons for secondary performing medium proficiency Level I. Jury required. Consult adviser for appropriate course and section.

APPL 322. Applied Lessons Secondary Instrument. 2 Hours.
Semester course; one-hour weekly private lesson plus daily practice. 2 credits. Open to music majors only. Prerequisite: APPL 321 with a minimum grade of C. Corequisite: APPM 299. Applied lessons for secondary performing medium proficiency Level II. Jury required. Consult adviser for appropriate course and section.

APPL 323. Applied Lessons Secondary Instrument. 2 Hours.
Semester course; one-hour weekly private lesson plus daily practice. 2 credits. Open to music majors only. Prerequisite: APPL 322 with a minimum grade of C. Corequisite: APPM 299. Applied lessons for secondary performing medium proficiency Level III. Jury required. Consult adviser for appropriate course and section.

APPL 324. Applied Lessons Secondary Instrument. 2 Hours.
Semester course; one-hour weekly private lesson plus daily practice. 2 credits. Open to music majors only. Prerequisite: APPL 323 with a minimum grade of C. Corequisite: APPM 299. Applied lessons for secondary performing medium proficiency Level IV. Jury required. Must earn a minimum grade of C. Consult adviser for appropriate course and section.

APPL 415. Applied Lessons. 2 Hours.
Semester course; one-hour weekly private lesson plus daily practice. 2 credits. For music majors only. Prerequisite: APPL 314 with a minimum grade of C. Corequisite: APPM 299. Applied lessons for principal performing medium proficiency Level V. Jury required. Consult adviser for appropriate course and section.

APPL 416. Applied Lessons and Junior Recital. 2 Hours.
Semester course; one-hour weekly private lesson plus daily practice. 2 credits. For music majors only. Prerequisite: APPL 415 with a minimum grade of C. Corequisite: APPM 299. Applied lessons for principal performing medium proficiency Level VI. Recital required. Consult adviser for appropriate course and section.

APPL 417. Applied Lessons. 2 Hours.
Semester course; one-hour weekly private lesson plus daily practice. 2 credits. For music majors only. Prerequisite: APPL 416 with a minimum grade of C. Corequisite: APPM 299. Applied lessons for principal performing medium proficiency Level VII. Jury required. Consult adviser for appropriate course and section.

APPL 418. Applied Lessons and Senior Recital. 2 Hours.
Semester course; one-hour weekly private lesson plus daily practice. 2 credits. For music majors only. Prerequisite: APPL 417 with a minimum grade of C. Corequisite: APPM 299. Applied lessons for principal performing medium proficiency Level VIII. Recital required. Must earn a minimum grade of C. Consult adviser for appropriate course and section.

APPLIED MUSIC (APPM)

APPM 126. Keyboard Skills Applied Lesson. 1 Hour.
Semester course; half-hour lesson per week. 1 credit. Repeatable for a maximum total of 3 credits. Open only to music majors. Acquisition of keyboard performance skills with emphasis on sight reading, keyboard harmony and improvisation.

APPM 161. Lyric Diction. 3 Hours.
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisite: completion of APPM 161 to enroll in APPM 162. A study of English, Italian, ecclesiastical Latin, French and German stage diction with practical experience in singing and phonetic transcription using the International Phonetic Alphabet.

APPM 162. Lyric Diction. 3 Hours.
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisite: completion of APPM 161 to enroll in APPM 162. A study of English, Italian, ecclesiastical Latin, French and German stage diction with practical experience in singing and phonetic transcription using the International Phonetic Alphabet.

APPM 173. Keyboard Skills I. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Open only to music majors. Initial placement in course sequence determined by proficiency audition. Acquisition of keyboard performance skills with emphasis on sight reading, keyboard harmony and improvisation.

APPM 174. Keyboard Skills II. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Prerequisite: APPM 173. Open only to music majors. Initial placement in course sequence determined by proficiency audition. Acquisition of keyboard performance skills with emphasis on sight reading, keyboard harmony and improvisation.

APPM 199. Recital/Convocation Attendance. 0 Hours.
Semester course; no credit. Course may be repeated without limit. Music majors only. Attendance at weekly departmental convocations and a minimum of 10 additional concerts or recitals each semester.

APPM 251. Jazz Improvisation I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MHIS 147. A study of basic compositional techniques that can be used in creating a musically effective improvised solo in the jazz medium.

APPM 252. Jazz Improvisation II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: APPM 251. Advanced melodic, harmonic and rhythmic improvisational techniques as applied to contemporary jazz compositions.

APPM 272. Jazz Piano for the Non-keyboard Player. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Prerequisites: APPM 174 and MHIS 147. Acquisition of jazz keyboard performance skills with emphasis on reading, harmonization and improvisation.

APPM 273. Keyboard Skills III. 1 Hour.
Semester course; 2 laboratory hours. 1credit. Prerequisite: APPM 174. Open only to music majors. Initial placement in course sequence determined by proficiency audition. Acquisition of keyboard performance skills with emphasis on sight reading, keyboard harmony and improvisation.

APPM 299. Master Class. 0 Hours.
Semester course; no credit. Course may be repeated without limit. Participation in weekly master classes in student's applied major area.

APPM 309. Applied Composition. 1 Hour.
Semester course; one-hour weekly private lesson. 1 credit. May be repeated for a total of 4 credits. Prerequisite: MHIS 245. For music majors only. A structured approach to composing music from exercises and studies to complex large forms.

APPM 310. Applied Jazz Composition. 1 Hour.
Semester course; one-hour weekly private lesson. 1 credit. May be repeated for a total of 4 credits. Prerequisite: MHIS 245. For music majors only. A structured approach to composing music in the jazz idiom, including small and large ensemble formats.

APPM 350. Vocal Coaching. 1,2 Hour.
Semester course; one-half- or one-hour weekly private lessons plus daily practice. 1 or 2 credits. May be repeated for a total of 12 credits. Restricted to music majors. Corequisite: applied voice. Detailed exploration of historical musical style; diction skills for Italian, French, German, Spanish and English; audition techniques; and dramatic interpretation.

APPM 355. Orchestra. 1 Hour.
Semester course; 3 laboratory hours. 1 credit. May be repeated for a total of 8 credits. Open to music majors or by permission; audition required. Provides an opportunity to rehearse and perform works from the symphonic repertoire while improving ensemble skills.

APPM 356. Symphonic Wind Ensemble. 1 Hour.
Semester course; 3 laboratory hours. 1 credit. May be repeated for a total of 8 credits. Open to music majors or by permission; audition required. Ensemble performs a variety of contemporary wind ensemble repertoire as well as standards. Ensemble performs multiple times throughout the semester and at off-campus events. In addition to rehearsals, weekly one-hour sectionals are required.

APPM 357. University Band. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. May be repeated for a total of 8 credits. Open to all students who play wind or percussion instruments. The class does not require an audition for participation. Ensemble preparation intended for a single performance each semester.

APPM 358. Commonwealth Singers. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. May be repeated for a total of 8 credits. Open to music majors or by permission; audition required. Rehearsals focus on the development of individual and group vocal technique, musicianship and communication relevant to repertoire prepared.

APPM 359. Choral Arts Society. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. May be repeated for a total of 8 credits. A large, nonauditioned chorale open to all university students with choral experience. Ensemble will prepare and perform a variety of choral literature each semester.

APPM 360. Jazz Orchestra. 1 Hour.
Semester course; 3 laboratory hours. 1 credit. May be repeated for a total of 8 credits. Open to music majors or by permission; audition required. Ensemble performs a range of contemporary and historical styles and performs multiple times throughout the semester. In addition to rehearsals, weekly one-hour sectionals are required.

APPM 361. Small Jazz Ensemble. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. May be repeated for a total of 8 credits. Open to music majors or by permission; audition required. Jazz ensembles of typically five to nine players rehearse and prepare existing repertoire and student compositions. Independent problem-solving and ensemble-playing skills developed through weekly rehearsals and coaching.

APPM 362. Accompanying: Piano. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. May be repeated for a total of 2 credits. For piano majors only. The development of skills in piano accompaniment of vocal and instrumental performance. Coaching and guidance will include harmonic voicing, sound coloring, balance issues, pedaling and score reduction.

APPM 363. Flute Choir. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. May be repeated for a total of 8 credits. Open to music majors or by permission. Conducted ensemble rehearses and prepares repertoire.

APPM 364. Guitar Ensemble. 1 Hour.
Semester course; 2.5 laboratory hours. 1 credit. May be repeated for a total of 8 credits. Open to guitar music majors or by permission; audition required. Biweekly rehearsals prepare this ensemble of 20-25 guitarists for performances of repertoire from the Renaissance to newly composed and arranged works.

APPM 365. Aural Skills V. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Prerequisites: MHIS 246. Open to music majors only. Advanced development of skills in melodic and rhythmic dictation, harmonic identification and sight singing.

APPM 366. Aural Skills VI. 1 Hour.
Semester course; 2 laboratory hours. 1credit. Prerequisites: MHIS 246. Open to music majors only. Advanced development of skills in melodic and rhythmic dictation, harmonic identification and sight singing.

APPM 367. Piano Ensemble. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. May be repeated for a total of 8 credits. Open to music majors or by permission; audition required. Small chamber ensemble in which piano shares leading or equal role rehearses and prepares repertoire. Groups will rehearse weekly and receive at least three or four coaching sessions per semester.

APPM 368. Woodwind Ensemble. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. May be repeated for a total of 8 credits. Open to music majors or by permission; audition required. Chamber ensembles of two to 13 players, involving woodwinds and often other instruments. Coached by various music faculty on a weekly basis.

APPM 369. Percussion Ensemble. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. May be repeated for a total of 8 credits. Open to music majors or by permission; audition required. Small ensembles of three to six players rehearse primarily non-conducted repertoire for semester performances. Weekly rehearsals with coaching from instructor designed to address musicianship, chamber ensemble skills, rehearsal technique and familiarity with contemporary performance practices.

APPM 370. Large Ensembles. 1 Hour.
Semester course; 3 laboratory hours. 1 credit. Each section may be repeated up to eight times for credit. An audition is prerequisite for sections 1, 3 and 4. Sections: (1) orchestra, (2) University Band, (3) symphonic wind ensemble, 4) Commonwealth Singers, (5) Choral Arts Society.

APPM 371. String Chamber Music. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. May be repeated for a total of 8 credits. Open to music majors or by permission; audition required. String chamber involving two to five players rehearse and prepare repertoire. Independent problem-solving and ensemble-playing skills are developed through weekly rehearsals and coaching.

APPM 372. Brass Ensemble. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. May be repeated for a total of 8 credits. Open to music majors or by permission; audition required. Chamber ensembles of three to five players, involving various combinations of brass instruments. Coached by various music faculty on a weekly basis.

APPM 373. Advanced Keyboard Skills I. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. For piano majors only. Emphasis is on harmonization with correct style and voice-leading, reading figured bass and lead sheets, improvisation and reducing scores at the keyboard.

APPM 374. Advanced Keyboard Skills II. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Prerequisites: APPM 373 and MHIS 146. Enrollment restricted to piano majors. Emphasis is on harmonization with correct style and voice-leading, reading figured bass and lead sheets, improvisation and reducing scores at the keyboard.

APPM 375. Score Reading. 1 Hour.
Continuous courses; 2 laboratory hours. 1-1 credit. Prerequisites: APPM 274; completion of APPM 375 to enroll in APPM 376. Acquisition of skill in reducing scores at the keyboard, beginning with simple three-part works and progressing to full instrumentation.

APPM 376. Score Reading. 1 Hour.
Continuous courses; 2 laboratory hours. 1-1 credit. Prerequisites: APPM 274; completion of APPM 375 to enroll in APPM 376. Acquisition of skill in reducing scores at the keyboard, beginning with simple three-part works and progressing to full instrumentation.

APPM 377. Vocal Chamber Ensemble. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. May be repeated for a total of 3 credits. Open to music majors or by permission; audition required. Variable sized non-conducted ensembles receive weekly coaching in preparation for performances. Ensembles will seek to build proficiency in musicianship skills, reading ability, performance practices and interpretative technique in a variety of styles.

APPM 378. Women's Choir. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Repeatable to fulfill degree requirements. Open to music majors or by permission; audition required. Ensemble rehearses and prepares repertoire for performance. Women's choir is open to female university students with previous choral experience.

APPM 381. Conducting. 2 Hours.
Semester course; 1 lecture and 2 laboratory hours. 2 credits. Prerequisite: MHIS 246. Development of fundamental gestural skills for conducting instrumental and choral ensembles including simple and compound meters, multimetric music and aleatoric music. Introduces basic score reading, aural analysis skills and terminology.

APPM 385. Opera Theatre. 2 Hours.
Semester course; 1 lecture and 4 studio hours. 2 credits. May be repeated for a total of 16 credits. Permission of instructor required. Explores aspects of opera through study, written research and fully staged public performances of operatic scenes and/or one-act operas.

APPM 390. Small Ensembles. 0.5,1 Hours.
Semester course; 2 or 3 laboratory hours. 0.5 or 1 credit. Each section may be repeated up to eight times for credit. Auditions required for all sections. Sections: (1) ensemble for new music, (2) the madrigalists, (3) collegium musicum, (4) women's chorus, (5) vocal ensembles, (6) piano ensembles, (7) accompanying, (8) percussion ensemble, (9) percussion lab ensemble, (10) woodwind ensembles, (11) brass ensembles, (12) chamber orchestra, (13) string ensembles, (14) guitar ensembles, (15) small jazz ensembles, (16) jazz orchestra I, (17) jazz orchestra II, (18) jazz orchestra III, (19) basketball pep band.

APPM 399. Jazz Master Class. 0.5 Hours.
Semester course; 1 laboratory hour. .5 credit. Prerequisites: APPL 314 and APPM 252. Weekly classes of mixed instrumentation prepare the student with the performance skills for entry into the jazz field. Instructor and peer critique, transcription and analysis, exposure to improvisatory issues.

APPM 463. Pedagogy. 2 Hours.
Semester course; 2 lecture hours. 2 credits. A study of the musical, physiological and psychological aspects of teaching instruments or voice.

APPM 464. Piano Pedagogy Practicum. 2 Hours.
Semester course; 1 lecture and 1 laboratory hour. 2 credits. Prerequisites: MHIS 304 and APPM 463 (piano). An advanced study of piano pedagogy with a supervised teaching component.

APPM 492. Senior Project: Portfolio Review. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisites: APPL 416 for performance majors or APPL 314 for B.A. degree students. Enrollment restricted to students with senior standing and a minimum of 18 credits in 300- or 400-level courses. A capstone experience integrating resume preparation and professional development within the field of music. Documentation of creative activities and achievements accumulated during music studies is compiled for a portfolio review. Graded as Pass/Fail.

APPM 493. Music Internship. 1-4 Hours.
Semester course; Variable hours. 1-4 credits. May be repeated for a maximum of 4 credits. Prerequisites: open to music majors with junior standing, 3.0 GPA in major course work and minimum of 2.5 overall GPA, plus consent of coordinator and department chair. Provides full- or part-time professional field experience with approved organizations/individuals. Areas for the internship include (but are not limited to) music publication and production, arts administration and promotion, arts management, entertainment law, presentations and research, instrument repair, recording techniques, composition and arranging, and/or performance opportunities. Graded as S/U.

APPM 571. Choral Pedagogy. 3 Hours.
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. Score Reading. 1 Hour.
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 576. Score Reading. 1 Hour.
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. 2 Hours.
Semester course; 1 lecture and 4 studio hours. 2 credits. May be repeated up to four times for credit. Prerequisite: Permission of instructor. Explores aspects of opera through study, written research and fully staged public performances of operatic scenes and/or one-act operas.

APPM 663. Advanced Pedagogy. 1 Hour.
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. 0.5,1 Hours.
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. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Physiology of piano playing. Alternative approaches to building and reconstructing technique.

APPM 673. Piano Literature and Performance Practice. 2 Hours.
Semester course; 2 lecture hours. 2, 2 credits. To familiarize the student with a broad repertoire 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 674. Piano Literature and Performance Practice. 2 Hours.
Semester course; 2 lecture hours. 2, 2 credits. To familiarize the student with a broad repertoire 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. 2 Hours.
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. 2 Hours.
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. 0.5,1 Hours.
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) ensemble for new music, (2) the madrigalists, (3) collegium musicum, (4) women's chorus, (5) vocal ensembles, (6) piano ensembles, (7) accompanying, (8) percussion ensemble, (9) percussion lab ensemble, (10) 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. 1-6 Hours.
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.

ARABIC (ARBC)

ARBC 101. Elementary Arabic. 4 Hours.
Continuous courses; 5 lecture/recitation hours. 4-4 credits. Prerequisite: completion of ARBC 101 to enroll in ARBC 102. Elementary grammar, reading, writing and speaking.

ARBC 102. Elementary Arabic. 4 Hours.
Continuous courses; 5 lecture/recitation hours. 4-4 credits. Prerequisite: completion of ARBC 101 to enroll in ARBC 102. Elementary grammar, reading, writing and speaking.

ARBC 201. Intermediate Arabic I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ARBC 102 or the equivalent. Continuation of the essentials of grammar with emphasis on achieving proficiency in aural comprehension, speaking, reading and writing skills.

ARBC 202. Intermediate Arabic II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ARBC 201 or the equivalent. Continuation of the essentials of grammar with emphasis on achieving proficiency in aural comprehension, speaking, reading and writing skills.

ARBC 205. Intermediate Conversation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ARBC 201. Designed to increase student proficiency in the spoken language through audio-oral exercises, dialogues and conversation.

ARBC 301. Arabic Creative Expression. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ARBC 202 or 205. Designed to develop further all language skills: reading, writing, comprehension and speaking. Course is divided into two parts: (a) language skills (grammar, short stories and poetry) and (b) field project (interaction with native speakers). Both parts include lectures, guest speakers and practicing the language with native speakers from the student body and the community at large.

ARBC 391. Topics in Arabic: ____. 1-3 Hours.
Semester course; variable hours. 1-3 credits. Prerequisite: ARBC 202 or equivalent. May be repeated with different topics for a maximum of 9 credits. Conducted in Arabic. An in-depth study of selected topics in Arabic. See the Schedule of Classes for specific topics to be offered each semester.

ART EDUCATION (ARTE)

ARTE 250. Computer Technology in Art Education. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. For art education majors only. The use of computer as a tool for creating electronic imagery, as a filtering mechanism for traditional media and to develop teaching materials for the pre-K through 12th-grade classroom. The course includes an introduction to presentation technology, digital imaging and Web page design. Ethical and copyright issues related to new technologies will be addressed.

ARTE 301. Art for Elementary Teachers. 3 Hours.
Continuous courses; 1 lecture, 1 seminar and 2 studio hours. 3-3 credits. Prerequisite: completion of ARTE 301 to enroll in ARTE 302. The nature of art and its function in the lives of individuals and society is considered in addition to materials and methods for guiding the visual expression of children.

ARTE 302. Art for Elementary Teachers. 3 Hours.
Continuous courses; 1 lecture, 1 seminar and 2 studio hours. 3-3 credits. Prerequisite: completion of ARTE 301 to enroll in ARTE 302. The nature of art and its function in the lives of individuals and society is considered in addition to materials and methods for guiding the visual expression of children.

ARTE 310. Foundations of Art Education. 3 Hours.
Semester course; 3 lecture hours. 3 credits. For art education majors only or by approval of the department chair. An examination of art education within the curricular structure of educational programs and the developmental growth of children. Students will explore the historical, philosophical and sociological foundations of art in education, including art education's development and current roles.

ARTE 311. Art Education Curriculum and Instructional Procedures. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: ARTE 310. For art education majors only. A study of the principles of learning, instruction and curriculum in art education programs. Students will develop teaching competencies through micro-teaching experiences, analysis of instructional methods and writing units of study.

ARTE 401. Art Education Elementary Materials and Practicum. 4 Hours.
Semester course; 3 lecture and 3 studio hours. 4 credits. Prerequisites: UNIV 200 or HONR 200, admission to the art teacher preparation program and completion of ARTE 311. For art education majors only or by the approval of the department chair. A preparatory experience with observation and participation in art programs in elementary grades prior to student teaching. This course explores art materials, techniques and teaching methods suitable for this level; and analyzes evaluation strategies appropriate for art.

ARTE 402. Art Education Secondary Materials and Practicum. 4 Hours.
Semester course; 3 lecture and 3 studio hours. 4 credits. Prerequisites: admission to the art teacher preparation program and completion of ARTE 311. For art education majors only or by approval of department chair. A preparatory experience with observation and participation in art programs in middle school, secondary school and nontraditional settings prior to student teaching. This course explores art materials and techniques suitable for these levels, examines developmental performance levels and analyzes evaluation methods appropriate for art. Writing intensive.

ARTE 404. Clinical Internship Seminar. 1 Hour.
Semester course; 1 seminar hour. 1 credit. Corequisites: TEDU 485 and 486. For art education majors only. Capstone experience. A seminar concurrent with clinical internship (student teaching) that gives students an opportunity to discuss and evaluate their progress in teaching assignments and other related activities.

ARTE 407. Photography in Art Education. 3 Hours.
Semester course; 1 lecture and 2 studio hours. 3 credits. A general introduction to the technical, theoretical and historical issues related to photography. Taught as a seminar and workshop teaching both digital and traditional camera functions, photographic terms, concepts, history, technique and alternative processes applicable to K-12 education.

ARTE 408. Two-dimensional Art Experiences. 3 Hours.
Semester course; 1 seminar and 4 studio hours. 3 credits. Open to art education majors only. Students will explore the two-dimensional traditional and emerging media that are relevant to teaching. The focus will be contemporary methods and conceptual approaches to visual meaning-making.

ARTE 409. Three-dimensional Art Experiences. 3 Hours.
Semester course; 1 seminar and 4 studio hours. 3 credits. Open to art education majors only. Students will explore the three-dimensional traditional and emerging media that are relevant to teaching. The focus will be contemporary methods and conceptual approaches to visual meaning-making.

ARTE 450. Art for the Exceptional Student. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: ARTE 311. For art education majors only. A study of the unique characteristics of exceptional students as related to involvement in the arts. The course examines disabled, aged, gifted, talented and other exceptional learners, and may include practicum and field experiences.

ARTE 491. Special Topics. 3 Hours.
Semester course; variable hours. Variable credit. May be repeated for a maximum of 9 credits with different content. A seminar and/or workshop offered on a variety of art education issues not included in the regular curriculum. See the Schedule of Classes for specific topics to be offered each semester.

ARTE 492. Independent Study. 1-6 Hours.
Semester course; variable hours. 1-6 credits per semester. May be repeated for a maximum total of 6 credits. Prerequisites: consent of department chair and instructor. Offered to art education majors only. This course will be limited to those few students who have demonstrated an exceptional level of ability and intense commitment to a particular area.

ARTE 493. Internship. 1-6 Hours.
Semester course; variable hours. 1-6 credits. May be repeated for a maximum total of 6 credits. Consent of department chair required. Offered to art education majors only. This service-learning course is designed to encourage students to seek internships with organizations that lead to research in art education and deepen engagement with diverse communities. Students must secure departmental approval for internships the semester prior to registration. International internships must register with the Education Abroad office.

ARTE 494. International Field Experience. 1-6 Hours.
Semester course; variable hours. 1-6 credits. Education Abroad application and consent of instructor required. Open to all students. This course is designed to facilitate student interactions with arts organizations in international settings that lead to research in art education and deepen engagement with diverse communities.

ARTE 501. Art Education Elementary Materials and Practicum. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: admission to the art teacher preparation program. A preparatory experience with observation and participation in art programs in elementary grades prior to student teaching. This course explores art materials, techniques and teaching methods suitable for this level and analyzes evaluation strategies appropriate for art.

ARTE 502. Art Education Secondary Materials and Practicum. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: admission to the art teacher preparation program. A preparatory experience with observation and participation in art programs in middle school, high school or nontraditional settings prior to student teaching. This course explores art materials and techniques suitable for these levels, examines developmental performance levels and analyzes evaluation methods appropriate for art.

ARTE 508. Two-dimensional Art Experiences. 3 Hours.
Semester course; 2 seminar and 3 studio hours. 3 credits. Not offered for credit for studio art majors. The course explores the media, techniques and concepts of drawing, painting and printmaking.

ARTE 509. Three-dimensional Art Experiences. 3 Hours.
Semester course; 2 seminar and 3 studio hours. 3 credits. Not offered for credit for studio art majors. Exploration of sculptural concepts with three-dimensional materials such as wood, metal, clay, fiber, plaster, plastic and glass.

ARTE 550. Art for the Exceptional Learner. 3 Hours.
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 591. Topics in Art Education. 1-3 Hours.
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. Independent Study in Art Education. 1-6 Hours.
Semester course; 1-6 credits. Prerequisite: Approval from department chair. Art education majors only. An in-depth study of a selected art education topic.

ARTE 600. Seminar: Issues in Art Education. 3-6 Hours.
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. Elementary Art Education. 3 Hours.
Semester course; 3 lecture and 3 laboratory 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. Theory and Literature in Art Education. 3 Hours.
Semester courses; 3,3 seminar hours. 3, 3 credits. An introduction to the body of literature and key issues within the field of art education. Students will also develop an overview of the history of art education as well as an understanding of the major roles that theory plays in the crafting of literature within the field, including the roles of conceptual and theoretical frameworks in conducting and consuming research.

ARTE 612. Theory and Literature in Art Education. 3 Hours.
Semester courses; 3,3 seminar hours. 3, 3 credits. An introduction to the body of literature and key issues within the field of art education. Students will also develop an overview of the history of art education as well as an understanding of the major roles that theory plays in the crafting of literature within the field, including the roles of conceptual and theoretical frameworks in conducting and consuming research.

ARTE 665. Curriculum Development and Evaluation. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The 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. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Readings and discussions of studies in art education and related 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. 1-3 Hours.
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 692. Independent Study in Art Education. 1-6 Hours.
Semester course; 1-6 credits. Prerequisite: Approval from department chair. Art education majors only. An in-depth study of a selected art education topic.

ARTE 701. Issues in Art Education. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Readings and discussions of current issues in art education, art and education. This course emphasizes contemporary issues and research in the field and makes connections between theory and practice.

ARTE 702. History of Art Education. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course is a survey of the history of art education, its major theories and influences. The emphasis is on the influence of education, art, society and politics on the shaping of art education. While the history of art education from Plato to the present is surveyed, the emphasis is on the past 50 years.

ARTE 703. Contemporary Philosophies and Art Education. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Readings and discussions of philosophical writings that affect contemporary art education, art and education.

ARTE 704. Research in Art Education. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Advanced readings and discussions of studies in art education. Advanced methods of research in the field will be reviewed and students will develop a beginning dissertation proposal.

ARTE 780. Cultural Diversity in Art and Society. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Recognizing the complex intersections of art, culture and social issues, this course explores the diverse social and cultural landscape in which art is produced. Students will consider recent and historical examples of how policies and social issues have shaped art production in both U.S. and global contexts.

ARTE 799. Thesis. 1,3 Hour.
Semester course; 1 or 3 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.

ARTE 800. Advanced Seminar in Art Education. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum total of 9 credits. The course investigates contemporary issues and identifies problems in art education. Students prepare oral and written reports to explore new directions and discuss the implications for teachers and art programs.

ART FOUNDATION (ARTF)

ARTF 115. Art History Survey. 3 Hours.
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisite: completion of ARTF 115 to enroll in ARTF 116. A survey of the history and development of the visual arts within the contexts of history, geography, politics, religion, economics and the broad social and personal aspects of human culture. Offered at VCU Qatar.

ARTF 116. Art History Survey. 3 Hours.
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisite: completion of ARTF 115 to enroll in ARTF 116. A survey of the history and development of the visual arts within the contexts of history, geography, politics, religion, economics and the broad social and personal aspects of human culture. Offered at VCU Qatar.

ARTF 121. Introduction to Drawing. 2 Hours.
Continuous courses; 1 lecture and 3 studio hours. 2-2 credits. Prerequisite: completion of ARTF 121 to enroll in ARTF 122. Not for art majors. An introduction to the fundamentals of freehand drawing with an emphasis on representational drawing skills, perception and traditional drawing materials. Does not fulfill Art Foundation Program requirements.

ARTF 131. Drawing Studio. 3 Hours.
Semester course; 6 studio hours. 3 credits. Open only to first-year fine arts and design majors in the School of the Arts. Drawing A to Z, from pencil to perspective, from sumi ink to skywriting. An intensive drawing studio covering the historic principles of drawing and their place in contemporary practice. Provides an in-depth investigation of line, perspective, the figure, gesture, space, atmosphere, erasure, etc. Through the repeated physical activity of drawing, students will refine their intellectual powers of observation and visualization.

ARTF 132. Surface Research. 3 Hours.
Semester course; 6 studio hours. 3 credits. Open only to first-year fine arts and design majors in the School of the Arts. A studio-based course designed to cultivate a student's ability to create and understand two-dimensional imagery. Will include basic principles of design, color and visual organization in traditional, digital and lens-based media. Course content will explore the context of imagery in the larger culture and the potential of art and design.

ARTF 133. Space Research. 3 Hours.
Semester course; 6 studio hours. 3 credits. Open only to first-year fine arts and design majors in the School of the Arts. A comprehensive investigation of three-dimensional phenomena in fine art and design. Will cultivate a student's ability to think, perceive, visualize, design and build in three dimensions. Issues of understanding and envisioning space, objects, scale and the relationship of the body to the built environment are subjects of the course. Students will acquire a broad skill set of fabrication techniques and an inquiry into the possibility of 21st-century materials.

ARTF 134. Time Studio. 3 Hours.
Semester course; 6 studio hours. 3 credits. Open only to first-year fine arts and design majors in the School of the Arts. Brings together tenets of contemporary practice that have extended the fields of fine art and design. Time-based media such as film, video and sound are included in this mix. The historically underrepresented impulses of theatrically and performance will be explored. Students will use video as a primary tool, but will address larger issues of ephemerality, duration and the possibilities of the moving image.

ARTF 139. Project. 1-2 Hours.
Short course (5 weeks); variable hours. 1-2 credits. Open only to first-year fine arts and design majors in the School of the Arts. A seminar or studio on a selected issue, topic or skill in the fields of fine art and design. May be repeated up to maximum of 4 credits.

ARTF 150. Pre-Art Foundation Studio. 4 Hours.
Semester course; 6 studio and 2 lecture hours. 4 credits. For students in the Pre-Art Foundation Program in the School of the Arts. Offered to Pre-Art Foundation designees only. A beginning studio course emphasizing the fundamental issues of art and design, such as meaning, context, content and parameters, structure, materials, means of construction, form, space, and light. As the primary studio offering in the Pre-Art Foundation year, this course stresses the development of values that will become a basis for students' actions as professional artists and designers. Introduces students to the values, habits, traditions and expectations of studio culture. Addresses the processes and methods involved in the identification, development and realization of ideas and concepts. Does not fulfill Art Foundation Program requirements.

ARTF 160. Pre-Art Foundation Drawing. 4 Hours.
Semester course; 6 studio and 2 lecture hours. 4 credits. For students in the Pre-Art Foundation Program in the School of the Arts. Offered to Pre-Art Foundation designees only. A beginning drawing course offering intense exposure to the basic skills of figure and perspective drawing. Traditional drawing media, the fundamentals of anatomy and the fundamentals of linear perspective are covered. Does not fulfill Art Foundation Program requirements.

ARTF 191. Topics in Foundation Studies. 1-4 Hours.
Short course; variable hours. 5 weeks. 1-4 credits. May not be repeated. Prerequisites: permission of the program director and instructor.
A seminar or studio on a selected issue, topic or skill in the field of foundation studies.

ART HISTORY (ARTH)

ARTH 103. Survey of Art I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Introductory survey of art from the prehistoric era through the 13th century, including examples from selected regions of Europe, Asia, Africa and the Americas. Illustrated lectures demonstrate visual analysis and other art historical methods while also identifying key monuments and artists' work in relationship to historical contexts.

ARTH 104. Survey of Art II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Introductory survey of art from the 14th century through 21st century, including examples from selected regions of Europe, Asia, Africa and the Americas. Illustrated lectures demonstrate visual analysis and other art historical methods while also identifying key monuments and artists' work in relationship to historical contexts.

ARTH 207. Introduction to Non-Western Art. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Art will be presented as an integral aspect of each culture from the areas of China, Japan, Africa, Oceania, Native America, and pre-Columbian Central and South America. Aesthetic appreciation will be enhanced through a presentation of various philosophies, customs and values. Illustrated lectures and analytical practices will be supported by the student visiting local museums and galleries to examine selected works of art.

ARTH 245. Survey of Asian Art. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Introductory survey of South Asian, Himalayan, Southeast Asian and East Asian art. Illustrated lectures provide a survey of Asian art and architecture.

ARTH 260. Islamic Art Survey. 3 Hours.
Semester course; 3 lecture hours. 3, 3 credits. Prerequisites: ARTH 103 or ARTF 105 or 115 and ARTH 104 or ARTF 106 or 116. First semester: seventh century to 13th century. Second semester: 14th century to the present. Illustrated lectures provide a survey of Islamic art and architecture. Students will visit local museums and galleries to examine selected works of art.

ARTH 261. Islamic Art Survey. 3 Hours.
Semester course; 3 lecture hours. 3, 3 credits. Prerequisites: ARTH 103 or ARTF 105 or 115 and ARTH 104 or ARTF 106 or 116. First semester: seventh century to 13th century. Second semester: 14th century to the present. Illustrated lectures provide a survey of Islamic art and architecture. Students will visit local museums and galleries to examine selected works of art.

ARTH 270. History of the Motion Picture I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The history of development of the motion picture from the early 1800s to the mid-20th century, with both technical and aesthetic consideration. Students engage in analysis and discussion after viewing selected films.

ARTH 271. History of the Motion Picture II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The history of development of the motion picture from post-WWII to the present, with both technical and aesthetic consideration. Students engage in analysis and discussion after viewing selected films.

ARTH 291. Special Topics. 1-3 Hours.
Semester course; 1-3 variable hours. 1-3 credits. May be repeated with different topics for a maximum of 9 credits. An in-depth study of a selected topic in art history not included in the curriculum. See the Schedule of Classes for specific topics to be offered each semester.

ARTH 300. Prehistoric and Ancient Art and Architecture. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTH 103 and UNIV 200 or HONR 200, both with a minimum grade of C. A survey of the artistic expressions of the major prehistoric and ancient cultures of Europe, the Near East, Egypt and the Aegean.

ARTH 301. Art and Architecture of Ancient North America. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTH 103 and UNIV 200 or HONR 200, both with a minimum grade of C. A survey of the major artistic traditions of ancient America, north of Mexico, including Woodlands, Mississippian, Plains, Eskimo, Northwest Coast and the Southwest.

ARTH 302. Museums in the 21st Century. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 200 or HONR 200 with a minimum grade of C. A survey of contemporary theories, issues and practices in the museum environment. Topics include museum identity and function, administration, museum ethics, collections maintenance and management, curatorial and exhibition issues, and education and public interaction.

ARTH 305. Classical Art and Architecture. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTH 103 and UNIV 200 or HONR 200, both with a minimum grade of C. A survey of the development of Greek, Etruscan and Roman architecture, sculpture, painting and the minor arts from their beginnings to the early fourth century A.D.

ARTH 310. Medieval Art and Architecture. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTH 103 and UNIV 200 or HONR 200, both with a minimum grade of C. Survey of Western art and architecture between A.D. 300 and 1400.

ARTH 311. Islamic Art and the West Before 1200. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTH 260 and 261. Explores the early development of Islamic and Christian artistic traditions with an emphasis on artistic contact and exchange.

ARTH 312. Islamic Art and the West From 1200 to 1600. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTH 260 and 261. Explores the artistic dynamics of the Renaissance with an emphasis on interactions between the Christian and Islamic worlds.

ARTH 315. Renaissance Art and Architecture. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTH 104 and UNIV 200 or HONR 200, both with a minimum grade of C. An examination of the Renaissance in Italy and Northern Europe. Painting, sculpture and architecture of the 14th, 15th and 16th centuries.

ARTH 317. History of Architecture. 3 Hours.
Semester courses; 3 lecture hours. 3, 3 credits. Prerequisites: ARTH 104 and UNIV 200 or HONR 200, both with a minimum grade of C. First semester: major architectural forms from ancient Egypt through Medieval period. Second semester: architecture in Europe and America from the Renaissance to the present.

ARTH 318. History of Architecture. 3 Hours.
Semester courses; 3 lecture hours. 3, 3 credits. Prerequisites: ARTH 104 and UNIV 200 or HONR 200, both with a minimum grade of C. First semester: major architectural forms from ancient Egypt through Medieval period. Second semester: architecture in Europe and America from the Renaissance to the present.

ARTH 320. Baroque and Rococo Art and Architecture. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTH 104 and UNIV 200 or HONR 200, both with a minimum grade of C. The art and architecture of Italy and northern Europe between 1600 and 1750.

ARTH 321. Islamic Art and the West From 1600 to 1800. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTH 260 and 261. Explores the Counter-Reformation in light of the Ottoman expansion in Europe and the development of artistic forms that reflect the status quo of the Roman Catholic Church.

ARTH 325. 19th-century Art and Architecture in Europe. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTH 104 and UNIV 200 or HONR 200, both with a minimum grade of C. Study of European art and architecture between 1770 and 1900.

ARTH 330. 20th-century Art and Architecture. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTH 104 and UNIV 200 or HONR 200, both with a minimum grade of C. A survey of 20th-century art with emphasis on architecture, painting and sculpture.

ARTH 333. Modern Architecture. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTH 103, ARTH 104 and UNIV 200 or HONR 200. Open to School of the Arts majors only. An investigation of major architectural periods and achievements in commercial and residential designs from 1850 to the present; tracing the development of the International Style, traditional architecture, the evolution of the skyscraper, Art Nouveau and the works of Henry Hobson Richardson, Louis Sullivan and Frank Lloyd Wright.

ARTH 335. Pre-Columbian Art and Architecture. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTH 103 and UNIV 200 or HONR 200, both with a minimum grade of C. A study of the major artistic traditions of ancient America (i.e., Maya, Aztec and Inca). The course concentrates on Meso-America and the Andean Region.

ARTH 338. Colonial Art and Architecture of Latin America. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTH 104 and UNIV 200 or HONR 200, both with a minimum grade of C. A study of the major artistic traditions in Latin America from the 16th to the end of the 18th century.

ARTH 339. Modern and Contemporary Art and Architecture of Latin America. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTH 104 and UNIV 200 or HONR 200, both with a minimum grade of C. A study of 19th- and 20th-century art in Latin America focusing on the major movements and artists of Mexico, the Caribbean, Central and South America.

ARTH 340. Art and Architecture of the United States. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTH 104 and UNIV 200 or HONR 200, both with a minimum grade of C. A survey of painting, sculpture and architecture from the Colonial period to the present.

ARTH 341. Architecture of the United States. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTH 103, ARTH 104 and UNIV 200 or HONR 200. Open to School of the Arts majors only. An in-depth investigation of major architectural developments from the Colonial period to the present, including an analysis of European prototypes.

ARTH 342. African-American Art. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTH 104 and UNIV 200 or HONR 200, both with a minimum grade of C. A study of the art forms produced by Americans of African origin from the 17th century to the present with an emphasis on contemporary trends in black art. Crosslisted as: AFAM 342.

ARTH 343. Architecture in Richmond. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTH 103, ARTH 104 and UNIV 200 or HONR 200. History and origins of Richmond-area architecture.

ARTH 345. The Art of India. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTH 103, ARTH 104 and UNIV 200 or HONR 200. Open to School of the Arts majors only. The Indus Valley civilization through Maurya, Sunga, Kushana, Andhra, Gupta and Pallava periods.

ARTH 347. Studies in Asian Art. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with different topics for a maximum of 9 credits. Prerequisite: UNIV 200 or HONR 200. Explores the development of Asian artistic traditions in a particular geographic region or specified period. Topics may be an art form or medium, a geographical area, a theme, a function, or a context. May focus on artistic contact and cultural interconnection within a global context. See the Schedule of Classes for specific topics to be offered each semester.

ARTH 350. African and Oceanic Art. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 200 or HONR 200 with a minimum grade of C. A study of the architecture, painting, sculpture and civilizations of the major art-producing tribes of West Africa and Oceania from the 13th century to the present. Crosslisted as: AFAM 413.

ARTH 357. Women, Art and Society. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTH 103, ARTH 104 and UNIV 200 or HONR 200. Open to School of the Arts majors only. A re-examination of a variety of issues concerning women, art and society: the position assigned women within the history of art as it relates to historical place and the aesthetic values of the canon, the gendering of style, patronage, audience and gaze. Through a survey of images of and by women, as well as through an analysis of art historical and critical texts, this course addresses the question: "How are the processes of sexual differentiation played out across the representations of art and art history? Crosslisted as: GSWS 457.

ARTH 358. African Art and Architecture. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 200 or HONR 200. A study of African art and architecture from prehistoric times to the present. Special emphasis is placed on form, content, function and meaning, as well as the impact of African art on modern and African-American art. Crosslisted as: AFAM 358.

ARTH 359. Studies in Aesthetics, Theory and Criticism of Art. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with a different topic for a maximum of 9 credits. Prerequisites: ARTH 103, ARTH 104 and UNIV 200 or HONR 200. Open to School of the Arts majors only. An in-depth examination of selected topics. See the Schedule of Classes for specific topics to be offered each semester.

ARTH 361. The Human Condition: An Arts Perspective. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 200 or HONR 200. Considers both the commonality of the human condition and differentiation among sociological and cultural experiences represented in selected artworks in the permanent collection of the Virginia Museum of Fine Arts.

ARTH 365. Modern and Contemporary Art I. 3 Hours.
Semester courses; 3 lecture hours. 3, 3 credits. Prerequisites: ARTH 103, ARTH 104 and UNIV 200 or HONR 200. Open to School of the Arts majors only. First semester: an in-depth examination of art, theory and criticism from 1900-50. Second semester: an in-depth examination of art, theory and criticism since 1960.

ARTH 366. Modern and Contemporary Art II. 3 Hours.
Semester courses; 3 lecture hours. 3, 3 credits. Prerequisites: ARTH 103, ARTH 104 and UNIV 200 or HONR 200. Open to School of the Arts majors only. First semester: an in-depth examination of art, theory and criticism from 1900-50. Second semester: an in-depth examination of art, theory and criticism since 1960.

ARTH 369. Studies in Museum Methods. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with a different topic for a maximum of 6 credits. Prerequisites: ARTH 103, ARTH 104 and 302. Open to School of the Arts majors only. An in-depth examination of selected topics. Topics include museum administration, museum ethics, collections maintenance and management, curatorial and exhibition issues, and education. See the Schedule of Classes for specific topics to be offered each semester.

ARTH 370. History of Animated Film. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTH 104 and UNIV 200 or HONR 200. The history of animation as an art form, from early experimental to popular culture to independent animation. Design, structure and technique are considered.

ARTH 372. History of Photography. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 200 or HONR 200. Examines the history of photography from its invention in 1839 to contemporary artworks. Illustrated lectures, assigned readings and class discussion cover technical aspects of photography, types of photographic practices and important works of photographic artists.

ARTH 374. Studies in Film. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with a different topic for a maximum of 6 credits. Prerequisite: UNIV 200 or HONR 200. An in-depth examination of selected topics in film. See the Schedule of Classes for specific topics to be offered each semester.

ARTH 390. Art Historical Methods. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTH 104 and UNIV 200 or HONR 200. Course further develops critical thinking and writing skills specific to art history through several short written assignments and a final extended written project.

ARTH 391. Special Topics. 1-3 Hours.
Semester course; 1-3 variable hours. 1-3 credits. May be repeated with different topics for a maximum of 9 credits. Prerequisite: UNIV or HONR 200. An in-depth study of a selected topic in art history not included in the curriculum. See the Schedule of Classes for specific topics to be offered each semester.

ARTH 415. Early Italian Renaissance Art and Architecture. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ARTH 390 with a minimum grade of C. An investigation of painting, sculpture and architecture of the Duecento, Trecento and Quattrocento in Italy.

ARTH 417. The High Renaissance. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ARTH 390 with a minimum grade of C. Intensive consideration of the great masters of Italian art in the early 16th century.

ARTH 425. Neoclassicism, Romanticism, Realism and Impressionism through Fin-de-Siecle. 3 Hours.
Semester courses; 3 lecture hours. 3, 3 credits. Prerequisite: ARTH 390 with a minimum grade of C. First semester: a detailed analysis of European art during the first half of the 19th century with special emphasis on French and English painting. Consideration also will be given to artistic and cultural interrelationships marking the transition from the 18th to the 19th century. Second semester: a detailed analysis of European art during the latter 19th century. Consideration also will be given to artistic and cultural interrelationships heralding the transition to the 20th century.

ARTH 426. Neoclassicism, Romanticism, Realism and Impressionism through Fin-de-Siecle. 3 Hours.
Semester courses; 3 lecture hours. 3, 3 credits. Prerequisite: ARTH 390 with a minimum grade of C. First semester: a detailed analysis of European art during the first half of the 19th century with special emphasis on French and English painting. Consideration also will be given to artistic and cultural interrelationships marking the transition from the 18th to the 19th century. Second semester: a detailed analysis of European art during the latter 19th century. Consideration also will be given to artistic and cultural interrelationships heralding the transition to the 20th century.

ARTH 430. Modern Painting. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ARTH 390 with a minimum grade of C. An analysis of the major movements in 20th-century painting.

ARTH 431. Modern Sculpture. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ARTH 390 with a minimum grade of C. The evolution of 20th-century sculpture considering major movements and artists.

ARTH 439. Studies in 20th-century Art. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with a different topic for a maximum of 6 credits. Prerequisite: ARTH 390 with a minimum grade of C. An in-depth examination of selected art and issues of the period. See the Schedule of Classes for specific topics to be offered each semester.

ARTH 440. Contemporary Art and Architecture of Africa. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ARTH 390 with a minimum grade of C. A study of the impact on African art and architecture of Colonialism, urbanization and modernization. Special emphasis is placed on the search for a new identity by contemporary African artists. Crosslisted as: AFAM 440.

ARTH 444. Studies in the Art of the United States. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with a different topic for a maximum of 6 credits. Prerequisite: ARTH 390 with a minimum grade of C. An in-depth examination of selected art and issues of the period. See the Schedule of Classes for specific topics to be offered each semester.

ARTH 449. Studies in Asian Art. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with a different topic for a maximum of 6 credits. Prerequisite: ARTH 390 with a minimum grade of C. An in-depth examination of selected art and issues of the period. See the Schedule of Classes for specific topics to be offered each semester.

ARTH 450. Art and Architecture of Mesoamerica. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ARTH 390 with a minimum grade of C. An in-depth study of the artistic traditions of Mesoamerica (i.e., Maya, Aztec and Olmec).

ARTH 451. Art and Architecture of Andean America. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ARTH 390 with a minimum grade of C. An in-depth study of the pre-Columbian art production of the Andean region (i.e., Chavin, Moche and Inca art).

ARTH 452. Studies in Pre-Columbian Art and Architecture. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with a different topic for a maximum of 6 credits. Prerequisite: ARTH 390 with a minimum grade of C. An in-depth examination of selected art and issues of the period (Ancient America). See the Schedule of Classes for specific topics to be offered each semester.

ARTH 454. Studies in African and Oceanic Art. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with a different topic for a maximum of 6 credits. Prerequisite: ARTH 390 with a minimum grade of C. An in-depth examination of selected art and issues of the period. See the Schedule of Classes for specific topics to be offered each semester.

ARTH 461. Art and Architecture in Latin America, 1915 to the Present. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ARTH 390 with a minimum grade of C. This course studies the finest expressions of modern Latin American art within the context of the arrival of Modernism in art, improved communications and travel, the growth of the middle class, population explosion, industrialization, urbanization, movements for reform and revolution, and the struggle against economic and cultural dependence and homogenization. The course is hemispheric in scope but devotes special attention to Mexico, Brazil and Argentina.

ARTH 465. Islamic Art and the West From 1800 to 1900. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTH 260, ARTH 261 and ARTH 390. Examines the art and architecture of the Islamic world during the age of European colonialism.

ARTH 466. Modern and Contemporary Art in the Middle East. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTH 260, ARTH 261 and ARTH 390. Focuses on art and architecture in the Middle East in the 20th and 21st centuries. Issues considered include the lives and work of selected artists, architects and designers; artistic media and themes; collecting; and the art market.

ARTH 489. Topics in Advanced Art History. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with a different topic for a maximum of 9 credits. Prerequisite: UNIV 200 or HONR 200. An in-depth study of a selected topic in art history not included in the curriculum. See the Schedule of Classes for specific topics to be offered each semester.

ARTH 490. Senior Seminar in Art History. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ARTH 390 with a minimum grade of C. A study of a specific topic, artist, movement or style in a seminar format. Students will produce an extended research project to fulfill the seminar requirements. Fulfills School of the Arts writing intensive requirement.

ARTH 493. Museum Internship. 3-6 Hours.
Semester course; 9 to 18 studio hours. 3 to 6 credits. May be repeated with different topics for a maximum of 12 credits. Prerequisites: ARTH 302 and 390, both with a minimum grade of C. Restricted to art history majors only. Fieldwork in a local or regional museum. Topics inlcude museum administration, museum ethics, collections maintenance and management, curatorial and exhibition issues, and education.

ARTH 497. Directed Research Project. 3 Hours.
Semester course; 3 credits. May be repeated for a maximum of 6 credits. Prerequisite: ARTH 390 with a minimum grade of C. Advanced individual work on a subject to be formulated in writing by the student and the instructor.

ARTH 591. Special Topics in Art History. 1-6 Hours.
Semester course; variable hours. 1-6 credits. May be repeated for a maximum of 9 credits. An in-depth study of a particular aspect of art history or art made in a particular time or place, or by a specific artist or group of artists. Course may include extended off-campus trips to sites and collections throughout the United States or abroad. See the Schedule of Classes for specific topics to be offered each semester.

ARTH 598. German for Art Historical Research. 3 Hours.
Semester course. 3 practicum hours. 3 credits. A sustained and progressively complex sequence of exercises in reading and translating art historical research that is written and published in German. Graded P/F.

ARTH 621. Historical Preservation and Architectural History. 3 Hours.
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 622. Studies in Architectural History. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 9 credits. An advanced, in-depth study of a selected period of architectural history in Europe and/or America. See the Schedule of Classes for specific topics to be offered each semester.

ARTH 681. Museums and Communities. 3 Hours.
Semester course; 3 seminar hours. 3 credits. An examination of relationships between museums and communities, focusing on critical/theoretical analyses of how museums have constructed community identities, histories of place and cross-cultural relations. Also provides understanding of organizational structures and the roles and responsibilities of museum administrators.

ARTH 682. The Museum as Educational Institution. 3 Hours.
Semester course; 3 seminar hours. 3 credits. An overview of the history, theory and practice of museums as educational institutions, focusing on education philosophies and teaching methods as well as criteria for evaluating the educational merit of exhibits and programs. Also provides an understanding of the roles and responsibilities of museum educators and the structural organization of museum departments of education.

ARTH 683. Museum Collections. 3 Hours.
Semester course; 3 seminar hours. 3 credits. An examination of the history, motivations and procedures of museums collecting. Considers the ethical and logistical issues involved in acquiring objects (through bequests and purchase), in releasing objects (through restitution and deaccessioning) and in stewardship of objects (through conservation and registration). Also provides understanding of the roles and responsibilities of curators, collections managers, registrars and conservators, as well as an understanding of the structural organization of curatorial/collections staff.

ARTH 684. Curating Museum Exhibitions. 3 Hours.
Semester course; 3 seminar hours. 3 credits. Prerequisite: ARTH 681, ARTH 682, ARTH 683 or ARTH 691. Students work collaboratively to develop an exhibit script that reflects a contemporary museological issue through the display of artworks and/or artifacts.

ARTH 690. Historiography and Methodology of Art History. 3 Hours.
Semester course; 3 seminar hours. 3 credits. Historiographic overview of art history since the mid-18th century that provides a foundational understanding of the changing methodological and theoretical bases for its disciplinary practices in academia and museums. Critical reading and writing skills and research methods will be developed through class discussion, small assignments and an independent research project in the student's primary area of interest.

ARTH 691. Special Topics in Museum Studies. 3 Hours.
Semester course; 3 seminar hours. 3 credits. An advanced, in-depth study of museum histories, theories or practices in a particular time period, region or culture.

ARTH 693. Graduate Museum Internship. 3-6 Hours.
Semester course; variable hours. 3-6 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. Professionally supervised work in a local, regional, national or international museum.

ARTH 694. Art History and Pedagogy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An examination of teaching philosophies and methods that have been enacted in the development of art history curricula, course design, classroom activities and gallery programs within higher education and museum contexts.

ARTH 695. Writing Seminar I. 3 Hours.
Semester course; 3 seminar hours. 3 credits. An investigation and practical application of rhetorical styles of writing for various audiences and purposes in academic, museum and/or online contexts, with particular focus on scholarly writing.

ARTH 721. Seminar in Early Modern Art. 3 Hours.
Semester course; 3 seminar hours. 3 credits. May be repeated for a maximum of 12 credits. An advanced, in-depth study of a selected aspect of Renaissance or Baroque art in Europe. See the Schedule of Classes for specific topics to be offered each semester.

ARTH 722. Seminar in 19th-century Art. 3 Hours.
Semester course; 3 seminar hours. 3 credits. May be repeated for a maximum of 12 credits. An advanced, in-depth study of a selected aspect of 19th-century art in Europe and/or America, including though not limited to movements, artists, new techniques, technologies or display venues. See the Schedule of Classes for specific topics to be offered each semester.

ARTH 723. Seminar in 20th-century Art. 3 Hours.
Semester course; 3 seminar hours. 3 credits. May be repeated for a maximum of 12 credits. An advanced, in-depth study of a selected aspect of 20th-century art in Europe and/or America, including though not limited to movements, artists, new techniques, technologies or display venues. See the Schedule of Classes for specific topics to be offered each semester.

ARTH 725. Seminar in Pre-Columbian Art and Architecture. 3 Hours.
Semester course; 3 seminar hours. 3 credits. May be repeated for a maximum of 12 credits. Advanced research on specific topics related to the study of pre-Columbian art in the Mesoamerican and Andean regions. See the Schedule of Classes for specific topics offered each semester.

ARTH 726. Seminar in African Art. 3 Hours.
Semester course; 3 seminar hours. 3 credits. May be repeated for a maximum of 12 credits. A study of the culture and traditional art forms, which may include architecture; sculptural works in wood, stone, ivory and metal; royal attire; jewelry and/or weaponry of a specific African region. See the Schedule of Classes for specific topics offered each semester.

ARTH 727. Seminar in Latin American Art. 3 Hours.
Semester course; 3 seminar hours. 3 credits. May be repeated for a maximum of 12 credits. In-depth study of specific topics related to the study of Renaissance art in the Caribbean, Mexico, Central America or South America. See the Schedule of Classes for specific topics offered each semester.

ARTH 728. Seminar in Asian Art. 3 Hours.
Semester course; 3 seminar hours. 3 credits. May be repeated for a maximum of 12 credits. An advanced, in-depth study of a selected aspect of the art of India, Southeast Asia or the Middle East. See the Schedule of Classes for specific topics to be offered each semester.

ARTH 741. Seminar in Art and Theory. 3 Hours.
Semester course; 3 seminar hours. 3 credits. May be repeated for a maximum of 9 credits. An advanced, detailed investigation of critical, aesthetic or social theories as they relate to the history of art. See the Schedule of Classes for specific topics offered each semester.

ARTH 742. Seminar in Trans-millennial Art and Ideas. 3 Hours.
Semester course; 3 seminar hours. 3 credits. May be repeated for a maximum of 9 credits. An advanced, detailed investigation of an issue, idea or topic that transcends millennia in the history of art. See the Schedule of Classes for specific topics offered each semester.

ARTH 743. Seminar in Art and Representation. 3 Hours.
Semester course; 3 seminar hours. 3 credits. May be repeated for a maximum of 9 credits. An advanced, detailed investigation of an issue, idea or topic that considers artworks as representations of people, places, ideas, cultural values, etc. See the Schedule of Classes for specific topics offered each semester.

ARTH 749. Seminar in Diasporic Art. 3 Hours.
Semester course; 3 seminar hours. 3 credits. May be repeated for a maximum of 6 credits. An examination of African-inspired cultural and artistic traditions in North and South America and the Caribbean. See the Schedule of Classes for specific topics offered each semester.

ARTH 771. Writing Seminar II. 3 Hours.
Semester course; 3 seminar hours. 3 credits. Prerequisite: ARTH 695. Provides Master of Arts students with a structure in which to complete a qualifying paper that fulfills degree requirements. Students meet periodically as a group while also working independently with a faculty adviser to articulate a paper topic, conduct research and refine a paper of publishable quality.

ARTH 772. Major Field Exam. 3 Hours.
Semester course; 3 research hours. 3 credits. Enrollment requires permission of director of graduate studies. Provides doctoral students with opportunities to investigate research areas related to their major field of study. Students work with a faculty adviser to establish a bibliography for independent reading and study in preparation for the major field exam. Graded as Pass/Fail.

ARTH 773. Minor Field Exam. 3 Hours.
Semester course; 3 research hours. 3 credits. Enrollment requires permission of director of graduate studies. Provides doctoral students with opportunities to investigate research areas related to their minor field of study. Students work with a faculty adviser to establish a bibliography for independent reading and study in preparation for the minor field exam. Graded as Pass/Fail.

ARTH 774. Dissertation Proposal. 3 Hours.
Semester course; 3 research hours. 3 credits. Enrollment requires permission of director of graduate studies. Students prepare a dissertation proposal under the direction of the dissertation adviser. Graded as S/U/F.

ARTH 791. Special Topics in Art History. 3 Hours.
Semester course; 3 seminar hours. 3 credits. May be repeated for a maximum of 9 credits. An in-depth investigation of a topic or issue in art history. See the Schedule of Classes for specific topics offered each semester.

ARTH 797. Directed Research Project. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May be repeated for a maximum of 6 credits. Prerequisite: permission of instructor, director of graduate studies and chair of the Department of Art History. Advanced individual work on a subject to be formulated by the student in collaboration with and/or approved by the instructor.

ARTH 798. Museum Thesis Project. 1-6 Hours.
Semester course; 1, 3 or 6 credits. Prerequisite: completion of all formal course work, comprehensive examinations, foreign language examination and permission of departmental graduate committee and museum studies program. The practical application of museological issues, concepts or theories in exhibit curation, education program development, exhibit or program evaluation, collections planning, or policy analysis. A written account of the museological significance of the project is required. Graded as S/U/F.

ARTH 799. Thesis. 1-6 Hours.
Semester course; 1-6 credits. May be repeated. 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.

ARTH 899. Dissertation Research. 1-6 Hours.
Semester course; variable hours. Variable credit. A minimum of 6 semester hours required; may be repeated for a maximum of 15 credits. Enrollment restricted to students who have achieved Ph.D. candidacy. Preparation of a dissertation based on independent research and in consultation with a faculty dissertation director. Graded S/U/F.

ARTS (ARTS)

ARTS 001. Open Studio Workshop. 0 Hours.
Semester course; hours to be arranged. No credit.

ARTS 190. Advanced Workshop, Drawing. 3 Hours.
Semester course; 1 lecture and 6 studio hours. 3 credits. Must be taken concurrently with ARTS 191 and 192. Special summer workshop in drawing for the freshman applicant whose work shows potential worthy of consideration for advanced placement in September. Students are admitted only by invitation of the dean of the School of the Arts.

ARTS 191. Advanced Workshop, Design. 4 Hours.
Semester course; 1 lecture and 9 studio hours. 4 credits. Must be taken concurrently with ARTS 190 and 192. Special summer workshop in design for the freshman applicant whose work shows potential worthy of consideration for advanced placement in September. Students are admitted only by invitation of the dean of the School of the Arts.

ARTS 192. Advanced Workshop, Art History. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Must be taken concurrently with ARTS 190 and 191. Special summer workshop in art history for the freshman applicant whose work shows potential worthy of consideration for advanced placement in September. Students are admitted only by invitation of the dean of the School of the Arts.

ARTS 291. Special Topics. 0.5-4 Hours.
Semester course; variable hours. .5-4 credits. May be repeated with different topics for a maximum of 6 credits. Prerequisite: approval of School of the Arts dean. Open only to School of the Arts students. Topical course offering a variety of subjects not available through an individual department. See the Schedule of Classes for specific topics to be offered.

ARTS 350. The Creative Economy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines the contribution of creative ideas to the world economy with a focus on where, how and why creative ideas are produced and consumed.

ARTS 351. Piloting the Enterprise. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Introduces the language of the creative enterprise, focusing on intellectual property, contracts and negotiations, tracking business performance, and using financial data to improve decision-making.

ARTS 352. Idea Accelerator. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Exposes students to the processes and methodologies used to transform ideas and opportunities into sustainable business models. Students evaluate business case studies, engage industry professionals and investigate the commercial potential of their creative ideas.

ARTS 353. Creative Disruption. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Course may be repeated for a maximum of 6 credits. Prerequisite: ARTS 352 or permission of the instructor. Provides a low-risk educational environment for students to develop their own ventures, including a product/service business model, legal considerations, financial and marketing plans and media presence (Web, mobile, social). Students work with a network of mentors from the university and industry.

ARTS 370. Topics in Art. 3 Hours.
Semester courses; 3 lecture or 9 studio hours (or combinations thereof). 3, 3 credits. An in-depth study of a selected topic in art. See the Schedule of Classes for specific topics to be offered each semester.

ARTS 371. Topics in Art. 3 Hours.
Semester courses; 3 lecture or 9 studio hours (or combinations thereof). 3, 3 credits. An in-depth study of a selected topic in art. See the Schedule of Classes for specific topics to be offered each semester.

ARTS 375. Message Therapy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Open to arts majors only. Students will learn the skills to craft powerful communication and attract/hold attention and interest. The course offers strategies on how to connect with an audience and effectively communicate about artistic work, promote an event/person/product and tell a story.

ARTS 391. Special Topics. 1-4 Hours.
Semester course; variable hours. 1-4 credits. May be repeated with different topics for a maximum of 6 credits. Prerequisite: approval of School of the Arts dean. Open only to School of the Arts students. Topical course offering a variety of subjects not available through an individual department. See the Schedule of Classes for specific topics to be offered.

ARTS 392. Independent Study. 1-6 Hours.
Semester course; variable hours. 1-6 credits. May be repeated for a maximum of 9 credits. Offered to School of the Arts majors only. This course is for students pursuing advanced scholarly or studio projects not addressed by the existing curriculum.

ARTS 393. CoLab Internship. 1-6 Hours.
Semester course; variable hours. 1-6 credits. (40 work hours per credit.) May be repeated for a maximum of 12 credits. A practicum that provides students with experience in hands-on research and innovative problem-solving. Emphasis is on the collaborative development and commercial application of products that focus on emerging technologies. Internship details are determined by supervising professor(s) and project adviser(s).

ARTS 430. Guided Study Afield. 1-9 Hours.
1-9 credits. Prerequisite: permission of instructor required. Designed to enhance the student's knowledge by providing first-hand experience with the most significant contribution of aesthetic import within the geographic areas traveled.

ARTS 491. Special Topics. 1-4 Hours.
Semester course; variable hours. 1-4 credits. May be repeated with different topics for a maximum of 6 credits. Prerequisite: approval of School of the Arts dean. Open only to School of the Arts students. Topical course offering a variety of subjects not available through an individual department. See the Schedule of Classes for specific topics to be offered.

ARTS 492. Independent Study. 1-6 Hours.
Semester course; variable hours. 1-6 credits. May be repeated for a maximum of 9 credits. Offered to School of the Arts majors only. This course is for students pursuing advanced scholarly or studio projects not addressed by the existing curriculum.

ARTS 493. Internship. 1-6 Hours.
Semester course; variable hours. 1-6 credits. (30-40 work hours per credit.) May be repeated for a maximum of 9 credits. Prerequisites: junior standing in the School of the Arts and permission of department chair. A practicum that provides students with valuable hands-on experience. Internship details are to be worked out and agreed upon by supervising professor, department chair and internship employer. A grade of PR will be assigned for an internship that extends past the grading period.

ARTS 591. Special Topics. 1-4 Hours.
Semester course; variable hours. 1-4 credits. May be repeated with different topics for a maximum of 6 credits. Prerequisite: approval of the instructor. Topical course offering a variety of subjects that are not offered as a part of the standard curriculum of any individual department within the School of the Arts. See the Schedule of Classes for specific topics to be offered.

ARTS 592. Individual Projects/Fieldwork. 1-6 Hours.
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. Seminar in Art. 3 Hours.
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 602. Seminar in Art. 3 Hours.
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. 2 Hours.
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 proto-thesis concludes course work.

ARTS 692. Individual Projects/Fieldwork. 1-6 Hours.
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 705. Research in the Arts. 3 Hours.
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.

ARTS 706. Research in the Arts. 6 Hours.
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.

BIOCHEMISTRY (BIOC)

BIOC 502. Biochemistry (Medicine). 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment 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. Biochemistry, Cell and Molecular Biology. 1-5 Hours.
Continuous course; variable hours. 1-5 credits. Prerequisites: undergraduate organic chemistry, physical chemistry recommended. Permission of instructor is required for any student not enrolled in a graduate (certificate, M.S. or Ph.D.) program. A comprehensive introductory course that describes basic biochemistry and reviews current concepts of modern cell and molecular biology.

BIOC 504. Biochemistry, Cell and Molecular Biology. 1-5 Hours.
Continuous courses; variable hours. 1-5 credits. Prerequisites: undergraduate organic chemistry, physical chemistry recommended. Permission of instructor is required for any student not enrolled in a graduate (certificate, M.S. or Ph.D.) program. A comprehensive introductory course that describes basic biochemistry and reviews current concepts of modern cell and molecular biology.

BIOC 505. Experimental Biochemistry. 2 Hours.
Continuous courses; 4 laboratory hours. 2 credits. Prerequisite: BIOC 503 (or concurrent) or equivalent quantitative chemistry. Laboratory work, including theory and practice of advanced biochemical research methods.

BIOC 506. Experimental Biochemistry. 2 Hours.
Continuous courses; 4 laboratory hours. 2 credits. Prerequisite: BIOC 503 (or concurrent) or equivalent quantitative chemistry. Laboratory work, including theory and practice of advanced biochemical research methods.

BIOC 507. Bioorganic Chemistry. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: Permission of the instructor. Study of structure, chemistry, and mechanism of small, biologically important molecules.

BIOC 510. Radiation Safety. 1 Hour.
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 Nuclear Radiation License. Offered on a demand basis (2-4 times or approximately 20 students per year).

BIOC 524. Biochemistry (Pharmacy). 2 Hours.
Continuous courses; 2 lecture hours. 2 credits. Prerequisites: BIOC 501 or 523. Specialty topics in biochemistry are presented in the spring semester as part of the fundamental background of modern pharmacy.

BIOC 530. Biochemistry, Cell and Molecular Biology Module 1: Protein Structure and Function. 2 Hours.
Modular course; 2 lecture hours. 2 credits. Prerequisites: undergraduate organic chemistry, physical chemistry recommended. Permission of instructor is required for any student not enrolled in a graduate (certificate, M.S. or Ph.D.) program. The first module of a group of four (BIOC 530-533), which taken together provide a comprehensive introductory course that describes basic biochemistry and reviews current concepts of modern cell and molecular biology.

BIOC 531. Biochemistry, Cell and Molecular Biology Module 2: Basic Metabolism. 1 Hour.
Modular course; 1 lecture hour. 1 credit. Prerequisites: undergraduate organic chemistry, physical chemistry recommended. Permission of instructor is required for any student not enrolled in a graduate (certificate, M.S. or Ph.D.) program. The second module of a group of four (BIOC 530-533), which taken together provide a comprehensive introductory course that describes basic biochemistry and reviews current concepts of modern cell and molecular biology.

BIOC 532. Biochemistry, Cell and Molecular Biology Module 3: Central Dogma of Molecular Biology. 1 Hour.
Modular course; 1 lecture hour. 1 credit. Prerequisites: undergraduate organic chemistry, physical chemistry recommended. Permission of instructor is required for any student not enrolled in a graduate (certificate, M.S. or Ph.D.) program. The third module of a group of four (BIOC 530-533), which taken together provide a comprehensive introductory course that describes basic biochemistry and reviews current concepts of modern cell and molecular biology.

BIOC 533. Biochemistry, Cell and Molecular Biology Module 4: Lipids/ Membranes and Bioenergetics. 1 Hour.
Modular course; 1 lecture hour. 1 credit. Prerequisites: undergraduate organic chemistry, physical chemistry recommended. Permission of instructor is required for any student not enrolled in a graduate (certificate, M.S. or Ph.D.) program. The fourth module of a group of four (BIOC 530-533), which taken together provide a comprehensive introductory course that describes basic biochemistry and reviews current concepts of modern cell and molecular biology.

BIOC 601. Membranes and Lipids. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOC 503. 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. 1-4 Hours.
Semester course; 4 lecture hours. 1-4 credits. Prerequisites: BIOC 503 and physical chemistry or permission of instructor. Structure of macromolecular components and macromolecules; biophysical approaches to the determination of structure.

BIOC 604. Enzymology. 1-3 Hours.
Semester course; 3 lecture hours. 1-3 credits. Students may register for module 1 only, modules 1 and 2, or modules 1, 2 and 3. Prerequisite: BIOC 503. 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. 2 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: undergraduate chemistry or biochemistry. An advanced course on molecular biology. Eukaryotic replication, transcription, RNA processing, control of gene expression, translation, cell cycle, oncogenes and tumor suppressors, viral vectors, and gene therapy.

BIOC 610. Current Trends in Biochemistry. 2 Hours.
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 651. Biochemistry Journal Club. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Talks given by students describing and critiquing recent published research or review articles.

BIOC 652. Cancer Biology Journal Club. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Permission of instructor is required for any student not enrolled in a graduate program. Oral presentations/discussions on the advances in cancer biology research in order to further the field in cancer research and critically evaluate and understand scientific research articles. Graded S/U/F.

BIOC 661. Critical Thinking. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Paper presentations and discussions of important topics in biomedical science.

BIOC 662. Signal Metabolism Lipids. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Talks given by faculty members, students describing research progresses or discussion of recent published research or review articles.

BIOC 690. Biochemistry Seminar. 1 Hour.
Semester course. 1 credit. Reports on recent biochemical literature and research by students and staff. Graded as S/U/F.

BIOC 691. Special Topics in Biochemistry. 1-4 Hours.
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 692. Special Topics. 1-4 Hours.
Semester course; 1-4 variable hours. 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 the research training. Graded as S/U/F.

BIOC 695. Biochemistry Student Seminar. 1 Hour.
Semester course; 1 seminar hour. 1 credit. Reports by students on their thesis research projects. Graded as Satisfactory/Unsatisfactory/Fail.

BIOC 697. Directed Research in Biochemistry. 1-15 Hours.
Semester course; 1-15 credits. Research leading to the M.S. or Ph.D. degree and elective research projects for other students.

BIOINFORMATICS (BNFO)

BNFO 201. Computing Skills and Concepts for Bioinformatics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 151 or 200 with a minimum grade of C, or satisfactory score on the VCU Mathematics Placement Test within the one-year period immediately preceding the beginning of the course. An introduction to computation in bioinformatics, including basics of data representation, and computer organization, as well as programming in PERL or other appropriate scripting language. Bioinformatics applications in the literature will be discussed. Guest speakers will share bioinformatics career experiences and opportunities.

BNFO 251. Phage Discovery I. 2 Hours.
Semester course; 4 laboratory hours. 2 credits. Corequisite: BIOL 151 or 152. An exploratory laboratory where students will purify phage from soil, visualize phage using electron microscopy and isolate genomic material for nucleic acid sequencing. Registration by override only. Crosslisted as: LFSC 251.

BNFO 252. Phage Discovery II. 2 Hours.
Semester course; 4 laboratory hours. 2 credits. Corequisite: BIOL 151 or 152. An exploratory laboratory where students will learn about the genomes of viruses infecting bacteria. Students will be given the genome sequence of a novel virus, which will be the basis for a series of computer-based analyses to understand the biology of the virus and to compare it with other viruses that infect the same host. Registration by override only. Crosslisted as: LFSC 252.

BNFO 292. Independent Study. 1-2 Hours.
Semester course; variable hours. 1-2 credits. May be repeated for a maximum total of 6 credits. Prerequisite: permission of instructor. A course designed to provide an opportunity for independent readings of the bioinformatics literature under supervision of a staff member.

BNFO 300. Molecular Biology Through Discovery. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The course aims to expand students' "ignorance," a prerequisite for success in science, by confronting them with the interface between the known and the unknown, stressing the process by which the boundary is traversed. It will do so using as the raw material the study of molecular biology, an essential groundwork for bioinformatics.

BNFO 301. Introduction to Bioinformatics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Introduction to the basic concepts, tools and possibilities of bioinformatics, the analysis of large bodies of biological information. The course stresses problem-solving and integrative projects, making extensive use of exercises in class that draw on bioinformatics resources on the Web and on local servers. Graded as pass/fail. Crosslisted as: BIOL 351.

BNFO 380. Introduction to Mathematical Biology. 4 Hours.
Semester course; 3 lecture and 2 laboratory hours. 4 credits. Prerequisites: MATH 200 and BIOL 151, or permission of instructor. An introduction to mathematical biology. Various mathematical modeling tools will be covered and implemented in a range of biological areas. Additionally, the collaborative research process will be presented and discussed. Crosslisted as: MATH 380/BIOL 380.

BNFO 420. Applications in Bioinformatics. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisites: CMSC 245 or 255 and BNFO 301. Capstone course. Students will integrate biological, computational and quantitative skills to complete bioinformatics projects in a professional team-problem-solving context. Course includes explicit instruction in the conduct of research as well as a review of applicable strategies, methods and technologies. Written and oral presentation is emphasized, with systematic feedback and practice opportunities provided.

BNFO 440. Computational Methods in Bioinformatics. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisites: CMSC 255 and 256; BNFO 301, or permission of instructor. An introduction to mathematical and computational methods in bioinformatics analysis. Topics include but are not limited to operating systems, interfaces, languages, SQL, search algorithms, string manipulation, gene sequencing, simulation and modeling, and pattern recognition. Students will be exposed to Maple, Matlab, SPSS, E-cell, BioPerl, Epigram and C as part of the requirements of this course.

BNFO 491. Special Topics in Bioinformatics. 1-4 Hours.
Semester course; variable hours. 1-4 credits. Prerequisites: permission of instructor and adviser. An introductory, detailed study of a selected topic in bioinformatics unavailable as an existing course. 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. Adviser's approval is required for counting each special topics course toward meeting specific requirements of the B.S. program.

BNFO 492. Independent Study. 1-4 Hours.
Semester course; variable hours. A minimum of three hours of supervised activity per week per credit is required. 1-4 credits. May be repeated for a maximum total of 6 credits. Prerequisite: BIOL 218. Projects should include data collection and analysis, learning bioinformatics-related research techniques, and mastering experimental procedures, all under the direct supervision of a faculty member. A final report must be submitted at the completion of the project. Graded as pass/fail.

BNFO 496. Undergraduate Teaching Assistantship in Bioinformatics. 1-2 Hours.
Semester course; variable hours. 1-2 credits. May be repeated for a maximum total of 2 credits. Prerequisites: permission of instructor and a minimum grade of B in the course the student will TA. Student will work with course instructor to implement course objectives. Typical duties involve media preparation, answering questions, providing feedback on course assignments and peer mentoring. Provides exposure to the practice, possibilities, rewards and responsibilities of the act of teaching.

BNFO 497. Research and Thesis. 1-4 Hours.
Semester course; variable hours. A minimum of three hours of supervised activity per week per credit is required. 1-4 credits. May be repeated for a maximum total of 6 credits. Prerequisites: BIOL 218, junior or senior status. Projects should include data collection and analysis, learning bioinformatics-related research techniques, and mastering experimental procedures, all under the direct supervision of a faculty member. A written thesis of substantial quality is required at the completion of the research.

BNFO 501. Introduction to Physical Implementation of Databases. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: permission of instructor. Basic searching and sorting algorithm design, and advanced data structures including hashing and B-trees.

BNFO 505. Essentials of Statistics in Bioinformatics. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisites: Statistics and 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. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisites: Cell biology and permission of instructor; Pre- or corequisite: Organic chemistry or permission of instructor. An intensive course designed for graduate students in either the quantitative/statistics or the computational science tracks of the bioinformatics program, aimed at providing the background in molecular biology necessary for them to participate in graduate-level courses involving molecular biology. The course will focus on areas of particular interest in bioinformatics, including DNA, RNA and protein synthesis, gene structure, function and regulation, protein structure, activity and regulation, and the tools by which formation in these areas has been discovered.

BNFO 508. Introduction to Bioinformatics Research. 2 Hours.
Semester course; lectures and 3 laboratory hours. 2 credits. Prerequisites: graduate status and permission of instructor. 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/F. Required of all first-year students pursuing the thesis option (M.S.).

BNFO 514. Modeling Biocomplexity. 3 Hours.
Semester course; 2.5 lecture and .5 laboratory hours. 3 credits. Prerequisite: one year of calculus. Introduction to the modeling and simulation of the behavior of complex biological systems, including models in both continuous and discrete time. Numerical methods using mathematica, analytical methods using calculus and laboratory experiments using computer interfaces will be used to study population dynamics and the behavior of physiological systems exhibiting such properties as oscillations and chaotic biological dynamics. Crosslisted as: PHYS 514.

BNFO 530. Bioinformatics and Genomics in Drug Research. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Covers the basic elements of cellular pathways and drug interactions, and how modern genomics comes into play. Presents bioinformatics principles being used every day in data-intensive fields of research. Introductory and concept-oriented, the course will prepare students for grasping how bioinformatics is being used in many areas of biomedical sciences. Geared toward students coming from a variety of backgrounds in biology, biochemistry and chemistry. While many of the analytical approaches are statistical in nature, there is no requirement for a background in statistics or mathematics. Each student will have the opportunity to design a small project applying bioinformatics concepts. Crosslisted as: MEDC 530.

BNFO 540. Fundamentals of Molecular Genetics. 3 Hours.
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 reorganization. Emphasis will be placed on a broad introduction to and integration of important topics in prokaryotic and eukaryotic systems. Crosslisted as: BIOL 540.

BNFO 541. Laboratory in Molecular Genetics. 2 Hours.
Semester course; 1 lecture and 4 laboratory hours. 2 credits. Pre- or corequisite: BIOL 540 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 relevant published literature, scientific writing and providing hands-on experience with advanced equipment and methodologies. Crosslisted as: BIOL 541.

BNFO 591. Special Topics in Bioinformatics. 1-4 Hours.
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. 1-9 Hours.
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 the student outside what is available through the courses and other options in the Bioinformatics Program. Graded as "S," "U" or "F.

BNFO 600. Basic Scripting Languages. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: permission of instructor. Basics of programming in PERL or other appropriate scripting language.

BNFO 601. Integrated Bioinformatics. 3 Hours.
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. 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. Crosslisted as: BIOL 601.

BNFO 620. Bioinformatics Practicum. 3 Hours.
Semester course; 3 lecture hours. 3 credits. BNFO 601/BIOL 601 or permission of instructor. Practical application of bioinformatics to genomic, proteomic 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 621. Business and Entrepreneurship Essentials for Life Scientists. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Consists of presentations on the core concepts of business, including intellectual property, patents and patent law, entrepreneurship, launching a "start up," raising capital, financial management, marketing, managerial accounting, planning, and project management. Course includes lectures and discussions on core concepts of business and their real-world application. Students will develop a business plan and/or a plan to manage a research project. Business case studies and team projects with presentations are required. Focus is on the biotechnology and pharmaceutical industries.

BNFO 637. Networks Biology. 3 Hours.
Semester course; 2.5 lecture hours. 3 credits. Prerequisite: prior course work in cell biology or molecular biology, or permission of instructor. Covers in detail networks as a basic tool for the systems biology approach to biology and medicine, particularly on the molecular level. Qualitative and quantitative aspects of biological systems and processes will be identified and analyzed. The course focuses on the biochemical networks formed in the cell from genes, proteins and metabolites. Network structure and dynamics will be characterized proceeding from graph theory and other mathematical methods. Essential part of the course is the practical work with basic software for building, manipulation and analysis of biological networks, as well as for identifying structural motifs and modules, and comparative network organisms (human, drosphila, yeast, C. elegans).

BNFO 650. Sequence Analysis in Biological Systems. 3 Hours.
Semester course; 1 lecture and 2 laboratory hours. 3 credits. Prerequisite: BNFO 601/BIOL 601 or permission of instructor. This course will treat the computational theory behind algorithms that are used for nucleic acid and protein sequence analysis. Students will be exposed to the theory 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 653. Advanced Molecular Genetics: Bioinformatics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: Cell/molecular biology or permission of instructor. An advanced course on contemporary bioinformatics. Topics covered include the principles and practice of DNA, RNA and protein sequence analysis, computational chemistry and molecular modeling, expression array analysis and pharmacogenomics. The course includes lectures, reading, computer lab, homework problem sets and projects. Crosslisted as: MICR 653.

BNFO 690. Seminars in Bioinformatics. 1 Hour.
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. 1-4 Hours.
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. Students will find specific topics and prerequisites for each special topics course listed in the Schedule of Classes.

BNFO 692. Independent Study. 1-9 Hours.
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.

BNFO 697. Directed Research in Bioinformatics. 1-9 Hours.
Semester course; variable hours. 1-9 credits. May be repeated for credit. Directed research leading to the M.S. degree in bioinformatics. Graded as S/U/F.

BNFO 700. Externship in Bioinformatics. 1,2 Hour.
Semester course; variable hours. 1 or 2 credits. Prerequisites: BNFO 601/BIOL 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.

BIOLOGY (BIOL)

BIOL 101. Biological Concepts. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A topical approach to basic biological principles. Topics include molecular aspects of cells, bioenergetics, photosynthesis, cellular respiration, cellular and organismal reproduction, genetics and evolution, and ecology. Not applicable for credit toward the major in biology.

BIOL 103. Environmental Science. 4 Hours.
Hybrid semester course taught mostly online; 3 lecture and 2 laboratory hours. 4 credits. Online presentations, assignments, debates and exams require students to understand situations and ideas that involve scientific, social and economic concepts associated with Earth's environment. Laboratory exercises reinforce major course concepts. Integrates aspects of biology, chemistry, geology, physics and sociology. Topics include ecology, evolution, natural resources, air and water resources, energy and recycling, population biology, and sustainable global societies. Not applicable as a prerequisite for any biology course at the 200 level or above, nor for credit toward the B.S. in Biology. Crosslisted as: ENVS 103.

BIOL 151. Introduction to Biological Sciences I. 3 Hours.
Semester course: 3 lecture hours. 3 credits. Pre- or corequisites: MATH 151 and CHEM 101. Introduction to core biological concepts including cell structure, cellular metabolism, cell division, DNA replication, gene expression and genetics. Designed for biology majors.

BIOL 152. Introduction to Biological Sciences II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 151 and CHEM 101, both with a minimum grade of C. Focuses on evolutionary principles, the role of natural selection in the evolution of life forms, taxonomy and phylogenies, biological diversity in the context of form and function of organisms, and and basic principles of ecology. Designed for biology majors.

BIOL 200. Quantitative Biology. 3 Hours.
Semester course; 3 lecture hours (delivered online). 3 credits. Prerequisites: BIOL 151 and BIOZ 151 with minimum grades of C; and MATH 151, MATH 200, MATH 201, STAT 210 or satisfactory score on the VCU Mathematics Placement Test within a one-year period immediately preceding the beginning of the course. Enrollment restricted to biology majors and biology minors. An introduction to the application of the scientific method, experimental design and quantitative aspects of biology.

BIOL 201. Human Biology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOL 101, 151, or 152, or BIOL/ENVS 103. Fundamentals of human biology, including the structure, function and disorders of human body systems, principles of human genetics and inheritance, human evolution, and the interaction of humans with the environment. Not applicable for credit toward the B.S. in Biology.

BIOL 205. Basic Human Anatomy. 4 Hours.
Semester course; 3 lecture and 2 laboratory hours, plus online component. 4 credits. Prerequisites: BIOL 101 and BIOZ 101, BIOL 151 and BIOZ 151, or BIOL 152 and BIOZ 152, each with a minimum grade of C. Restricted to communication arts majors; health, physical education and exercise science majors; pre-health majors in clinical laboratory sciences, clinical radiation sciences, dental hygiene and nursing; students enrolled in the health sciences certificate program; and students in the advising tracks for pre-nursing, pre-occupational therapy, pre-pharmacy and pre-physical therapy and pre-nursing acclerated. Human specimens, models and interactive software are used to study human body structures; emphasis is on the skeleto-muscular aspects. Not applicable for credit toward the B.S. in Biology.

BIOL 209. Medical Microbiology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 101 and BIOZ 101, BIOL 151 and BIOZ 151, or BIOL 152 and BIOZ 152, each with a minimum grade of C. General principles of microbiology and immunology to provide a thorough understanding of the host-microbe relationship in disease. Not applicable for credit toward the B.S. in Biology.

BIOL 217. Principles of Nutrition. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOL 101, 151 or 152 with a minimum grade of C, or BIOL/ENVS 103 with a minimum grade of C. An introduction to basic principles of nutrition and their application in promoting growth and maintaining health throughout the life cycle. Not applicable for credit toward the B.S. in Biology.

BIOL 291. Topics in Biology. 1-4 Hours.
Semester course; variable hours. Variable credit. Prerequisites: BIOL 151, 152 and BIOZ 151, 152, with minimum grades of C. A study of a selected topic in biology. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

BIOL 300. Cellular and Molecular Biology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 151 and 152; BIOZ 151 or LFSC/BNFO 251; BIOZ 152 or LFSC/BNFO 252; CHEM 101 and CHEZ 101, all with a minimum grade of C; BIOL 200, MATH 200, MATH 201, STAT 210, STAT 212, STAT 314 or satisfactory score on the VCU Mathematics Placement Test within the one-year period immediately preceding the beginning of the course. Biology majors must have completed BIOL 200. Pre- or corequisites: CHEM 102 and CHEZ 102. A study of the molecular biology of the cell as it relates to gene expression, cell signaling, and cell growth and differentiation.

BIOL 303. Microbiology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOL 300 with a minimum grade of C. The morphological, biochemical, taxonomic, genetic and evolutionary characteristics of microorganisms with a primary focus on bacteria. Focuses on the structural, mechanical and biochemical adaptations employed by microorganisms in their interactions with host cells and substrates.

BIOL 307. Aquatic Ecology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 317, CHEM 102 and CHEZ 102, with minimum grades of C. The physical, chemical and especially the biological aspects of freshwater ecosystems.

BIOL 308. Vertebrate Histology. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisite: BIOL 300 with a minimum grade of C. Microanatomy of vertebrate cells, tissues and organs and the relationship of structure to function. Laboratory work involves an in-depth study of vertebrate microanatomy at the light microscope level as well as an introduction to techniques used for the preparation of materials for histological study.

BIOL 309. Entomology. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisites: BIOL 151, 152 and BIOZ 151, 152, with minimum grades of C. A field-based course that focuses on insect diversification, identification, natural history and basic biology.

BIOL 310. Genetics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 151 and BIOL 152; BIOZ 151 or LFSC/BNFO 251; BIOZ 152 or LFSC/BNFO 252, each with a minimum grade of C; and BIOL 200, MATH 200, MATH 201, STAT 210, STAT 212, STAT 314 or satisfactory score on the VCU Mathematics Placement Test within the one-year period immediately preceding the beginning of the course. Biology majors must have completed BIOL 200. The basic principles of molecular and applied genetics of plants, animals and microorganisms.

BIOL 312. Invertebrate Zoology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 151, 152 and BIOZ 151, 152, with minimum grades of C. A survey of the invertebrate animals with emphasis on environmental interactions. A weekend trip to a marine environment is required.

BIOL 313. Vertebrate Natural History. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 151, 152 and BIOZ 151, 152, with minimum grades of C. The natural history of vertebrates with emphasis on the species native to Virginia.

BIOL 314. Animal Reproduction. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL and BIOZ 151, BIOL and BIOZ 152, and BIOL 300, each with a minimum grade of C. Introduction to basic reproductive anatomy and physiology. Examination of the basic factors that affect reproductive performance and how these factors are used to regulate the reproductive processes of domestic animals and humans.

BIOL 317. Ecology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL and BIOZ 151 and BIOL and BIOZ 152, each with a minimum grade of C; and BIOL 200, MATH 200, MATH 201, STAT 210, STAT 212, STAT 314 or satisfactory score on the VCU Mathematics Placement Test within the one-year period immediately preceding the beginning of the course. Biology majors must have completed BIOL 200. An introduction to the basic principles of ecology, including interactions among organisms and influences of the physical environment.

BIOL 318. Evolution. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL and BIOZ 151 and BIOL and BIOZ 152, each with a minimum grade of C; and BIOL 200, MATH 200, MATH 201, STAT 210, STAT 212, STAT 314 or satisfactory score on the VCU Mathematics Placement Test within the one-year period immediately preceding the beginning of the course. Biology majors must have completed BIOL 200. An exploration of the theoretical and empirical foundations of evolutionary biology with a focus on the processes driving evolutionary change across all of life.

BIOL 320. Biology of the Seed Plant. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisites: BIOL and BIOZ 151 and BIOL and BIOZ 152, each with a minimum grade of C. The physiology, structure and adaptation of seed plants.

BIOL 321. Plant Development. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 300 and 310, each with a minimum grade of C. A survey of the developmental changes that take place during the life cycle of lower and higher plants. Emphasis is placed on the control factors that are involved in regulating the ordered changes which take place during development.

BIOL 322. Economic Botany. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 151 and 152 and BIOZ 151 and 152, or equivalents, with minimum grades of C. This class focuses on plant morphology, anatomy, phytochemistry, growth and reproduction through an examination of the biology of economically and culturally important plants, including crops used for foods and beverages, medicines and drugs, fibers, and timber.

BIOL 323. Plant Physiology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL and BIOZ 151, BIOL and BIOZ 152, and BIOL 300, or equivalents, with minimum grades of C. An introduction to basic plant physiology, including transport processes, energy production and secondary metabolism with emphasis on adaptations to stress.

BIOL 325. Fungal Biology. 3 Hours.
Semester course; 2 lecture and 3 laboratory hours. 3 credits. Prerequisite: BIOL 300 with a minimum grade of C. The basic biology of fungi, including growth, structure, genetics, diversity, the commercial uses of fungi and their importance as model organisms. Also discusses the interactions between fungi and plants and fungi and humans.

BIOL 332. Environmental Pollution. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: eight credits in biology. The study of pollution in the environment with emphasis on the procedures for detection and abatement. Crosslisted as: ENVS 330.

BIOL 333. Evolution of the Angiosperms. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 151,152 and BIOZ 151, 152, all with minimum grade of C. Application of evolutionary concepts to flowering plants. Topics include speciation concepts, evolution of vegetative and sexual characteristics and an overview of angiosperm diversity to the level of family.

BIOL 335. Global Change Biology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 151, BIOL 152, BIOZ 151 and BIOZ 152, all with minimum grade of C. Examines how humans influence biological systems and explores what can be done to adapt to or to mitigate future global change, emphasizing anthropogenic climate change.

BIOL 341. Human Evolution. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 200 or HONR 200 with a minimum grade of C. Introduces the range of human diversity as well as a broad understanding of evolution and evolutionary biology, particularly as it applies to hominid evolution. Specific topics include basic genetics, primatology, paleontology, and growth and development. Crosslisted as: ANTH 301.

BIOL 351. Introduction to Bioinformatics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Introduction to the basic concepts, tools and possibilities of bioinformatics, the analysis of large bodies of biological information. The course stresses problem-solving and integrative projects, making extensive use of exercises in class that draw on bioinformatics resources on the Web and on local servers. Graded as pass/fail. Crosslisted as: BNFO 301.

BIOL 380. Introduction to Mathematical Biology. 4 Hours.
Semester course; 3 lecture and 2 laboratory hours. 4 credits. Prerequisites: MATH 200 and BIOL 151, or permission of instructor. An introduction to mathematical biology. Various mathematical modeling tools will be covered and implemented in a range of biological areas. Additionally, the collaborative research process will be presented and discussed. Crosslisted as: BNFO 380/MATH 380.

BIOL 391. Topics in Biology. 1-4 Hours.
Semester course; variable hours. Variable credit. Prerequisites: BIOL 151, 152 and BIOZ 151, 152, with minimum grades of C. A study of a selected topic in biology. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

BIOL 392. Introduction to Research. 2 Hours.
Semester course; 1 lecture and 1 demonstration hour. 2 credits. Prerequisite: BIOL 300, BIOL 310, BIOL 317 or BIOL 318 with a minimum grade of C. An introduction to the scientific process, including the mechanics of problem definition, information gathering and experimental design. Experimentation is discussed in context with methods of data collection and analysis. Aims are to prepare the student for future research experiences and to have the student write detailed research proposals.

BIOL 395. Directed Study. 1-2 Hours.
Semester course; variable hours. 1-2 credits. Maximum of 2 credits per semester; maximum total of 6 credits for all independent study courses (BIOL 395, BIOL 492, BIOL 495 and/or BIOZ 395). Prerequisites: BIOZ 151 and BIOZ 152 with minimum grades of C, permission of the Department of Biology and research mentor. Mentors are not limited to faculty members within the Department of Biology, but the context of the research study must be applicable to the biological sciences as determined by the department. Studies should include directed readings, directed experimentation or advanced guided inquiry — all under the direct supervision of a faculty member. A minimum of three hours of supervised activity per week per credit hour is required. Graded as pass/fail.

BIOL 401. Applied and Environmental Microbiology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: 300 and 317, each with a minimum grade of C. The biology and chemical activities of microorganisms (bacteria, algae, virus and fungi) of industrial, pharmaceutical and agricultural importance.

BIOL 402. Comparative Vertebrate Anatomy. 5 Hours.
Semester course; 3 lecture and 4 laboratory hours. 5 credits. Prerequisite: BIOL 300 with a minimum grade of C. The evolution of vertebrate forms as demonstrated by anatomical studies of selected vertebrate types.

BIOL 403. Primatology. 4 Hours.
Semester course; 3 lecture and 2 laboratory hours. 4 credits. Prerequisite: ANTH 210 or ANTH 301/BIOL 341. Primatology investigates the taxonomic relationships among primates through comparative anatomy, comparative behavior and comparative biochemistry. Study of primate evolution, demography, subsistence, reproduction, social organization, communication systems and ecology. Crosslisted as: ANTH 403.

BIOL 411. Animal Physiology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 300 and CHEM 301, each with a minimum grade of C. Physiological principles of animal cells, tissues and organs from the viewpoint of chemical and physical phenomena.

BIOL 413. Parasitology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOL 300 with a minimum grade of C. The epidemiology and pathological effects of eukaryotic parasites, including parasite life cycles and host-parasite relationships.

BIOL 415. Mangrove Avian Field Ecology. 4 Hours.
Semester course; two weeks abroad in Panama (or other tropical location with mangrove forests) followed by class meetings two days per week throughout most of spring semester. 4 credits. Prerequisite: BIOL 317. An immersive study of tropical ecology with a focus on bird ecology and conservation of mangrove ecosystems through a unique blend of rigorous science and community engagement. Two weeks of study abroad, including engagement with local conservation organizations and participation in education outreach with local schools, followed by discussion, data analysis and presentation of progress and research in a public symposium on campus.

BIOL 416. Ornithology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOL 317 with a minimum grade of C. Provides an integrative study of birds, including avian evolution and diversity, general anatomy and physiology, behavior, and ecology.

BIOL 417. Mammalogy. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisites: BIOL 218 and 317 with minimum grades of C. Study of the characteristics, adaptive radiation and distribution of mammals, with emphasis on North American forms.

BIOL 420. Yeast and Fermentation. 3 Hours.
Semester course; 2 lecture and 3 laboratory hours. 3 credits. Prerequisite: BIOL 300 with a minimum grade of C. Corequisites: BIOL 303 and BIOL 310. Addresses the basic biology of yeast used in brewing beer and briefly in wine production. Topics will include yeast properties such as growth, structure, genetics, biodiversity and natural habitats. The process of wine and beer production will be discussed. Laboratory sessions include basic microbiology techniques, yeast isolations and characterization using DNA and biochemical methods, as well as the study of factors that affect fermentation. At the end of the course the students will give a presentation on other fermentation products of their interest such as vinegar, bread, etc., providing an expanded version of this important process.

BIOL 422. Forest Ecology. 4 Hours.
Semester course; 3 lecture hours and 3 laboratory hours. 4 credits. Prerequisite: BIOL 317 with a minimum grade of C. Covers the fundamentals of forest ecology, with a particular emphasis on Virginia's diverse forest ecosystems. Students gain an understanding of the principal controls on forest structure, growth and distribution and relate these principles to sustainable forest management.

BIOL 425. Field Botany. 3 Hours.
Semester course; 2 lecture hours and 3 laboratory hours.(60 percent online, 40 percent field/laboratory) 3 credits. Prerequisites: BIOL 310 and BIOL 317, both with minimum grades of C. Online lectures, discussions, reflections and assessments in conjunction with field experience. Explores the effects of environmental conditions on plant morphology and adaptations, with emphasis on plant anatomy, plant physiology and ecology.

BIOL 430. Invasion Biology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 151, BIOL 152, BIOZ 151, BIOZ 152 and BIOL 317, all with minimum grade of C. A comprehensive view of the ecology and impacts of invasive species. Integrates the effects of historical human demography, ecological disturbance, natural history, species interactions, barriers to invasion, invasive species management and impacts on natural communities and ecosystems.

BIOL 431. Introduction to Marine Biology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 317, CHEM 102 and CHEZ 102, with minimum grades of C. An introduction to physical, chemical and geological oceanography and a more detailed treatment of the organisms and ecological processes involved in the pelagic and benthic environments of the world's oceans and estuaries.

BIOL 435. Herpetology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOL 317 with a minimum grade of C. The evolution, ecology, structure, taxonomy and behavior of reptiles and amphibians.

BIOL 438. Forensic Molecular Biology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CHEM 302, CHEZ 302, and BIOL 310 or equivalent, each with a minimum grade of C. Provides an understanding of molecular biology testing methodologies as applied to analysis of forensic samples. Current topics in forensic DNA analysis will include quality assurance, DNA databanking, contemporary research and population genetics. Crosslisted as: FRSC 438.

BIOL 440. Developmental Biology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 300 and 310, each with a minimum grade of C. Basic principles of developmental biology focused on vertebrate model organisms with an emphasis on the underlying cellular and molecular mechanisms that guide development.

BIOL 445. Neurobiology and Behavior. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisite: BIOL 317 with a minimum grade of C. The study of animal behavior stressing ecological, evolutionary and neurobiological approaches.

BIOL 448. Neuroscience. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOL 300 with a minimum grade of C. Pre- or corequisite: BIOL 310. An examination of the basic structure of the nervous system, nervous system operation on a cellular and molecular level and the formation of the nervous system during development.

BIOL 450. Biology of Cancer I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 300 with a minimum grade of C or PHIS 309. An examination of the cellular, molecular and clinical aspects of cancer development, progression and treatment.

BIOL 451. Biology of Cancer II. 4 Hours.
Semester course; 1 lecture and 12 laboratory hours. 4 credits. Prerequisites: BIOL 450 and instructor's permission. An examination of the cellular, molecular and clinical aspects of cancer development, progression and treatment.

BIOL 452. Biology of Drugs. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOL 300 with a minimum grade of C. Explores how drugs modulate biological signaling pathways to study, cure, enhance and intoxicate organisms. An introduction to basic pharmacology that largely focuses on human pathways and diseases. Topics include major drug classes (cardiovascular, gastrointestinal, etc.) and drugs of abuse (alcohol, marijuana, etc.).

BIOL 455. Immunology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOL 300 with a minimum grade of C or PHIS 309. A comprehensive introduction to the immune system of higher animals, emphasizing the molecular and cellular basis for antibody-medicated immunity.

BIOL 459. Infectious Disease Ecology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 151, BIOL 152, BIOZ 151, BIOZ 152 and BIOL 317, all with minimum grade of C. A comprehensive and up-to-date overview of the causes and consequences of infectious disease at levels from individual organisms to global scale. Examines the history of infectious disease ecology in human and nonhuman populations. Students learn about the roles of transmission and coevolution in infectious disease ecology and how population models are used to inform management of epidemics and emerging infectious diseases.

BIOL 460. Human Evolutionary Genetics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOL 318 or BIOL 341 with a minimum grade of C. The origin and genetic history of modern humans, our historic colonization and migration, the utility of the Human Genome Project, our differences from other primates, adaptation to our environment and disease, and the ethical implications of genetic research in our society.

BIOL 475. Biology Capstone Seminar: ____. 1-3 Hours.
Semester course; variable hours. 1-3 credits. Prerequisites: BIOL 300, BIOL 310 and BIOL 317 with minimum grades of C; and senior standing. Enrollment restricted to biology majors. Students read assigned topical papers before class, prepare critical analyses, discuss and debate selected positions. See Schedule of Classes for specific topics.

BIOL 477. Biology Capstone Experience. 0 Hours.
Semester course; variable hours. 0 credits. Prerequisites: completion of the Biocore with minimum grades of C and 90 hours of undergraduate course work. The following courses qualify as a capstone experience if taken as a co-requisite with this course: BIOL 492 Independent Study, BIOL 493 Biology Internship, BIOL 495 Research and Thesis, BIOL 497 Ecological Service Learning or other courses, including topics courses, that include the core competencies required for a capstone experience and are approved by the chair of the Department of Biology. Graded as Pass/Fail.

BIOL 480. Animal-Plant Interactions. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOL 317 or BIOL 318 with a minimum grade of C, or permission of the instructor. Ecological and evolutionary consequences of interactions among animals and plants.

BIOL 489. Communicating Research. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: Completion of the Biocore with minimum grades of C. Corequisite: BIOL 495, senior standing. An opportunity for students to develop skills necessary for effective communication of their research in writing. Includes a variety of seminar discussions and activities including preparation of figures for publication and the crafting of a research paper with correct usage of the primary literature. Students will use this as an opportunity to aid the writing of their thesis for BIOL 495.

BIOL 490. Presenting Research. 1 Hour.
Semester course; 1 credit. Prerequisite: Completion of the Biocore with minimum grades of C. Pre- or corequisites: BIOL 492 or 495, and senior standing. Opportunity for students to develop skills necessary for effective oral presentation of their research work. Includes a variety of seminar discussions and activities such as preparation of visual materials and statistical analysis of data. Students will make several oral presentations directly related to their specific BIOL 492 or 495 projects.

BIOL 491. Topics in Biology. 1-4 Hours.
Semester course; variable hours. Variable credit. Prerequisite: BIOL 300. A study of a selected topic in biology. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

BIOL 492. Independent Study. 1-4 Hours.
Semester course; 1-4 variable hours. 1-4 credits. Maximum of 4 credits per semester; maximum total of 6 credits for all independent study courses (BIOL 395, BIOL 492, BIOL 495 and/or BIOZ 395). A minimum of 2 credits is required for the course to count as a laboratory experience. Prerequisites: BIOZ 151 and BIOZ 152, each with a minimum grade of C; and permission of the chair of the Department of Biology. Projects should include data collection and analysis, learning field and/or laboratory techniques, and/or mastering experimental procedures, all under the direct supervision of a faculty member. A minimum of three hours of supervised activity per week per credit hour is required. A final report must be submitted at the completion of the project.

BIOL 493. Biology Internship. 1-3 Hours.
Semester course; variable hours. Variable credit. Maximum of 3 credits per semester; maximum total of 6 credits for all independent study and internship courses. 1 credit awarded for each 100 hours of work experience in professional biology setting. Prerequisites: BIOL 310 or 317 with minimum grades of C; and permission of the chair of the Department of Biology and of the agency, company or organization in which internship will be held. Internship designed to provide laboratory or field experience in an off-campus professional biology setting. A final report must be submitted upon completion of the internship. Graded as pass/fail.

BIOL 495. Research and Thesis. 1-4 Hours.
Semester course; 1-4 variable hours. 1-4 credits. Maximum of 4 credits per semester; maximum total of 6 credits for all undergraduate research in biology (BIOL 395, BIOL 492, BIOL 495 and/or BIOZ 395). A minimum of 2 credits is required for the course to count as a laboratory experience. A minimum of 4 credits is required for honors in biology. Prerequisites: BIOL 392, permission of the supervising faculty member and a research proposal acceptable to the departmental chair. Corequisite: BIOL 489 or BIOL 490, depending on term offering. Activities include field and/or laboratory research under the direct supervision of a faculty mentor. A minimum of three hours of supervised activity per week per credit hour is required. Research projects must include experimental design and analysis of data. This course must be taken for two consecutive semesters starting in the fall. A written thesis of substantial quality is required upon completion of the research.

BIOL 496. Biology Preceptorship. 2 Hours.
Semester course; 2 credits. May be repeated with a different course for a maximum of 4 credits. Prerequisites: completion of the relevant course with a minimum grade of B and a minimum cumulative GPA of 3.0. Permission of instructor and departmental chair required prior to registration. Preceptors assist instructors in lecture (BIOL) or laboratory (BIOZ) courses. Responsibilities vary and may include, but are not are limited to, attending class, conducting review sessions and preparing course study/review materials. Graded as pass/fail.

BIOL 497. Ecological Service Learning. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: BIOL 317 with a minimum grade of C. A service-learning course coupled to course content and material taught in BIOL 317. Students will seek out ecologically relevant opportunities with local, state and federal community partners who will provide experiences to enhance academic enrichment and personal growth and will help foster a sense of civic responsibility. Students must complete a minimum of 20 service-learning hours with community partner(s).

BIOL 498. Insects and Plants Service-learning. 2 Hours.
Semester course; 2 laboratory hours. 2 credits. Prerequisite: BIOL 317 or BIOL 318 with a minimum grade of C, or permission of the instructor. A service-learning course related to insect-plant interactions. Field experience with community partners, including public parks, botanical gardens and organic farms. Designed to expand academic instruction, enhance personal growth and foster a sense of civic responsibility. Students must complete a minimum of 40 service-learning hours with a community partner.

BIOL 502. Microbial Biotechnology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MICR/BIOC 503 or BIOC 530, 531, 532 and 533 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. 4 Hours.
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 fish and identification of specimens.

BIOL 507. Aquatic Microbiology. 4 Hours.
Semester course; 2 lecture and 4 laboratory hours. 4 credits. Prerequisites: BIOL 303 and 307 or equivalents. Open to qualified seniors and graduate students only. This course will involve a practical approach to the methods used to culture, identify 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. 3 Hours.
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 509. Microbial Ecology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOL 317 or equivalent with a grade of C or better. Open only to qualified seniors and graduate students. Explores the interactions of microorganisms and their environment, including discussion of microbial diversity, nutrient cycling, symbiosis and selected aspects of applied microbiology.

BIOL 510. Conservation Biology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. 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. 4 Hours.
Semester course; 3 lecture and 4 laboratory hours. 4 credits. Prerequisites: BIOL 300 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. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisite: BIOL 317. Open to qualified seniors and graduate students only. A study of the ecology of streams and rivers. Laboratory emphasis is on the structure and functioning of aquatic communities in mountain to coastal streams.

BIOL 516. Population Genetics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: STAT/BIOS 543. Theoretical and empirical analyses of how demographic and evolutionary processes influence neutral and adaptive genetic variation within populations. Crosslisted as: HGEN 516.

BIOL 518. Plant Ecology. 4 Hours.
Semester course; 3 lecture and 2 laboratory hours. One three-day field trip is required. 4 credits. Prerequisite: BIOL 317. Open to qualified seniors and graduate students only. A lecture, field and laboratory course concerned with the development, succession and dynamics of plant communities and their interrelations with climate, soil, biotic and historic factors.

BIOL 520. Population Ecology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 310 and BIOL 317 or permission of instructor. 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 of life history strategies and interspecific interactions. Quantitative models will be used extensively to explore ecological concepts.

BIOL 521. Community Ecology. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 300 and CHEM 301-302 and CHEZ 301L, 302L or equivalent. Open to qualified seniors and graduate students only. Hormonal control systems at the organ, tissue and cellular level. Although the major emphasis will be on vertebrate endocrine systems, some discussion of invertebrate and plant control systems will be covered.

BIOL 530. Introduction to Human Genetics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to qualified seniors and graduate students. Basic knowledge of genetics is recommended. Provides a comprehensive examination of the fundamentals of human genetics. Explores topics including Mendelian and non-Mendelian inheritance, pedigree analysis, cytogenetics, aneuploid syndromes, cancer, gene structure and function, epigenetics, gene expression, biochemical genetics, and inborn errors of metabolism. Crosslisted as: HGEN 501.

BIOL 532. Water Pollution Biology. 3 Hours.
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 535. Wetlands Ecology. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisite: BIOL 317 or equivalent or permission of instructor. A study of the ecology of freshwater and coastal wetlands, including the physical and biological aspects of these systems, wetland functions at local, landscape and global scales, and wetland regulations and restoration. Students will acquire skills with analytical techniques used in laboratory settings and in field-based applications for purposes of identifying and delineating wetland ecosystems.

BIOL 540. Fundamentals of Molecular Genetics. 3 Hours.
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 reorganization. Emphasis will be placed on a broad introduction to and integration of important topics in prokaryotic and eukaryotic systems. Crosslisted as: BNFO 540.

BIOL 541. Laboratory in Molecular Genetics. 2 Hours.
Semester course; 1 lecture and 4 laboratory hours. 2 credits. Pre- or corequisite: BIOL 540 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 relevant published literature, scientific writing and providing hands-on experience with advanced equipment and methodologies. Crosslisted as: BNFO 541.

BIOL 545. Biological Complexity. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisites: physics and calculus, or permission of instructor. Open only to graduate students and qualified seniors. 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. Crosslisted as: LFSC 510.

BIOL 548. Bioinformatic Technologies. 2 Hours.
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. Crosslisted as: LFSC 520.

BIOL 550. Ecological Genetics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. 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 560. Conservation Medicine. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Introduces students to key elements of wildlife diseases, zoonoses, emerging infectious diseases associated with wildlife and humans, and both the conservation and health impacts of these topics. Included are discussions of the interactions among environmental quality and wildlife and human diseases and health. Topics include diseases of fish, amphibians, reptiles, birds and mammals, the effects of environmental contaminants and climate on those diseases, and their interaction with human health.

BIOL 565. Advances in Cell Signaling. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOL 300 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 310 and BIOZ 310L, or graduate standing in biology or related fields. Open to qualified seniors and graduate students only. Discussion of principles, concepts, techniques, applications and current advances in cellular and molecular biology aspects of biotechnology for animal and plant cells. The course will cover molecular construction of foreign genes; DNA cloning; technologies for DNA, RNA and protein analyses; nonvector and vector-mediated genetic transformation; gene regulation in transgenic cells; cell and tissue culture; cell fusion; and agricultural, medical and other industrial applications.

BIOL 591. Special Topics in Biology. 1-4 Hours.
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 601. Integrated Bioinformatics. 3 Hours.
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. 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. Crosslisted as: BNFO 601.

BIOL 606. Quantitative Ecology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. 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 610. Conservation Applications. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Covers the implementation of conservation techniques including monitoring, planning, education, habitat management and combining conservation with human development strategies. Focuses on how to make conservation work where biodiverstiy and human livelihoods must be reconciled. Students will utilize a number of computer programs to analyze and interpret management strategies.

BIOL 618. Ecosystems Ecology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOL 317 or equivalent or permission by instructor. Introduction to the structure and functioning of aquatic and terrestrial ecosystems. The course complements other offerings in the graduate program by considering ecological processes at higher orders of organization and in the context of abiotic factors. Students will gain discipline-specific knowledge through lectures and readings while building quantitative and critical thinking.

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

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

BIOL 640. Evolution and Molecular Markers. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Methodologies and applications of molecular biology as they pertain to the study of evolution, with a focus on systematics, speciation and biogeography. The course provides proficiency in the understanding, interpretation and choice of appropriate molecular markers for evolutionary research, with particular attention to current methods and recent literature. Designed to benefit students of both natural history (ecologists, systematics, evolutionary biologists) and molecular biology.

BIOL 650. Conservation Genetics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Covers the application of molecular genetics to biodiversity conservation. Essential topics include molecular measures of genetic diversity, estimating loss of genetic diversity in small populations, detecting inbreeding, resolution of taxonomic uncertainties, genetic management of T&E species, captive breeding and reintroduction. Students will utilize a number of computer programs to analyze and interpret molecular genetic data.

BIOL 654. Environmental Remote Sensing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENVS 602, or permission of the instructor. 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. Crosslisted as: ENVS 654/URSP 654.

BIOL 660. Developmental Biology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: biochemistry or cell biology or their equivalent. Molecular and cellular principles of developmental biology in model systems, including flies, worms, fish and mammals. Understanding of morphogen gradients, transcription, cell movements and signaling in development. Advanced methods are taught enabling students to interpret and present findings from the primary literature.

BIOL 676. Plant and Animal Cell Biology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: biochemistry or cell biology or permission of instructor. Molecular and cellular principles of cell behavior and function in plant and animal cells. Topics include intracellular transport, cell cycle control, signaling and cell motility. Advanced methods are taught enabling students to interpret and present findings from the primary literature in this field.

BIOL 690. Biology Seminar. 1 Hour.
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/F.

BIOL 691. Special Topics in Biology. 1-4 Hours.
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. 1-4 Hours.
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. 1 Hour.
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.

BIOL 698. Thesis. 1-16 Hours.
Semester course; hours to be arranged. Credits to be arranged. Independent research by students in areas of systematics, environmental, developmental, behavioral, cellular and molecular biology, and comparative physiology.

BIOLOGY LAB (BIOZ)

BIOZ 101. Biological Concepts Laboratory. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Pre- or corequisite: BIOL 101, 151 or 152. Laboratory exercise correlated with BIOL 101. Not applicable for credit toward the B.S. in Biology.

BIOZ 151. Introduction to Biological Science Laboratory I. 1 Hour.
Semester course; 3 laboratory hours. 1 credit. Pre- or corequisites: BIOL 151, MATH 151 and CHEM 101. Laboratory investigation of cellular metabolism, genetics and molecular biology, with an emphasis on formation and testing of hypotheses. Laboratory exercises will elaborate themes discussed in BIOL 151.

BIOZ 152. Introduction to Biological Science Laboratory II. 1 Hour.
Semester course; 3 laboratory hours. 1 credit. Prerequisites: BIOL 151 and BIOZ 151, both with a minimum grade of C. Pre- or corequisites: BIOL 152, MATH 151 and CHEM 101. Laboratory investigation of evolutionary concepts, evolution of organisms, biological diversity and ecology, with an emphasis on formation and testing of hypotheses. Laboratory exercises will elaborate themes discussed in BIOL 152.

BIOZ 201. Human Biology Laboratory. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Pre- or corequisite: BIOL 201. Laboratory exercises correlated with BIOL 201 Human Biology. Exercises emphasize the structure, function and disorders of human body systems, principles of human genetics and inheritance, and human evolution and ecology. Not applicable for credit toward the B.S. in Biology.

BIOZ 209. Medical Microbiology Laboratory. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Pre- or corequisite: BIOL 209. Techniques to culture, isolate and identify microbes with related topics such as water coliform tests, and antibiotics and disinfectant sensitivity testing. Not applicable for credit toward the B.S. in Biology.

BIOZ 303. Microbiology Laboratory. 2 Hours.
Semester course; 4 laboratory hours. 2 credits. Pre- or corequisite: BIOL 303. Laboratory application of techniques and concepts in microbiology. Emphasis is placed on techniques to isolate, culture and identify bacteria; genetics and molecular biology of bacteria; safety and aseptic protocols; assays for antibiotic and disinfectant susceptibility.

BIOZ 307. Aquatic Ecology Laboratory. 1 Hour.
Semester course; 3 laboratory hours. 1 credit. Prerequisites: BIOL 317, CHEM 102 and CHEZ 102, with minimum grades of C. Pre- or corequisite: BIOL 307. Laboratory and field studies of the biota of aquatic habitats and their relationship with the environment.

BIOZ 310. Laboratory in Genetics. 2 Hours.
Semester course; 1 lecture and 3 laboratory hours. 2 credits. Prerequisites: UNIV 200 or HONR 200 with minimum grades of C. Prerequisite or corequisite: BIOL 310. Demonstrates the laws and molecular basis of heredity through exercises and experiments that use a variety of organisms.

BIOZ 312. Invertebrate Zoology Laboratory. 1 Hour.
Semester course; 3 laboratory hours. 1 credit. Prerequisites: BIOL and BIOZ 151 and 152, with minimum grades of C. Pre- or corequisite: BIOL 312. A laboratory survey of the invertebrate animals, with emphasis on environment interactions. A weekend trip to a marine environment is required.

BIOZ 313. Vertebrate Natural History Laboratory. 1 Hour.
Semester course; 3 laboratory hours. 1 credit. Prerequisites: BIOL and BIOZ 151 and 152, with minimum grades of C. Pre- or corequisite: BIOL 313. Laboratory exercises focusing on the natural history of vertebrates, with emphasis on the species native to Virginia.

BIOZ 317. Ecology Laboratory. 2 Hours.
Semester course; 4 laboratory hours. 2 credits. Prerequisites: BIOL and BIOZ 151 and 152, and UNIV 200 or HONR 200; all with minimum grades of C. Pre- or corequisite: BIOL 317. A field-oriented course that provides experience in ecological research, including experimental design, instrumentation, data collection and data analysis.

BIOZ 321. Plant Development Laboratory. 2 Hours.
Semester course; 4 laboratory hours. 2 credits. Pre- or corequisite: BIOL 321. An experimental approach applied to a phylogenetic survey of developmental model systems. Observational and experimental protocols will be used to collect data and gather information. Problem-solving skills will be utilized to analyze and present experimental results.

BIOZ 341. Human Evolution Lab. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Corequisite: BIOL 341/ANTH 301. Laboratory exercises correlated with BIOL 341/ANTH 301. Exercises emphasize comparative primate and fossil anatomy, morphology and behavior, as well as practice in recognizing and applying evolutionary principles in human evolution. Crosslisted as: ANTZ 301.

BIOZ 391. Topics in Biology Laboratory. 1-4 Hours.
Semester course; variable hours. Variable credit. Prerequisites: BIOL and BIOZ 151 and 152, with minimum grades of C. Laboratory investigations in a selected topic of biology. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

BIOZ 395. Directed Study. 1-2 Hours.
Semester course; variable hours. 1-2 credits. Maximum of 2 credits per semester; maximum total of 6 credits for all independent study courses (BIOL 395, BIOL 492, BIOL 495 and/or BIOZ 395). Prerequisites: BIOZ 151 and BIOZ 152 with minimum grades of C, permission of the Department of Biology and research mentor. Mentors are not limited to faculty members within the Department of Biology, but the context of the research study must be applicable to the biological sciences as determined by the department. Studies should include directed readings, directed experimentation or advanced guided inquiry — all under the direct supervision of a faculty member. A minimum of three hours of supervised activity per week per credit hour is required. Graded as pass/fail.

BIOZ 416. Ornithology Laboratory. 2 Hours.
Semester course; 4 laboratory hours. 2 credits. Prerequisite: BIOL 317 with a minimum grade of C. Pre- or corequisite: BIOL 416. A field-oriented course that develops basic skills in bird identification by sight and sound for a variety of regional taxa with emphasis on avian anatomy and adaptations for flight. Students conduct an independent or small-group research project on a question of their choice relating to avian ecology or behavior, including experimental design, data collection and analysis, and a final project presentation.

BIOZ 438. Forensic Molecular Biology Laboratory. 2 Hours.
Semester course; 3 laboratory hours. 1 credit. Pre- or corequisite: BIOL/FRSC 438. Provides comprehensive coverage of the various types of DNA testing currently used in forensic science laboratories. Students will have hands-on experience with the analytical equipment employed in forensic science laboratories and the techniques for human identification in forensic casework. Students also will explore and practice both scientific writing and writing of DNA case reports. Crosslisted as: FRSZ 438.

BIOZ 476. Biology Capstone Laboratory. 2 Hours.
Semester course; 1 lecture and 3 laboratory hours. 2 credits. Prerequisite: BIOL 310 with a minimum grade of C, and 90 credit hours of undergraduate course work. Application of basic methods used in cellular and molecular biology to the investigation of topics of current biological interest. Emphasis on experimental design, data collection and analysis, communication skills, critical thinking, and ethical and social responsibility.

BIOZ 491. Topics in Biology Laboratory. 1-4 Hours.
Semester course; variable hours. Variable credit. Prerequisites: BIOL 300 with a minimum grade of C. Laboratory investigations in a selected topic of biology. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

BIOMEDICAL ENGINEERING (EGRB)

EGRB 101. Biomedical Engineering Practicum I. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisites: registration in biomedical engineering department and permission of course coordinator. This course involves the introduction of clinical procedures and biomedical devices and technology to biomedical engineering freshmen. Students will tour medical facilities, clinics and hospitals and will participate in medical seminars, workshops and medical rounds. Students will rotate among various programs and facilities including orthopaedics, cardiology, neurology, surgery, otolaryngology, emergency medicine, pharmacy, dentistry, nursing, oncology, physical medicine, ophthalmology, pediatrics and internal medicine.

EGRB 102. Introduction to Engineering. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisites: registration is restricted to biomedical engineering majors only. Introduces basic engineering principles in the context of biomedical topics, including electrical circuits and components such as resistors, capacitors, diodes, transistors, digital electronics and motors. Applications of biomedical systems including heart function, brain waves, human motion and skin responses are discussed. The laboratory introduces fundamental biomedical circuit testing and measurement and proper laboratory writing, with students required to analyze, build and test biomedical devices such as those involving ECG, EMG and Galvanic Skin Response.

EGRB 105. History of Medical Technology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Origins and recent advances in medical technologies including hearing aids, artificial knees, heart-lung machines, medical anesthesia devices and medical imaging systems such as CAT MRI.

EGRB 203. Introduction to Biomechanics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 201 and PHYS 207. Restricted to biomedical engineering majors only. The theory and application of engineering mechanics applied to the design and analysis of rigid and deformable biomedical and physiological structures. The study of forces and their effects, including equilibrium of two- and three-dimensional bodies, stress, strain and constitutive relations, bending, torsion, shearing, deflection, and failure of physiological and biomedical systems.

EGRB 215. Computational Methods in Biomedical Engineering I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 201 and sophomore standing in biomedical engineering. Corequisite: MATH 301, MATH 310 or permission of instructor. The goal of this course is to enhance students' software skills for subsequent biomedical engineering courses and laboratories, as well their careers. The course covers the basic fundamentals of programming in MATLAB, as well as data analysis of biomedical data. An important component of this course is developing problem-solving skills.

EGRB 301. Biomedical Engineering Design Practicum. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGRB 101, EGRB 102, EGRB 203, EGRB 215, EGRE 206 (or equivalent), each with a minimum grade of C. Restricted to students with junior standing in the biomedical engineering program. Explores the professional and ethical responsibilities of a biomedical engineer. Emphasis will be placed on design issues associated with biomedical engineering, teamwork, regulatory issues and human and animal subjects.

EGRB 303. Biotransport Processes. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: PHIS 309, 310 (or equivalents); EGRB 203; and PHYS 207. Course involves the study of mass, momentum and heat transfer within the human body, between the human body and the environment, and in the design of devices and systems that are involved with transport processes in medical and clinical settings. The underlying principles of mass, momentum and energy transfer will be addressed followed by a study of such processes that are ongoing in the human body. The design of biomedical devices and systems that involve transport processes also will be studied. Examples include cardiovascular blood flow, transport across cell membranes, respiration and thermoregulation.

EGRB 307. Biomedical Instrumentation. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisites: EGRE 206, EGRB 215. A study of the physical principles, design and clinical uses of biomedical instrumentation. Analysis and design of low frequency electronic circuits, which are most frequently used in biomedical instruments, will be conducted. Analysis of biosensors, biopotential electrodes, the measurements of biopotential signals including electrocardiogram (ECG), electroencephalogram (EEG) and electromyogram (EMG), blood pressure, blood flow, and respiratory system will be conducted. Laboratory work on basic biomedical electronics and instrumentation will be performed.

EGRB 308. Biomedical Signal Processing. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisites: MATH 301 and 310; PHIS 309 and 310; EGRB 215. Explores the basic theory and application of digital signal processing techniques related to the acquisition and processing of biomedical and physiological signals including signal modeling, AD/DA, Fourier transform, Z transform, digital filter design, continuous and discrete systems.

EGRB 310. Biomechanics. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisites: EGRB 203, EGRB 215, PHIS 309 and PHIS 310. Corequisites MATH 301 and MATH 310. A study of the forces, stresses and strains in the human body during normal function. Emphasis is placed on the mechanics of various components of the body including hard (bone) and soft (skin, vessels, cartilage, ligaments, tendons) tissues from a structure-function perspective. Stress and strain relationships for these biomaterials will be analyzed based upon the fundamentals of engineering mechanics. In addition, the distinctive features of biological materials will be studied with respect to their differences from nonliving materials and elaborated upon in laboratory exercises using material evaluation protocols.

EGRB 315. Computational Methods in Biomedical Engineering II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGRB 215, MATH 301 and MATH 310. The goals of this course are to: (1) prepare software skills for using LabVIEW for collecting real-time data from sensors, process information and control actuators and (2) prepare mechanical design skills using SolidWorks for designing structures and mechanisms, as well as performing simple analyses for assessing mechanical design criteria.

EGRB 401. Biomedical Engineering Senior Design Studio. 3 Hours.
Semester course; 9 laboratory hours. 3 credits. Prerequisites: EGRB 301, EGRB 303, EGRB 307, EGRB 308, EGRB 310, EGRB 315 and EGRB 427, each with a minimum grade of C. Enrollment restricted to students with senior standing in the Department of Biomedical Engineering or by permission of instructor. A minimum of nine laboratory hours per week is dedicated to the design, development and execution of the senior design (capstone) project for biomedical engineering under the direction of a faculty research adviser in biomedical engineering or an acceptable substitute as determined by the course coordinator. Tasks include team meetings (for team projects), brainstorming, sponsor advising, designing, fabrications, assembling, reviewing, studying, researching, testing and validating projects. Monthly progress reports are due to the research adviser and course coordinator. At the end of the first semester, each team will orally present to the BME faculty project background information and discuss potential technical approaches and deliverables.

EGRB 402. Biomedical Engineering Senior Design Studio. 3 Hours.
Semester course; 9 laboratory hours. 3 credits. Prerequisites: Completion of EGRB 401 with a minimum grade of C. A minimum of nine laboratory hours per week is dedicated to the design, development and execution of the senior design (capstone) project for biomedical engineering under the direction of a faculty research adviser in biomedical engineering or an acceptable substitute as determined by the course coordinator. Tasks include team meetings (for team projects), brainstorming, sponsor advising, designing, fabrications, assembling, reviewing, studying, researching, testing and validating projects. Monthly progress reports are due to the research adviser and course coordinator. Final project reports must be submitted before the end of the semester. All design teams must participate in the School of Engineering public poster session. At the end of the semester and conclusion of the two-semester design process, teams must present their final designs and deliverables before the BME faculty.

EGRB 403. Tissue Engineering. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: junior standing in engineering and PHIS 309 and 310, or permission of instructor. Study of the design, development and clinical application of tissue engineered components for use in the human body. Analysis of biology, chemistry, material science, engineering, immunology and transplantation as pertains to various tissue engineered components including blood vessels, bone, cartilage, pancreas, liver and skin.

EGRB 405. Finite Element Analysis in Solid Mechanics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGRB 310 and MATH 301. Finite element analysis as presented in this course is a numerical procedure for solving continuum mechanics problems that cannot be described by closed-form mathematical solutions. Emphasis will be placed on understanding the theoretical basis for the method, using a commercial software program, and understanding the volume of information that can be generated. Applications to both one- and two-dimensional problems in solid mechanics and biomechanics will be explored.

EGRB 406. Artificial Organs. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: PHIS 309 and PHIS 310 (or equivalents), EGRB 303, 307 and 310, or permission of instuctor. This course explores the design, operating principles and practices regarding artificial organs and their use in the human body. Analysis of dialysis systems for kidney replacement, artificial hearts and heart assist devices, cardiac pacemakers, sensory organ assist and replacement devices, and artificial liver and pancreas devices. Design aspects, legal ramifications, regulatory issues and clinical implantation issues will be addressed.

EGRB 407. Physical Principles of Medical Imaging. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: junior standing in the School of Engineering and PHYS 208. A study of the physical principles and basic clinical uses of medical imaging. Analysis of radiation and interaction of radiation, generation and control of X-rays, X-ray diagnostic methods, X-ray computed tomography (CT), magnetic resonance imaging (MRI) and ultrasonic imaging will be conducted. Basic principle of radionuclide imaging also will be introduced.

EGRB 408. Advanced Biomedical Signal Processing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGRB 308. This course will briefly review the basic theory of discrete-time signal processing techniques in biomedical data processing. Advanced signal processing techniques including adaptive signal processing, wavelets, spectral estimation and multirate signal processing will be employed. Specific examples utilizing electrocardiogram (ECG) and other biological signals are provided. Topics covered are alternance phenomenon in biological systems, late potential in ECG, intrapotential in ECG and coherence analysis.

EGRB 409. Microcomputer Applications in Biomedical Engineering. 3 Hours.
Semester course; 2 lecture and 3 laboratory hours. 3 credits. Prerequisite: EGRB 307. Covers microcomputer applications (hardware and software) as applied to biomedical science and biomedical engineering. Basic hardware components of a microcomputer are discussed with particular reference to configurations needed for analyzing biomedical events. Software applications including data encoding, data storage, graphical interfaces and real-time processing are explored for analysis of physiological and biomedical signals. Students will develop algorithms using LabView and MatLab to solve problems in biomedical engineering in the laboratories.

EGRB 410. Cellular Engineering. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: PHIS 309 and PHIS 310, both with minimum grades of C. This course will be a detailed study of the structure and function of the cell from an engineering perspective. Fundamental molecular biology, cell biology and biochemistry topics (cellular structure, signal transduction, cell adhesions, cytoskeleton) will be introduced. Engineering principles (kinetics, transport, mechanics, thermodynamics, electrochemical gradient) will be applied to these topics. Emphasis is placed on methods to disrupt, enhance or mimic in vivo cellular function in biomedical applications.

EGRB 411. Cell Mechanics and Mechanobiology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGRB 310 and EGRB 410 with minimum grades of C or permission of instructor. Focusing on cellular-extracellular matrix interactions, students will gain a quantitative understanding of the way cells detect, modify and respond to the physical properties within the cell environment. Coverage includes the mechanics of single-molecule polymers, polymer networks, two-dimensional membranes, whole-cell mechanics and mechanobiology. Mechanobiology topics include cancer and development, pulmonary system, cardiovascular system, and the nervous system. Students will gain understanding of techniques in cellular manipulation and quantification of cellular forces.

EGRB 412. Regenerative Engineering and Medicine. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGRB 410 or equivalent with minimum grade of C. Students will apply fundamental concepts of cell and molecular biology, biochemistry, medicine and pathology, as well as material science and engineering principles to design novel strategies for cell and drug delivery, tissue engineering and regenerative medicine. Emphasis will be placed on designs and methods to solve current complex biomedical problems.

EGRB 413. Computational and Experimental Models of Cellular Signal Transduction. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGRB 215 and EGRB 410 with minimum grades of C. Students will study the process by which an extracellular protein binding event is transduced and interpreted as an incoming signal into a cell. Students will learn the biology of cellular signal transduction and will also learn how to apply computational models and experimental techniques to predict and investigate these pathways. Students will follow the course of a protein within a signal transduction cascade, from binding to a receptor, activating intracellular pathways, inducing new transcription and translation and targeting of the protein to its final location. Students will develop MATLAB-based mathematical models to predict signal transduction dynamics, and then will study experimental techniques that are used to both disrupt and measure signal transduction.

EGRB 420. Assistive Technology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGRE 206 or equivalent; EGRB 310; and PHIS 309 and PHIS 310 or equivalents; or permission of instructor. Enrollment is restricted to biomedical engineering students or with permission of instructor. This course explores the principles and practice regarding the development of assistive technology for individuals with disabilities. The course will address the human user considerations that need to be taken into account in developing technology for individuals with different disabilities or multiple disabilities. It will also provide a general overview of current technology and software algorithms used. The four main areas of assistive technology that will be considered are for the deaf and hard of hearing, individuals who are blind and visually impaired, individuals with cognitive impairments, and individuals with motor impairments.

EGRB 421. Human Factors Engineering. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: PHIS 309 and PHIS 310 (or equivalents), and EGRB 310. This course explores the principles and practices regarding ergonomics and human factors engineering and the interaction of biomedical engineering with human function. Analysis of the functions of the human body regarding motion, sensory mechanisms, cognition and interaction with the environment will be included. Interactions of the human body with technology, workplaces, equipment and computers will be examined. Design of workplaces for optimal human performance will be discussed. Analysis of the design and arrangement of controls and displays will be covered.

EGRB 422. Human Performance Measurement Engineering. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGRB 307, EGRB 308, PHIS 309 and PHIS 310 or equivalent; and EGRB 421, each completed with a minimum grade of C, or by permission of instructor. Enrollment is restricted to biomedical engineering majors or with permission of instructor. Course explores the principles and practices of human performance measurement including direct and indirect measurement techniques and analysis. Course addresses the subjective, psychophysical and physiological methods related to the measurement, analysis and quantification of human performance.

EGRB 423. Rehabilitation Engineering and Prostheses. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGRB 203, PHIS 309 and PHIS 310, or permission of instructor. Enrollment restricted to biomedical engineering majors or with permission of instructor. This course explores the principles and practices regarding the development of rehabilitation therapy devices and prostheses. The course will further address the human user and factors that must be considered when developing devices and engineering solutions for individuals with different therapy and prosthetic needs. The course will also provide a general overview of current technologies and the engineering principles behind these designs.

EGRB 427. Biomaterials. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: junior standing in biomedical engineering, PHIS 309 and 310, or permission of instructor. Principles of materials science as it relates to the use of materials in the body. Characterization of biomaterials. Study of the properties of biomedical materials used as implants, prostheses, orthosis and as medical devices in contact with the human body. Analysis of physical, chemical, thermal and physiological response factors associated with materials and implant devices used in the human body.

EGRB 507. Biomedical Electronics and Instrumentation. 3 Hours.
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. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: Calculus and ordinary differential equations (MATH 200-201, MATH 301 or equivalent). Presents basic mechanical properties of materials, describes methods of material testing and introduces techniques for analyzing the solid and fluid mechanics of the body. Considers topics such as stress/strain relationships, particle mechanics, and force balances.

EGRB 517. Cell Mechanics and Mechanobiology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: previous course in biomechanics and a previous cell biology course, or permission of instructor. Graduate-level students will gain a quantitative understanding of cellular mechanics and the way cells detect, modify and respond to the physical properties within the cell environment. Students will gain a thorough understanding of relevant primary literature and mathematical models. Both experimental and theoretical approaches toward cell mechanics and mechanobiology will be addressed. Emphasis will be placed upon cells from the nervous, cardiovascular and pulmonary systems. Cancer cell mechanotransduction will also be addressed.

EGRB 603. Biomedical Signal Processing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: Calculus and differential equations (MATH 301 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. 3 Hours.
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, EPROM programming and bus structure and interfacing.

EGRB 611. Cardiovascular Dynamics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Pre- or corequisite: PHIS 501 or PHIS 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. 3 Hours.
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 prostheses and braces, effect of vibration and impact on the body, mathematical and other models of the body.

EGRB 613. Biomaterials. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: Undergraduate material science or permission of the instructor. Primary and secondary factors determining the performance 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. 3 Hours.
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. Includes generation and detection of images, consideration of system design and qualitative image analysis.

EGRB 616. Cell Engineering. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PHIS 501. This course will cover the cell and its engineering principles with an emphasis on current research techniques. Topics covered include the organization and structure of the cell, cell signaling, and application of cell biology to biomedical research. Advanced methods are taught enabling students to interpret and present findings from primary literature.

EGRB 618. Regenerative Engineering and Medicine. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: undergraduate or graduate level physiology or permission of instructor. Study of the design, development and clinical application of regenerative medicine strategies. Analysis of molecular and cellular engineering, biomaterials and tissue engineering, stem cell biology, and immunology as they pertain to pre-translational and clinically used regenerative medicine therapies, as well as the regulatory and ethical considerations of their implementation.

EGRB 619. Computational and Experimental Models of Cellular Signal Transduction. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Corequisite: EGRB 616 or permission of instructor. In this course students will study the process by which an extracellular protein binding event is transduced and interpreted as an incoming signal into a cell. Students will learn the biology of cellular signal transduction, as well as how to apply computational models and experimental techniques to predict and investigate these pathways. The course will follow the course of a protein within a signal transduction cascade, from binding to a receptor, activating intracellular pathways, inducing new transcription and translation, and targeting of the protein to its final location. Students will develop MATLAB-based mathematical models to predict signal transduction dynamics and then study experimental techniques that are used to both disrupt and measure signal transduction.

EGRB 635. Modeling for Biomedical Engineers. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: Permission of instructor. Applies mathematical modeling techniques to biomedical systems. Covers linear and nonlinear systems, deterministic and random systems, large systems, ecosystems, numerical techniques, graph theoretical approaches and simulation packages. Utilizes examples of biochemical, physiological and pharmacokinetic systems throughout.

EGRB 670. Advanced Molecular Modeling Theory and Practice. 3 Hours.
Semester course; lecture and laboratory hours. 3 credits. Prerequisite: MEDC 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. 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.

EGRB 690. Biomedical Engineering Research Seminar. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Presentation and discussion of research reports and topics of current interest to the program seminar or special group seminar.

EGRB 691. Special Topics in Biomedical Engineering. 1-4 Hours.
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. 1-15 Hours.
Semester course; 1-15 credits. Research leading to the M.S. degree or elective research projects for other students.

BIOSTATISTICS (BIOS)

BIOS 513. Mathematical Statistics I. 3 Hours.
Continuous course; 3 lecture 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. Crosslisted as: STAT 513.

BIOS 514. Mathematical Statistics II. 3 Hours.
Continuous course; 3 lecture hours. 3 credits. Prerequisite: STAT 513/ BIOS 513. 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. Crosslisted as: STAT 514.

BIOS 516. Biostatistical Consulting. 1 Hour.
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.

BIOS 524. Biostatistical Computing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Techniques for biostatistical computing are presented by way of contemporary statistical packages. Students learn how to create and manage computer data files. Methods for data entry, preparation of data for analysis and summaritive procedures are covered. Students learn the basics of random number generation and its applications, numerical methods for statistical algorithms, and concepts of numerical accuracy and stability. Advanced topics include interactive matrix and macro languages. Emphasis is placed on computational methods and data management rather than on statistical methods and procedures.

BIOS 531. Clinical Epidemiology. 3 Hours.
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. Epidemiological concepts necessary for 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. Graduate Research Methods I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment is restricted to students with graduate standing, or one course in statistics and permission of instructor. This course is intended for graduate students and researchers without formal training in the statistical and biostatistical sciences. Students enrolled in this course will study various aspects of the research process, from creating the research question to publication. Particularly, students will learn sampling theory, the roles of probability, chance and variability in measurement and decision-making, study design characteristics and validity, basic data management, visualization and summarization, simple techniques for analyzing categorical data (e.g., chi-square test, exact tests), common techniques for analyzing continuous data (t-tests, analysis of variance, correlation and simple linear regression), and statistical decision-making. These topics will be covered through a variety of approaches, including traditional lecture, group discussion and in-class activities, and students will be assessed on their ability to understand statistical considerations in the study design process, appropriately perform simple statistical procedures and report statistical findings using the IMRaD format. The appropriate use of data management and statistical procedures will be modeled using several commonly used software packages. Students may receive degree credit for only one of STAT 543, BIOS 543 or STAT 641. BIOS 543 is not applicable toward the M.S. degree in mathematical sciences or the M.S. degree in computer science.

BIOS 544. Graduate Research Methods II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOS 543 or STAT 543 or permission of instructor. This course is intended for graduate students and researchers without formal training in the statistical and biostatistical sciences. Students enrolled in this course will study various aspects of statistical model-building, including adjusting estimates for other measurements, creating multivariate models, analyzing noncontinuous outcomes and summarizing results. Particularly, students will learn multiple linear regression, multifactor analysis of variance, analysis of covariance, random and mixed effects models, repeated measure and longitudinal data analysis, logistic and Poisson regressions, and time-to-event analysis. These topics will be covered through a variety of approaches, including traditional lecture, group discussion and in-class activities, and students will be assessed on their ability to understand statistical considerations in the model-building process, appropriately perform intermediate statistical procedures and report statistical findings using the IMRaD format. The appropriate use of data management and statistical procedures will be modeled using several commonly used software packages.

BIOS 546. Theory of Linear Models. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOS 513 and BIOS 553. Review of linear algebraic concepts and matrix operations. Topics include generalized inverses and systems of equations; distribution of quadratic forms under normal theory; general linear model of full rank and less-than-full rank; least squares and maximum likelihood estimation; hypothesis testing; multiple linear regression; analysis of variance; balanced and unbalanced design.

BIOS 547. Applied Data Analysis in Public Health I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Corequisite: EPID 547. This course is the first in a two-semester sequence in biostatistical methods for students in the Master of Public Health program. Basic probabilistic and statistical concepts will be introduced, such as probability theory and distributions, hypothesis testing, and sampling methodology. The course will also focus in detail on commonly used statistical methods for categorical and continuous measurements, including chi-square tests, t-tests, ANOVA and regression. The material will be motivated by data sets from public health studies.

BIOS 548. Applied Data Analysis in Public Health II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Corequisite: EPID 548. This course is the second in a two-semester sequence in biostatistical methods for students in the Master of Public Health program. Advanced statistical methods commonly used in public health research will be covered, including ANOVA, multiple linear regression, ANCOVA, mixed effects models, repeated measure designs, logistic regression and survival analysis. The material will be motivated by data sets from public health studies.

BIOS 549. Spatial Data Analysis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOS 543 and BIOS 544 or permission of instructor. Introduces students to spatial data and the statistical methods to appropriately analyze them. Covers spatial data visualization and manipulation, spatial point pattern analysis, interpolation and geostatistics for point-referenced data, and spatial regression modeling of areal data. Includes the use of a statistical software package for data analysis.

BIOS 553. Biostatistical Methods I. 4 Hours.
Semester course; 4 lecture hours. 4 credits. Prerequisites: one course in statistics and permission of instructor. Introduces applied biostatistical concepts intended primarily for graduate students in the Department of Biostatistics. Topics include linear algebra for statistical algorithms, distributions of quadratic forms, simple and multiple linear regression, model selection and regression diagnostics, analysis of variance and covariance, and linear mixed effects models.

BIOS 554. Biostatistical Methods II. 4 Hours.
Semester course; 4 lecture hours. 4 credits. Prerequisite: BIOS 553. Continued study of applied biostatistical concepts intended primarily for graduate students in the Department of Biostatistics. Topics include categorical data analysis, generalized linear models, generalized linear mixed models, generalized additive models, non-linear regression and survival analysis.

BIOS 567. Statistical Methods for High-throughput Genomics Data I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOS 524 and 546; and BIOS 544 or 554; or permission of instructor. Provides a detailed overview of all aspects pertaining to the preprocessing and analysis of data from high-throughput genomic experiments, such as normalization techniques, expression summaries, quality control assessments and data reduction methods. Presents strategies for class and identification of important molecular features. Includes hands-on experience using statistical software for processing and analyzing genomic data.

BIOS 571. Clinical Trials. 3 Hours.
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. Analysis of Biomedical Data I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: one course in statistics and permission of instructor. This course provides an overview of the analysis of continuous response data. The material begins with a brief review of theoretical tools used in inference and segues into common univariate and bivariate statistical methodologies for the analysis of continuous response data. Model-based statistical methodologies including linear regression, ANOVA, ANCOVA and mixed-effect models will also be covered. Practical consideration and usage of statistical methods, utilizing commonly used statistical software packages, will be emphasized over theoretical underpinnings of the methods.

BIOS 573. Analysis of Biomedical Data II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOS 572. This course provides an overview of the analysis of categorical data. The course begins with a brief review of commonly used probability distributions for binary, ordinal, count and time-to-event measurements, then segues into chi-square and tabular testing. Model-based statistical methods including logistic regression, Poisson regression, log-linear modeling and survival analysis will be covered. Practical consideration and usage of statistical methods, utilizing commonly used software packages, will be emphasized over the theoretical underpinnings of the methods.

BIOS 610. Research Processes and Methods for the Health Professions. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOS 531 or permission of instructor. Focus on research processes, methods and research proposal (RO1) writing for the health professions. Course will emphasize conceptual underpinnings of research; the continuum of methodologies, including qualitative date collection; and development of a relevant research question -- all toward writing a fundable proposal. Topics include framing a relevant research question, writing a problem statements and aims, synthesizing and critiquing relevant literature, project management, developing project budget and justification, as well as critically reviewing grants and serving on a mock study section.

BIOS 615. Advanced Inference. 4 Hours.
Semester course; 4 lecture hours. 4 credits. Prerequisite: BIOS/STAT 513, BIOS/STAT 514 or permission of instructor. Mathematical preliminaries: probability and expectation, modes of convergence, delta method, statistical limit theorems; ARE; asymptotic likelihood-based procedures. Decision theoretical approach to statistical inference; decision rules; admissibility. Bayes procedures. Point estimation; unbiasedness; efficiency. Hypothesis testing: the Neyman-Pearson theory; unbiasedness and invariant tests; conditional tests; likelihood-based tests. Nonparametric statistics: U statistics, rank-based tests, permutation test. Interval estimation; confidence sets; relationship between confidence sets and families of tests. Algorithms in statistical computation: EM algorithm, Newton Raphson method. Modern methods for controlling false discovery rate.

BIOS 616. Advanced Inference. 4 Hours.
Continuous courses; 4 lecture hours. 4 credits. Prerequisite: BIOS 514 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 procedures, invariance; 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. Asymoptotics; stochastic convergence; statistical limit theorems; ARE; asymptotic likelihood based procedures. Overview of robust statistical procedures.

BIOS 621. Nonparametric Statistical Methods. 3 Hours.
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-, two- and k-sample problems. Tests of randomness, Kolmogorov-Smirnov tests, analysis of contingency tables and coefficients of association. Crosslisted as: STAT 621.

BIOS 625. Categorical Data Analysis and Generalized Linear Models. 4 Hours.
Semester course; 4 lecture hours. 4 credits. Prerequisites: BIOS 514, 554 and 572. Introduction to the theory and methods of analysis of categorical data. Topics include exact and asymptotic analysis of contingency tables; measures of association and agreement; theory and applications of generalized linear models, maximum likelihood estimation and related numerical methods; linear models with different link functions and distributions; model fitting; and diagnostics.

BIOS 631. Mixed Models and Longitudinal Data Analysis. 4 Hours.
Semester course; 4 lecture hours. 4 credits. Prerequisites: BIOS/STAT 514, 546 and 554. Introduction to longitudinal data structures and statistical inference. Multivariate theory and applications of normal mixed models, generalized linear mixed models, mixed models for categorical data, nonlinear mixed models and multiple imputation methods for missing data.

BIOS 632. Multivariate Analysis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOS/STAT 514 and 554. One-and two-sample multivariate tests; invariance: MANOVA, MANCOVA and multiple design models; nonparametric methods; inference with covariance matrices; principal components; factor analysis; discriminate analysis; clustering.

BIOS 638. Statistical Design and Analysis in Toxicology. 3 Hours.
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; probit and logit 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 639. Statistical Design and Analysis in Toxicology. 3 Hours.
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; probit and logit 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOS 514 and 554 or permission of instructor. The analysis of survival (or failure time) data, with/without censoring. 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to students with graduate status in mathematical sciences or systems modeling and analysis, or permission of the instructor. Philosophy, terminology and nomenclature for response surface methodology, analysis in the vicinity of the stationary point, canonical analysis, description of the response surface, rotatability, uniform information designs, central composite designs and design optimality. Crosslisted as: STAT 650.

BIOS 660. Sequential Analysis and Advanced Design and Analysis of Clinical Trials. 3 Hours.
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 analysis 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. Statistical Learning and Data Mining. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOS 514, 524 and 554. Provides a detailed overview of statistical methods used to discover the underlying structure of large complex datasets. Specific topics will include discrimination analysis, k-nearest neighbors, naive Bayes classifiers, classification and regression trees, ensemble methods, random forests, L1 penalized models, bootstrap and cross-validation methods. The course includes hands-on experience using statistical software for each method.

BIOS 668. Statistical Methods for High-throughput Genomic Data II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOS 567. A continuation of BIOS 567 that will introduce methods of additional high-throughput genomic assays, including comparative genomic hybridization for copy number change analysis and next generation sequencing methods. Methods that will be addressed include issues in mapping reads, variability in representation of sequences, normalization of raw count data, ChIP-Seq analysis, and RNA-Seq analysis.

BIOS 671. Nonlinear Models. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOS 554. Nonlinear modeling is an important tool for biostatisticians working with clinical and pre-clinical applications of dose responsiveness. Addresses issues regarding estimation, inference and experimental designs associated with nonlinear models. Special attention is paid to sigmoid-shaped models and threshold or piecewise models. Both the generalized nonlinear least-squares and quasi-likelihood estimation criteria are developed for these models. In addition to the usual univariate data structure, nonlinear mixed models are described and illustrated with examples. Includes hands-on experience with available SAS software for data analyses.

BIOS 688. Applied Bayesian Biostatistics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Introduces the basic paradigm of Bayesian statistics along with the tools toward application of the methods in various data analysis situations. Covers Bayesian point estimation, interval estimation and model selection in univariate and multiparameter cases. Both conjugate and nonconjugate problems will be discussed. Modern Bayesian computation tools, such as rejection sampling, importance sampling, Gibbs sampling and Metropolis-Hastings algorithm, will be introduced with details of applied examples. A first introduction to Bayesian nonparametrics will also be done.

BIOS 690. Biostatistical Research Seminar. 1 Hour.
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. 1-4 Hours.
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 692. Special Topics. 1-3 Hours.
Semester course; 1-3 variable hours. 1-3 credits. Lectures, tutorials, library assignments in selected areas not available in other courses or as part of the research training. Graded as S/U/F.

BIOS 697. Directed Research in Biostatistics. 1-15 Hours.
Semester course; 1-15 credits. Research leading to the M.S. or Ph.D. degree and elective research projects for other students.

BRANDCENTER (BRND)

BRND 602. Introduction to Account Planning. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to Brandcenter students only. Building student understanding of the foundational principles of account/strategic planning practiced in advertising agencies. Focus will be on immersion into a range of consumer research tools and application of learning in the creative brief development and communication planning process.

BRND 608. Accounting for Communication Professionals. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to Brandcenter students. Course goal is to equip nonfinancial advertising students with the basic concepts of accounting and to apply their understanding of these principles to specific managerial situations within the advertising agency, brand management and marketing department environments. Students will also develop a framework for analyzing media results, ROI and various market/brand plan outcomes.

BRND 609. Information Architecture. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Designing and building information in the new media space. Students learn the power of user interaction, efficient usability and digital ergonomics. Information architecture is the effective coordination and selection of information -- what you leave out is as important as what you leave in. Students will be familiar with tracking data and site analytics for the best brand experience. Truly good design work always looks to break new ground or tries to explore new territory; this course is no exception.

BRND 620. Brand Design for Brand Managers. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to Brandcenter students only. Building student understanding of the role of design in its various forms within the marketing mix. Focused on design theory and covers all aspects of design and platforms and how consumers perceive brand essence.

BRND 621. Strategy and Design. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to Brandcenter students only. Building students' understanding of the role of strategists and experience designers working as a team.

BRND 622. Visual Storytelling. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The goal of this class is to take a story and translate it successfully to the screen. Class will include lectures and technology sessions. Classes will be be divided between discussions about existing films and spots, and classes devoted to learning the use of lights, cameras and software editing. Three short films will be produced.

BRND 623. Physical Computing I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to Brandcenter students only. Conceptualizing projects with brands in mind and creating prototypes and making sure the final output fits the brand it is paired with. This class will yield actual working prototypes that can help get across the function and look to a design/engineering team to create a production model.

BRND 624. Physical Computing II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: BRND 623. Restricted to Brandcenter students only. Dives deeper and builds off the content learned in the prerequisite course.

BRND 625. Comms Planning and UX. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to Brandcenter students only. This class will instruct students on traditional tools such as Simmons, add in new media channel tools such as Sysomos and give students a foundation on the skill set of comms planning and the incorporation of UX attributes into their strategic work.

BRND 627. Visual Storytelling and Design for Strategists. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to Brandcenter students only. The goal of this class is to take a story and translate it successfully to the screen. Class is geared to strategy students. Basic production techniques will be taught. By the end of the semester, students will be able to write, produce, shoot and edit a variety of commercial and viral video pieces. Short films will be produced. In order to bring this visual sensibility to all their work, strategists will be taught key design software that will enable them to improve the communication value of their written and presentation work.

BRND 629. Strategic Thinking. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to Brandcenter 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.

BRND 630. Problem Solving for Art Directors. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Restricted to Brandcenter students only. Explores the media of print, Internet and television to develop and understand the basis of good design and art direction. Will work through the process of visual concepts and execution.

BRND 631. Craft. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Restricted to Brandcenter students only or by permission of instructor. Explores the delivery of concepts to an audience to determine how the message is received. Will teach how to attack a problem, how to work through a creative block and how to be a better judge of your own work.

BRND 632. Foundations of Brand Management. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Restricted to Brandcenter students only. Provides students with an overview of the major tasks facing today's product/brand managers, including analyzing the market, developing objectives and strategies for products and services, and making decisions about price, promotion, distribution channels, customer service and advertising. Uses the product/marketing plan as the unifying framework and, via a heavy concentration on case study, takes a "hands-on" approach toward preparing students to assume positions in brand management.

BRND 633. User Participation Platforms. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Harness the power of Web users by designing within the architecture of user participation. Branding is no longer a one-way communication model. This course focuses on understanding and managing the communications from consumers to other consumers via the Web. Students will learn to cultivate organic growth and orchestrate grassroots efforts, as well as explore considerations in physical computing and augmentation of technology within someone's reality.

BRND 635. Creating Gravitational Pull. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Driving traffic to websites. Includes search engine optimization and search engine marketing, but goes way beyond. Designing integrated brand campaigns linking different channels and media types to take consumers on a journey with different touch points, channels and devices. Students will use proven strategies and design campaigns to have a live website and pull visitors to it. Students are expected to demonstrate their abilities on live sites where the effectiveness of their efforts is realized in real-time results.

BRND 638. Brand Engagement. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to Brandcenter students only or by permission of instructor. Enhancing consumers' brand experience. Students explore interactive ways to engage consumers. Core aspects of the future of the Web are explored. Students will be familiar with current engagement techniques, and they will create new ways to connect with consumers. Emphasis on the creation of ideas of sufficient scope as to become the basis for ad campaigns covering many platforms, especially including the Web.

BRND 639. Cultural Impact: Advanced Account Planning. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to Brandcenter students only or by permission of instructor. Identify a cultural issue that can impact business results and formulate a hypothesis for investigating the issue. Students gain experience in identifying a research need, in developing a research plan and methodology and in fielding the plan. After research, students get experience determining what they have learned and knowing what it means to the client.

BRND 640. Problem Solving. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to Brandcenter students only or by permission of instructor. Focuses on developing ability to create well-written, creatively focused advertising copy that solves communications problems. Addresses headline and body copy issues through presentation of students' work and research on major copywriters and their work.

BRND 647. Insights and Implications: Applied Strategic Planning. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to Brandcenter students only or by permission of instructor. Learn to formulate insights, to understand implications from the insights and to form conclusions that help to build a brand. This course is the natural follow-up to BRND 639. The emphasis shifts slightly from team-based projects to more individual, thesis-like projects. Students demonstrate that they have evolved from researchers and fact finders to strategists who can turn data into valuable information.

BRND 648. Innovation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to Brandcenter students only or by permission of instructor. This course will challenge students to learn the techniques of innovators in business and the community. The course combines lectures and instruction with a semester-long innovation competition in partnership with global brands. Both invention and execution will be explored.

BRND 649. Brand Analytics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to Brandcenter students only. Learning and applying statistical methodologies for analytics in order to make smart decisions for effective brand management. Techniques for decision-making are explored along with Web analytics, performance metrics and ROI.

BRND 651. Creative Thinking. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Restricted to Brandcenter students only. 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.

BRND 652. Concept Development. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: BRND 651. Develops students' ability to create visually effective work that targets specific groups of consumers through ongoing review and discussion sessions designed to pinpoint strategies and create relevant visually oriented ideas quickly. Emphasizes a teamwork approach to art direction and concept development.

BRND 653. Portfolio Development. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: BRND 652. Focuses student toward creative solutions to communication problems. Addresses specific strategies including briefs and concept work that require extensive copy. Emphasizes a team approach to copywriting and art direction.

BRND 659. Brand Experiences. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to Brandcenter students only. Provides thorough coverage for designing comprehensive brand communications for real-world clients that involve physical experiences for consumers. Projects will force students to think about every aspect of the consumer experience including store appearance, product selection, employee behavior and the purchasing process. An emphasis will be placed on producing comprehensive campaigns that develop strategic and creative brand experiences for customers.

BRND 662. Research Methodologies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to Brandcenter students only or by permission of instructor. Review a variety of qualitative and quantitative research techniques as well as an introduction to writing creative briefs. Students will learn how to translate research into insightful creative and business platforms. This is a practical course that prepares students to be senior-level strategic thinkers throughout their careers.

BRND 663. Team Building and Leadership for Brand Managers. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to Brandcenter students only. Course will be focused on equipping future brand managers with a managerial "toolkit" comprised of practical management and leadership techniques appropriate to the unique managerial requirements of the brand management discipline. Techniques will include topics such as facilitating interdisciplinary collaboration, strategic organizational structure, managing change and crisis management among others.

BRND 664. Persuasion. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to Brandcenter students only or by permission of instructor. This course offers an intensive in skills necessary to persuade when presenting work and ideas. Topics such as voice delivery, personal style, effective presentation of creative work, storytelling and capturing audience attention will be covered. Student presentations will be critiqued and videotaped for analysis.

BRND 667. Applied Brand Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to Brandcenter students only. Exposes students to detailed, practical information about the tools and tactics used to apply inventive brand strategies. Students will be exposed to managerial functions involving marketing and project management, while being challenged to synthesize and simplify complex information in order to create actionable plans. A portion of the course is dedicated to the use of a simulation case, "Pharmasim," which allows students to test theories and get real-time feedback on the likely results of their decisions.

BRND 668. Advanced Brand Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to Brandcenter students only. Involves intensive, interactive exploration of factors that affect the success of brands. Students study brand delivery systems from product and packaging design through sales channels to the ultimate consumer. The curriculum combines individual casework and team assignments to ground students in the art and science of strategy development. Students are also exposed to guest lecturers with brand management and integrated marketing expertise. Since brand managers must direct and manage the efforts of colleagues and agencies not under their control, there is a concentration on developing forceful, persuasive communication skills.

BRND 670. Creative Fusion. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Restricted to Brandcenter students only. Integrating new branding methods with traditional approaches (like advertising, public relations and direct marketing) to develop powerful, coordinated and synergistic campaigns.

BRND 673. Experimentation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to Brandcenter students only. Creative tracks working together in teams to create shifts in established paradigm and executing a prototype of these solutions.

BRND 677. The Business of Branding. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Requires students to develop ideas ranging from strategic to tactical and from rational to emotional. Students will be called on to develop and examine ideas that differentiate brands, build sales and affect market share. The new business process will be considered and successful presentation techniques will be evaluated. Ethical considerations faced by industry practitioners will be explored.

BRND 690. Supervised Business Study. 3 Hours.
Semester course; 6 laboratory hours. 3 credits. Restricted to Brandcenter students only. Working under close faculty supervision, students partner with local, real-life organizations to develop brand strategies. Students take responsibility for their learning of applied brand management. Each student is responsible for securing approval from the organization involved and for submitting a proposal to the faculty at the start of the semester. Work is centered on a specific brand challenge currently being faced by the organization. Examples may include a product launch, the reposition of an existing brand, the extension of a product line or the re-energizing of a declining brand.

BRND 695. Internship: Brandcenter. 1 Hour.
Semester course; 1 credit. Restricted to Brandcenter students only. Selected students will receive on-the-job training under the supervision of the instructor and employer. Internships are available in a variety of branding opportunities.

BRND 696. Advanced Portfolio. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to Brandcenter students only. 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. Individual development of concepts and materials necessary for the creation of mini-books and portfolios under one-on-one instruction. Independent projects pursued specifically for individual portfolio development.

BUSINESS (BUSN)

BUSN 201. Foundations of Business. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 112 or both ENGL 295 and HONR 200. Introduces students to basic business environments and business functions and practices. Builds awareness of corporate social responsibility and ethical business behavior. Helps students gain an integrated awareness of business and practice analytical skills needed for their advanced business courses and careers.

BUSN 202. Foundations of Business II. 3 Hours.
Continuous courses; 3-3 lecture hours. 3-3 credits. Prerequisite: BUSN 201 with a minimum grade of C. First semester: Introduces students to basic business environments, entrepreneurial thinking, and business functions and practices. Helps students gain an integrated awareness of business and practice analytical skills needed for their advanced business courses and careers. Second semester: Examines business functions and practices needed for sustainable business operation, building on knowledge and skills from BUSN 201 and executing or analyzing an integrated project or comprehensive case analysis. Students should take BUSN 202 immediately following BUSN 201.

BUSN 225. Winning Presentations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to School of Business freshmen, sophomores and juniors in the foundation or advanced programs. Why are some presenters bad, some good and others great? Why do some people have more “presence” than others? What leadership skills work in a room full of people who are not on the same page? How does one pitch an idea in less than two minutes? Presentation skills involve more than just speaking in public. Good presentation skills require an understanding of yourself, your subject and your audience. This course will explore the skills involved in mastering all of these.

BUSN 291. Topics in Business. 1-3 Hours.
Semester course; 1-3 variable hours. 1-3 credits. May be repeated for credit with different topics for a maximum of 6 credits. Study of current topics in the field of business providing specialized course work that provides deeper, more in-depth understanding. See Schedule of Classes for topics offered each semester and prerequisites as determined by instructor.

BUSN 293. Internship in Business. 1-3 Hours.
Semester course; 1-3 variable hours. 1-3 credits. May be repeated for credit with different topics for a maximum of 6 credits. Enrollment restricted to School of Business major or minor with permission of associate dean for undergraduate studies. Intention to enroll must be indicated to the instructor or director prior to advance registration for semester of credit. Exposes students to working in a business environment, enhances professionalism and develops rapport with employers. The course allows students to earn academic credit while gaining real-world experience in order to enhance their business education. May be used as an elective in the business foundation program but cannot count toward the advanced business program. Each credit requires 80 hours in the internship.

BUSN 323. Legal Environment of Business. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to students who have achieved sophomore standing. Basic legal concepts applicable to business, including the legal aspects of operating a business, contracts, employment relationships, sales, and bailments and commercial paper. Also includes ethical considerations and social and political influences. Students may not receive degree credit for both BUSN 323 and ACCT/MGMT 481.

BUSN 325. Organizational Communication. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: BUSN 225 or the equivalent. This course is restricted to students majoring in the School of Business who have completed at least 54 credit hours (junior standing). A study of interpersonal, team and organizational communication practices in modern dynamic work and virtual environments. This course includes dealing with written business messages, report writing, job-search techniques, nonverbal communication, oral presentations and intercultural communication. The focus will include both theoretical constructs and skill development.

BUSN 329. Introduction to Intercultural Communication. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to students who have completed at least 54 credit hours (junior standing). An introduction to the basic concepts, principles and skills for improving verbal and nonverbal communication with persons from different cultures. Using a cultural general approach, topics discussed include the concept of culture, barriers to intercultural communication, verbal communication process and nonverbal communication aspects. Appropriate for business and non-business majors.

BUSN 391. Topics in Business. 1-3 Hours.
Semester course; 1-3 variable hours. 1-3 credits. May be repeated for credit with different topics for a maximum of 6 credits. Study of current topics in the field of business providing specialized course work that provides deeper, more in-depth understanding. See Schedule of Classes for topics offered each semester and prerequisites as determined by instructor.

BUSN 400. Principles of Consulting. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: junior status and acceptance into International Consulting Program. Corequisite: BUSN 401. Intended to provide students with “formal” training in how to conduct consulting engagements. The course is designed to teach students how to conduct consulting engagements by providing academic background through readings and lectures, real-world perspectives from practicing consultants, and practice application through simulations and cases. The course culminates in a consulting engagement with a real client from the Richmond business community to provide the students with an opportunity to apply the consulting skills they learned in the classroom.

BUSN 401. International Consulting Practicum. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: junior status and acceptance into International Consulting Program. Corequisite: BUSN 401. Intended to provide students with an opportunity to apply the lessons learned about consulting in BUSN 400 to a real business client in a foreign country.

BUSN 490. Emerging Topics in Business. 1-3 Hours.
Semester course; 1-3 variable hours. 1-3 credits. May be repeated for credit with different topics for a maximum of 6 credits. Emerging topics in business designed to provide material not covered by an existing course or program. May be general business or multidisciplinary. See Schedule of Classes for topics offered each semester and prerequisites as determined by instructor.

BUSN 491. Special Topics in Business. 1-3 Hours.
Semester course; 1-3 variable hours. 1-3 credits. May be repeated for credit with different topics for a maximum of 6 credits. Study of current topics in the field of business providing specialized course work that provides deeper, more in-depth understanding. See Schedule of Classes for topics offered each semester and prerequisites as determined by instructor.

BUSN 492. Independent Study in Business. 1-3 Hours.
Semester course; 1-3 variable hours. 1-3 credits. May be repeated for credit with different topics for a maximum of 6 credits. Prerequisites: School of Business major and permission of instructor. Students must submit a written proposal to be approved by the supervising instructor prior to registration. The number of credit hours will be determined by the director of undergraduate studies. Intensive study under the supervision of a faculty member in an area not covered in-depth or contained in other School of Business courses and/or independent investigation and research of business problems through readings, data collection and analysis. Written and oral progress reports as well as a final report and presentation are required.

BUSN 493. Internship in Business. 1-3 Hours.
Semester course; 1-3 variable hours. 1-3 credits. May be repeated for credit with different topics for a maximum of 6 credits. Prerequisites: School of Business major and permission of associate dean for undergraduate studies. Intention to enroll must be indicated to the instructor or director prior to advance registration for semester of credit. Involves students in a meaningful experience, typically 20 hours per week, in a setting appropriate to business. Written interim and final reports required.

BUSN 601. Studies in Contemporary Business Issues: ____. 1 Hour.
Semester course; 1 lecture hour; content delivered online. 1 credit. May be repeated for a maximum of six credits. Enrollment restricted to students in the online MBA program. Course provides advanced study and analysis of contemporary business issues.

BUSN 610. On-campus Residency. 1 Hour.
Semester course; 1 lecture hour. 1 credit. May be repeated for a maximum of three credits. Enrollment restricted to students in the online MBA program. MBA faculty will lead this two-day residency immersion session offering activities such as seminars, case and/or simulation assignments, and meetings with business and thought leaders to enhance team-building, leadership and professional development skills. Students will be evaluated on face-to-face presentation skills, group interaction and career development plans. Graded as pass/fail.

BUSN 700. Principles of Scientific Inquiry in Business. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A seminar on the philosophical and epistemological foundations of scientific inquiry as they relate to research in business and its allied disciplines. The focus will be on the underlying logic, elements, reach and limits of alternative frameworks, such as positivism, empiricism and Bayesean analysis, and the conditions under which each is the preferred method of inquiry.

BUSN 701. Research Methods in Business. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: admission to Ph.D. program and permission of instructor. A seminar on the design of research in business, including the philosophy of science, theory development and the design of research capable of testing hypotheses, analytic levels, measurement theory and methods, and research design alternatives.

BUSN 702. Research Analysis in Business. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 524 or equivalent and acceptance into the doctoral program. Study of the scientific method as currently applied in business and organizational research, with emphasis on the conduct of studies, data analysis and presentation of empirically based knowledge.

CHEMICAL AND LIFE SCIENCE ENGINEERING (CLSE)

CLSE 101. Introduction to Engineering. 3 Hours.
Semester course; 2 lecture and 3 laboratory hours. 3 credits. Prerequisites: course open to first-year students majoring in chemical and life science engineering. Introduction to chemical and life science engineering. Topics covered include ethics and social responsibility; engineering design process; engineering solutions; estimations and approximations; dimensions, units and conversions; mathematics and computer solutions; life-long learning; introduction to the interface between engineering, biology and medicine.

CLSE 102. Methods in CLSE. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: CLSE 101. An introduction to problem formulation and solution methods for chemical and life science engineering. Typical chemical and life science engineering scenarios will be presented. Emphasis will be placed on identifying and formulating problems based on presented scenarios.

CLSE 115. Introduction to Programming for Chemical and Life Science Engineering. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisite: MATH 200. Introduction to the concepts and practice of structured programming. Topics include problem-solving, top-down design of algorithms, objects, basic syntax, control structures, functions and arrays.

CLSE 201. Chemical Engineering Fundamentals I: Material Balances. 4 Hours.
Semester course; 3 lecture and 1 recitation hours. 4 credits. Prerequisites: CLSE 115, CHEM 102 and MATH 201. The first of two introductory chemical and life science engineering courses. Covers material balances on steady-state chemical processes.

CLSE 202. Chemical Engineering Fundamentals II: Energy Balances and Engineering Thermodynamics. 4 Hours.
Semester course; 3 lecture and 1 recitation hours. 4 credits. Prerequisites: CLSE 201 with a minimum grade of C, CHEM 101-102 and MATH 200-201 or equivalents. The second of two introductory chemical and life science engineering courses. Covers energy balances on steady-state chemical processes, computer-aided balance calculations, balances on transient processes and introduction to thermodynamics.

CLSE 301. Transport Phenomena I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CLSE 202 with a minimum grade of C; PHYS 208 and MATH 301. Basic concepts of transport phenomena as applied to chemical and life science engineering. Topics include transport of mass momentum and energy in single and multidimensions.

CLSE 302. Transport Phenomena II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CLSE 301 and 305. Concepts of transport phenomena as applied to chemical and life science engineering. Topics include advanced multicomponent, multiphase systems, integral analysis, and an integrated view of momentum, heat and mass transport in unit operations.

CLSE 305. Thermodynamics of Phase Equilibria and Chemical Reactions. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CLSE 202 with a minimum grade of C and MATH 307. Thermodynamic properties of fluids and mixtures, partial molar quantities, phase equilibria, activity coefficients and correlations, equations-of-state, chemical reaction equilibria for liquid, vapor and multiphase reactions, and the use of equations-of-state and activity/fugacity correlations to obtain the thermodynamic functions required for the calculation of chemical reaction equilibrium constants. Computing using Excel VBA is a required component of this course.

CLSE 306. Industrial Applications of Inorganic Chemistry. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CHEM 302 and CHEZ 302. Chemical engineering students: EGRC 201 and EGRC 205. A study and analysis of the most important industrial applications of inorganic chemistry, with emphasis on structure/properties correlation, materials and energy balance, availability and logistics of starting materials, economic impact and environmental effects. Crosslisted as: CHEM 306.

CLSE 312. Chemical Reaction Engineering. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CLSE 301 and 305. Introduces the student to the analysis of reactors via coupling of empirical reaction rates and thermodynamic constraints with reactor material and energy balances. The behavior of the ideal reactor types (batch, CSTR and PFR) is emphasized with attention given to departure from these ideals by real systems.

CLSE 320. Instrumentation Laboratory. 2 Hours.
Semester course; 6 laboratory hours. 2 credits. Prerequisites: CLSE 301 and CLSE 305. This laboratory introduces students to a variety of measurement instruments used in modern chemical engineering laboratories and process plants. Detailed laboratory reports are required for each of the experiments undertaken by the students.

CLSE 325. Bioengineering. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CLSE 201 and BIOL 151 or BIOL 152. An introductory and survey level course required for all chemical engineering students. This course introduces concepts and principles of chemical engineering to problems and issues in the life sciences, biotechnology and medicine. Students apply heat and mass transfer concepts, separations and controls to topics that include clinical diagnostics, bioanalytical instrumentation, biosensors and biochips, bioprocess engineering including fermentation, biochemical pathway engineering, protein folding and aggregation, bioreactors and tissue engineering.

CLSE 402. Senior Design Studio I (Laboratory/Project Time). 2 Hours.
Semester course; 6 laboratory hours. 2 credits. Prerequisites: senior standing in chemical and life science engineering and participation in a senior design (capstone) project; CLSE 301, 302, 305 and 312. A minimum of six laboratory hours per week dedicated to the execution phase of the senior design (capstone) project, which should meet appropriate engineering standards and multiple realistic constraints. Tasks include team meetings, brainstorming, sponsor advising, designing, fabrications, assembling, reviewing, studying, researching, testing and validating projects.

CLSE 403. Senior Design Studio II (Laboratory/Project Time). 2 Hours.
Semester course; 6 laboratory hours. 2 credits. Prerequisites: senior standing in chemical and life science engineering and participation in a senior design (capstone) project; CLSE 402. A minimum of six laboratory hours per week dedicated to the execution phase of the senior design (capstone) project, which should meet appropriate engineering standards and multiple realistic constraints. Tasks include team meetings, brainstorming, sponsor advising, designing, fabrications, assembling, reviewing, studying, researching, testing and validating projects.

CLSE 405. Process Synthesis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CLSE 302, 305 and 312. A senior technical elective. Students synthesize flowsheets for existing and newly proposed chemical and biochemical products. Quantitative tools learned in earlier courses are used to examine the technical and economic feasibility of the flowsheets. Written bi-weekly status reports are required from each student and each student completes a process synthesis and analysis as a semester project.

CLSE 409. Process Control in Chemical and Life Science Engineering. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CLSE 301 and 305. Covers process control as applied to chemical and life science engineering with many practical examples. Topics include time and frequency domain analysis, multivariable processes and applications to chemical and biochemical production and processing.

CLSE 428. Introduction to Polymer Science and Engineering. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CLSE 302, 305 and 312, and CHEM 302, or equivalents. A senior technical elective. The course offers an introduction to the chemistry, physical properties and processing of polymers. Topics include step and chain polymerization, structure/property relationships, mechanical properties of plastics and elastomers, solution properties, methods for polymer characterization, and processing techniques.

CLSE 440. Unit Operations Laboratory. 2 Hours.
Semester course; 6 laboratory hours. 2 credits. Prerequisites: CLSE 302, 305 and 312. Students carry out experiments with chemical and biochemical reactors, energy exchangers, fluid flow networks and other unit operations. Detailed laboratory reports are required for each of the experiments undertaken.

CLSE 450. Undergraduate Research in Chemical and Life Science Engineering. 1-6 Hours.
Semester course; variable hours. Up to 6 credits. Undergraduate research under the supervision of a faculty member. Specific topics vary depending on the interests of the student and the adviser. Registration requires approval of the student's academic adviser and research adviser.

CLSE 460. Undergraduate Honors Research in Life Sciences Engineering. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Corequisites: BIOL 218, CLSE 302. An undergraduate honors research course for academically talented juniors and seniors requiring advanced work and an honors thesis on a topic relevant to life sciences engineering. Topics and credit hours will be chosen in consultation with a sponsoring faculty member.

CLSE 461. Stem Cell Engineering. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 218, CLSE 302. The production and behavior of adult and embryonic stem cells are studied and potential applications for the treatment of disease are surveyed. Stem cell engineering techniques including parthenogenesis, nuclear transfer stem cells and embryonic carcinoma cells are introduced. The use of stem and germ cells for cloning is covered, and ethical considerations involving the use of embryonic human stem cells are discussed.

CLSE 543. Advanced Reaction Engineering. 3 Hours.
Semester 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.

CLSE 544. Applied Transport Phenomena. 3 Hours.
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. Molecular mechanisms of momentum transport, energy transport and mass diffusion are utilized to develop an engineering analysis of a given process. This molecular approach is complemented with macroscopic mass, momentum and mechanical energy balances.

CLSE 549. Process Biotechnology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Designed to provide a rational basis addressing 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.

CLSE 560. Protein Engineering. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to students with senior or graduate standing in the School of Engineering or School of Pharmacy, or by permission of instructor. This course focuses on the structure-function characterization of proteins and the quantification of protein-protein interactions for the design of novel protein and peptide therapeutics. Additional topics include biochemistry of proteins for engineers, large scale, batch production and manufacturing techniques for biologics.

CLSE 561. Stem Cell Engineering. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 218 and CLSE 302. The production and behavior of adult and embryonic stem cells are studied and potential applications for the treatment of disease are surveyed. The importance of the extracellular matrix in cell differentiation and proliferation is established. Stem cell engineering techniques including parthenogenesis, nuclear transfer stem cells and embryonic carcinoma cells are introduced. The use of stem and germ cells for cloning, stem cells and tissue rejection, and ethical considerations in the use of embryonic human stem cells are discussed.

CLSE 562. Advanced Systems Biology Engineering. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 218, CLSE 115, and CLSE 302. The system-level properties of biology will be surveyed to understand how DNA leads to cellular behavior through complex molecular interactions. Theoretical and experimental concepts associated with high-throughput data (genomics, transcriptomics, metabolomics, fluxomics, proteomics), cellular regulation and computational modeling will be introduced. Bioinformatic analysis, integration of data and current challenges are discussed.

CLSE 563. Metabolic Engineering. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 218, CLSE 115, and CLSE 302. The principles and methods used in metabolic engineering of microbes will be covered. Theoretical and experimental concepts associated with metabolite production, strain design, strain construction and strain characterization will be introduced. Design principles, metabolic engineering challenges, metabolic engineering applications and ethical considerations of genomic alterations are discussed.

CLSE 570. Molecular Physiology and Microanatomy for Chemical and Life Science Engineering. 4 Hours.
Semester course; 3 lecture and 2 laboratory hours. 4 credits. Prerequisites: BIOL 218 and CLSE 302. Understanding physiology from the molecular perspective of cellular biochemical mass action kinetics, molecular diffusion and transport, biomolecular separation processes, and dynamic biochemical control theory is key to the engineering and design strategies for medical intervention in disease and human health. This course explores these biomolecular dynamic events in human physiology with an emphasis on the application of the fundamental biochemical transport phenomena, kinetics and separation processes, and dynamic control theory. Laboratory component emphasizes living, single-cell manipulation and analysis methods, such as patch clamp devices, and the microanatomy of internal organs.

CLSE 575. Nanotechnology in Life Science and Engineering. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to students with senior or graduate standing in the School of Engineering or Department of Chemistry, or with permission of instructor. Nanobiotechnology is the application of nano- and micro-fabrication methods to build tools for exploring the world of biological systems. This course will introduce the principles and practice of microfabrication techniques and perspectives in the field of nanobiotechnology. Lectures will cover interdisciplinary topics such as biomolecules at interfaces, biosensors, micro- and nano-fabrication strategies, self-assembly, nanoparticles, micro- and nano-devices and microfluidics.

CLSE 645. Biosensors and Bioelectronic Devices. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course develops the methodologies used in the design, fabrication and application of biosensors and bioelectronic devices to monitoring problems in the environmental, medical and chemicals industries. Fundamentals of measurement science will be applied to optical, electrochemical, mass and thermal means of signal transduction. Fundamentals of surface science will be used to interpret bio-immobilization, biofouling and non-specific interactions of enzymes, antibodies and DNA at surfaces.

CLSE 650. Quantitative Analysis in Chemical and Life Science Engineering. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 301. An understanding of the quantitative descriptions of chemical and biological processes is required for engineering analysis, including prediction and design. Analytical approaches are necessary to simplify and provide limits of complex behavior. These approaches include perturbation theory and scaling, density functional formulations, control theory, and stability theory. This course represents the applied mathematical foundations on equilibrium and nonequilibrium analysis of chemical and biological systems.

CLSE 654. Equilibrium Analysis in Chemical and Biological Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CLSE 305. Provides a molecular-based, thermodynamic framework for the quantitative equilibrium analysis of a broad range of biological and chemical processes. Contemporary equations of state, liquid solution models and elementary statistical mechanics are used to predict the behavior of molecules. Important issues addressed include the estimation of solvation and partitioning of molecules between phases or media, the calculation of free energy changes associated with cellular events and prediction of order/disorder phenomena.

CLSE 655. Nonequilibrium Analysis in Chemical and Life Science Engineering. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CLSE 301, CLSE 302 and MATH 301. An understanding of the spatial and temporal dynamics of biological systems is key to many cellular events including cell signaling processes, second messenger systems, positive and negative feedback control, transcription, translation, and many more. This course introduces nonequilibrium (dynamic) analysis as applied to biological and chemical systems.

CLSE 656. Advanced Chemical Reaction Engineering. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 301 and CLSE 312. This course builds upon fundamental principles of chemical reaction engineering including integration of mass balances, reactor design equations and chemical rate laws. Emphasis is given to development of mathematical models and computational simulation of chemical reaction systems with multiple reactions. Additional topics include analysis of systems with unknown reaction parameters and mechanisms and bioprocess/biochemical approaches to chemical production.

CLSE 660. Biomolecular and Computational Engineering. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CLSE 650. Dynamic analysis of interacting cellular events, including cell signal pathways, clock reactions, etc., often requires large-scale computational approaches. Furthermore, these techniques are necessarily time dependent requiring unique methodologies, such as multi-time scale methods. This course introduces the subject of real-time biomolecular simulations.

CLSE 675. Polymers in Medicine. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course is based on the need for integration of engineering and materials science of polymers with applications in life science engineering. Basic principles of polymer science including structural concepts at the molecular-, nano-, micro- and macro-scales are emphasized so that the student can understand structure/function correlation. The course treats polymer synthesis, molecular weight, morphology and surface science at an introductory level, but quantitative correlations are emphasized. Surface science is emphasized, as medical applications are often dependent on the interaction of a solid polymer with an in vivo environment (tissue, blood, membrane). The polymers chosen for emphasis include polyethylene (hip, knee replacement), poly(vinylchloride) (bood bags, catheters), polyurethanes (artificial heart, wound care) and silicones (implants, catheters). The use of polymers in drug delivery applications is explored, including osmotic-pressure-driven drug delivery. Concepts surrounding polymeric surface modifiers are developed, including applications such as enhanced biodurability and biocidal function.

CLSE 690. Research Seminar in Chemical and Life Science Engineering. 1 Hour.
Semester course; 1 lecture hour. 1 credit. May be repeated up to eight times. Presentations and discussions of current problems and developments in life science engineering by faculty and visiting lecturers.

CLSE 691. Special Topics in Chemical and Life Science Engineering. 1-4 Hours.
Semester course; 1-4 lecture hours. 1-4 credits. Prerequisites: At least one graduate-level engineering course and permission of the instructor. Lectures, tutorial studies, library assignments in selected areas of advanced study or specialized laboratory procedures not available in other course offerings or as part of research training.

CLSE 692. Independent Study in Chemical and Life Science Engineering. 1-5 Hours.
Semester course; 1-3 lecture and/or 0-4 laboratory hours. 1-5 credits. Prerequisites: graduate standing or permission of instructor. The student must submit a prospectus to the graduate committee for approval and identify a faculty member willing to supervise the course. Investigation of specialized engineering problems through literature search, mathematical analysis, computer simulation and/or experimentation. Written and oral reports, final report and examination required.

CLSE 697. Directed Research in Chemical and Life Science Engineering. 1-9 Hours.
Semester course; variable hours. 1-9 credits. Prerequisite: graduate standing or permission of instructor. Research directed toward completion of the requirements for the M.S. or Ph.D. in engineering, with concentration in chemical and life science engineering, under the direction of an engineering faculty member and advisory committee. Graded S/U/F.

CHEMICAL BIOLOGY (CHEB)

CHEB 601. Chemical Biology I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides an overview of the structure and function of biological macromolecules from a chemical biology perspective. The course will be divided into three sections -- nucleic acids, proteins and carbohydrates. Each section will initially focus on the thermodynamic properties of these macromolecules including the energetics of folding, thermodynamics of interactions and, for catalytic molecules, the kinetics of catalysis. Citing literature examples, the class will then focus on how small molecules have been used to uncover these properties.

CHEB 602. Chemical Biology II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Focuses on four broad areas of chemical biology: drug discovery (combinatorial chemistry, high throughput screening), natural product synthesis (combinatorial biochemistry), signal transduction (chemical genetics, pathway engineering) and protein translation (Phage display, in vitro translation/ sections). Each area will begin with a brief overview followed by several examples based on the current literature.

CHEB 690. Research Seminars in Chemical Biology. 1 Hour.
Semester course; 1 lecture hour. 1 credit. May be repeated for credit. Seminars presented by students, staff and visiting lecturers where current problems and developments in chemical biology are discussed. Graded as P/R.

CHEB 697. Chemical Biology Research Rotations. 1,2 Hour.
A research rotation laboratory course that gives students different experiences and allows them to choose a research supervisor. Students will learn the theory and practice of advanced chemical biology research methods in a research lab setting. Students will be mentored by a postgraduate student, postdoctoral fellow or technician. At the end of each rotation, the students will give a presentation on the laboratory work done at that time. The lab hours are a minimum of three hours per week to achieve significant experience, but it is expected that students will put in appropriate time to achieve meaningful results in the laboratory setting. Graded as S/U/F.

CHEMISTRY (CHEM)

CHEM 100. Introductory Chemistry. 3 Hours.
Semester course; 3 lecture and 1 problem session hour. 3 credits. Prerequisite: students must be eligible to take MATH 131 or higher. A course in the elementary principles of chemistry for individuals who do not meet the criteria for enrollment in CHEM 101; required for all students without a high school chemistry background who need to take CHEM 101-102. These credits may not be used to satisfy any chemistry course requirements in the College of Humanities and Sciences.

CHEM 101. General Chemistry. 3 Hours.
Continuous courses; 3 lecture and 1 recitation hour. 3-3 credits. Prerequisite: CHEM 100 with a grade of C or higher, or high school chemistry and a satisfactory combination of Math SAT score and high school GPA. Pre- or corequisite: MATH 151. Prerequisite for CHEM 102: CHEM 101 with a grade of C or higher. Fundamental principles and theories of chemistry, including qualitative analysis.

CHEM 102. General Chemistry. 3 Hours.
Continuous courses; 3 lecture and 1 recitation hour. 3-3 credits. Prerequisite: CHEM 100 with a grade of C or higher, or high school chemistry and a satisfactory combination of Math SAT score and high school GPA. Pre- or corequisite: MATH 151. Prerequisite for CHEM 102: CHEM 101 with a grade of C or higher. Fundamental principles and theories of chemistry, including qualitative analysis.

CHEM 110. Chemistry and Society. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The basic principles of chemistry are presented through the use of decision-making activities related to real-world societal issues. Not applicable for credit toward the B.S. in Chemistry.

CHEM 112. Chemistry in the News. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The basic principles of chemistry are used to interpret newspaper and magazine articles of current interest relating to chemistry in manufacturing, the global environment and medicine. Not applicable for credit toward the B.S. in Chemistry.

CHEM 301. Organic Chemistry. 3 Hours.
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisite: CHEM 102 with a minimum grade of C. Prerequisite for CHEM 302: CHEM 301 with a minimum grade of C. A comprehensive survey of aliphatic and aromatic compounds with emphasis on their structure, properties, reactions, reaction mechanisms and stereochemistry.

CHEM 302. Organic Chemistry. 3 Hours.
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisite: CHEM 102 with a minimum grade of C. Prerequisite for CHEM 302: CHEM 301 with a minimum grade of C. A comprehensive survey of aliphatic and aromatic compounds with emphasis on their structure, properties, reactions, reaction mechanisms and stereochemistry.

CHEM 303. Physical Chemistry. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CHEM 309 or CLSE 201 with minimum grades of C, and PHYS 202 or PHYS 208, and MATH 201 or MATH 301 or MATH 307. Ideal and nonideal gases, thermodynamics, free energy and chemical equilibrium.

CHEM 304. Physical Chemistry. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CHEM 303 with a minimum grade of C. Kinetics, solution thermodynamics, heterogeneous equilibria, electrochemistry and introductory biophysical chemistry.

CHEM 305. Physical Chemistry for the Life Sciences. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CHEM 301-302 and CHEM 309 with minimum grades of C; and MATH 200. Concepts and principles of physical chemistry as related to the life sciences, forensic science and the B.S in science programs. Major topics include thermodynamics of proteins and nucleic acids, enzyme kinetics and spectroscopic techniques useful in biophysical research such as circular dichroism, nuclear magnetic resonance and magnetic resonance imaging.

CHEM 306. Industrial Applications of Inorganic Chemistry. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CHEM 302 and CHEZ 302. Chemical engineering students: EGRC 201 and EGRC 205. A study and analysis of the most important industrial applications of inorganic chemistry, with emphasis on structure/properties correlation, materials and energy balance, availability and logistics of starting materials, economic impact and environmental effects. Crosslisted as: CLSE 306.

CHEM 309. Quantitative Analysis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CHEM 102 with a minimum grade of C, and MATH 151. Theory and practice of gravimetric, volumetric and instrumental analysis techniques and treatment of multiple equilibria in aqueous solutions.

CHEM 310. Medicinal Chemistry and Drug Design. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CHEM 302. 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. Crosslisted as: MEDC 310.

CHEM 320. Inorganic Chemistry I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CHEM 101-102 with minimum grades of C. A systematic, unified study of the structures, properties, reactions and practical applications of inorganic compounds.

CHEM 350. Guided Inquiry in Chemistry. 1.5 Hour.
Semester course; 1.5 lecture hours. 1.5 credits. Prerequisites: CHEM 101-102 with minimum grades of B. Student facilitators lead recitation sections using guided inquiry, group-based activities. Introduces students to the principles of guided inquiry, active learning and collaborative learning in chemistry through practical, hands-on class work, discussions, readings and a final project.

CHEM 351. Chemistry Preceptorship. 1.5 Hour.
Semester course; 1.5 lecture hours. 1.5 credits. Course may be repeated once for a total of 3 credits. Prerequisites: completion of relevant course with minimum grade of C, completion of CHEM 350 with a grade of B and permission of course instructor and departmental chair. Student facilitators lead recitation sections or laboratories in chemistry courses. Responsibilities vary and may include, but are not limited to, attending all classes, holding weekly review sessions or office hours and/or routine grading. A weekly reflection journal and final project are required.

CHEM 391. Topics in Chemistry. 1-4 Hours.
Semester course; variable hours. Variable credit. Maximum of 4 credits per semester; maximum total of 6 credits for all chemistry topics courses may be applied to the major. Prerequisites: CHEM 101-102 and CHEZ 101, 102. A study of a selected topic in chemistry. See the Schedule of Classes for specific topics to be offered each semester.

CHEM 392. Directed Study. 1-4 Hours.
Semester course; variable hours. 1-4 credits. May be repeated for a maximum total of 8 credits; only 3 credits are applicable to the chemistry major. Prerequisites: CHEM 102 and CHEZ 101 and 102. The independent investigation of chemical problems through readings and experimentation under the supervision of a research adviser. Written interim and final reports are required.

CHEM 398. Professional Practices and Perspectives Seminar. 1 Hour.
Seminar course; 1 lecture hour. 1 credit. Prerequisites: completion of 18 credits in chemistry. Seminar course for students considering careers in chemistry-related fields covering topics such as scientific professionalism and ethics, and using chemical literature.

CHEM 401. Applications of Instrumental Techniques in Organic and Forensic Chemistry. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisites: CHEM 302 and CHEZ 302. Theory and laboratory practice of instrumental and chemical methods applied to the analysis of organic compounds with emphasis on applications in forensic chemistry.

CHEM 403. Biochemistry I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CHEM 302 with a minimum grade of C. A presentation of structural biochemistry, enzymology, biophysical techniques, bioenergetics and an introduction to intermediary metabolism.

CHEM 404. Biochemistry II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CHEM 403 with a minimum grade of C. A presentation of metabolism and its regulation as integrated catoblism and anoblism of molecules that are essential to life.

CHEM 406. Inorganic Chemistry II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CHEM 304 and 320. An advanced study of inorganic chemistry, including inorganic spectroscopy, organometallic compounds and catalysis, and bioinorganic systems.

CHEM 409. Instrumental Analysis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CHEM 303 and 309, and CHEZ 309. Theory and practice of modern spectrophotometric, electroanalytical and chromatographic and nuclear magnetic resonance methods.

CHEM 491. Topics in Chemistry. 1-4 Hours.
Semester course; variable hours. Variable credit. Maximum of 4 credits per semester; maximum total of 6 credits for all chemistry topics courses may be applied to the major. Prerequisites: CHEM 102 and CHEZ 101 and 102. A study of a selected topic in chemistry. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

CHEM 492. Independent Study. 1-4 Hours.
Semester course; variable hours. 1-4 credits. May be repeated for a maximum total of 8 credits; only 3 credits are applicable to the chemistry major. Prerequisites: CHEM 102 and CHEZ 101 and 102. The independent investigation of chemical problems through readings and experimentation under the supervision of a research adviser. Written interim and final reports required.

CHEM 493. Chemistry Internship. 1-3 Hours.
Semester course; variable hours. Variable credit. Maximum of 3 credits; 1 credit will be given for each 150 hours (approximately one month) of part-time or full-time chemical work experience. Prerequisites: CHEM 102 and CHEZ 101 and 102. Acquisition of chemistry laboratory experience through involvement in a professional chemistry setting. Written progress and final reports will be required.

CHEM 498. Honors Thesis. 1 Hour.
Semester course; 1 credit. Prerequisites: completion of 29 credits in chemistry, including CHEM 398 and at least six credits of CHEM 492. Students submit to the Department of Chemistry a thesis based on their independent study research. Students also present their results to the department as a research seminar.

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

CHEM 506. Introduction to Spectroscopic Methods in Organic Chemistry. 1.5 Hour.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the biosynthetic origins, isolation, structure elucidation and uses of naturally occurring organic compounds. Emphasis is placed upon three major classes of compounds, carboaromatics, terpenes and alkaloids.

CHEM 510. Atomic and Molecular Structure. 3 Hours.
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. 3 Hours.
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 512. Applied Molecular Modeling. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Atomistic and coarse-grained force fields. Principles behind molecular simulations. Molecular dynamics and Monte Carlo approaches to problems in chemistry, molecular physics, biophysics and nanoscience. Thermodynamic and transport properties. Free energy calculations and rare event dynamics. Hands-on introduction to basic programming and operating systems. Suggested background: physical chemistry (CHEM 303) or thermodynamics with elements of statistical mechanics (PHYS 340, CHEM 511 or CHEM 612).

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

CHEM 550. Introduction to Polymer Chemistry. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of macromolecular compounds that includes classifications, 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. 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. 1-6 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An integrated study of the mechanism and stereochemistry of organic reactions and their application to organic synthesis. Emphasis is placed on addition and condensation reactions, carbanions, carbines, and other reactive intermediates.

CHEM 605. Physical Organic Chemistry. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The theory and application of physical methods in the study of the behavior of organic compounds. Topics covered include homogeneous kinetics, equilibria, acid-base catalysis, and the quantitative correlation of structure and reactivity as they apply to the understanding of the mechanisms of organic reactions.

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

CHEM 610. Applied Quantum Chemistry. 3 Hours.
Semester course; 3 lecture hours. 3 credits. 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. Suggested background: CHEM 510.

CHEM 611. Molecular Spectroscopy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. 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. Suggested background: CHEM 510.

CHEM 612. Modern Statistical Mechanics: Fundamentals and Applications. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Fundamental topics in modern equilibrium and non-equilibrium statistical mechanics, with applications to selected chemical, physical and biological systems. Suggested background: CHEM 510 and 511.

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

CHEM 616. Chemical Kinetics. 3 Hours.
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. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. . A coordinated study of synthetic methods, stereochemistry and reaction mechanisms including catalysis of inorganic, organometallic and bioinorganic compounds. Suggested background: CHEM 620.

CHEM 630. Electroanalytical Chemistry. 1.5 Hour.
Modular course; 3 lecture hours. 1.5 credits per module. Presents the theory and application of electroanalytical techniques including cyclic voltammetry, potential step methods and microelectrode voltammetry. Suggested background: CHEM 409 or equivalent experience.

CHEM 631. Separation Science. 1.5 Hour.
Modular course; 3 lecture hours. 1.5 credits per module. Students discuss theories and principles of separation science as applied to chemical problems with emphasis on current techniques, instrumentation and applications. Suggested background: CHEM 409 or equivalent experience.

CHEM 632. Chemometrics. 1.5 Hour.
Modular course; 3 lecture hours. 1.5 credits per module. 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. Suggested background: CHEM 409 or equivalent experience.

CHEM 633. Mass Spectrometry. 1.5 Hour.
Modular course; 3 lecture hours. 1.5 credits per module. Topics include mass spectrometry ionization methods, mass analyzers, theory and applications for ion structure determination. Suggested background: CHEM 409 or equivalent experience.

CHEM 634. Surface Science. 1.5 Hour.
Modular course; 3 lecture hours. 1.5 credits per module. 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. Suggested background: CHEM 409 or equivalent experience.

CHEM 635. Spectrochemical Analysis. 1.5 Hour.
Modular course; 3 lecture hours. 1.5 credits per module. 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. Suggested background: CHEM 409 or equivalent experience.

CHEM 690. Research Seminar in Chemistry. 1 Hour.
Semester course; 2 lecture hours. 1 credit. May be repeated for credit. In addition to reports presented by students, staff and visiting lecturers, current problems and developments in nanoscience and nanotechnology are discussed. Graded S/U/F.

CHEM 691. Topics in Chemistry. 1-6 Hours.
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 692. Chemistry Seminar Presentation. 1 Hour.
Semester course; 2 lecture hours. 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 693. Chemistry Perspectives and Ethics. 1 Hour.
Semester course; 1 lecture hour. 1 credit. The objectives of this course are to prepare graduate students for a career in the physical sciences and develop graduate student competency in the responsible conduct of research from both ethical and safety standpoints. Graded as S/U/F.

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

CHEM 698. Investigations in Current Chemistry Literature. 0.5 Hours.
Semester course; 1 lecture hour. 0.5 credit. May be repeated for credit. Up to 2 credits may be presented toward graduation requirements. Forum for graduate students to discuss recent literature in chemistry.

CHEMISTRY LAB (CHEZ)

CHEZ 101. General Chemistry Laboratory I. 1 Hour.
Semester course; 1 lecture and 2 laboratory hours. 1 credit. Pre- or corequisite: CHEM 101. Experimental work correlated with CHEM 101 with selected forensic science applications. Each student is charged for breakage incurred. Approved safety glasses are required. Failure to check out of laboratory upon withdrawal or for other reasons will incur a charge billed from the Student Accounting Department.

CHEZ 102. General Chemistry Laboratory II. 1 Hour.
Semester course; 1 lecture and 2 laboratory hours. 1 credit. Prerequisites: CHEM 101 and CHEZ 101 with minimum grades of C. Pre- or corequisite: CHEM 102. Experimental work includes qualitative analysis with selected forensic science applications. Each student is charged for breakage incurred. Approved safety glasses are required. Failure to check out of laboratory upon withdrawal or for other reasons will incur a charge billed from the Student Accounting Department.

CHEZ 110. Chemistry and Society Laboratory. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Pre- or corequisite: CHEM 110. Experimental work correlated with CHEM 110. Not applicable for credit toward the B.S. in Chemistry. Each student is charged for breakage incurred. Approved safety glasses are required. Failure to check out of laboratory upon withdrawal or for other reasons will incur a charge billed from the Student Accounting Department.

CHEZ 301. Organic Chemistry Laboratory I. 2 Hours.
Semester course; 4 laboratory hours. 2 credits. Prerequisites: CHEM 102 and CHEZ 102 with minimum grades of C. Pre- or corequisite: CHEM 301. Experimental work correlated with CHEM 301. Each student is charged for breakage incurred. Approved safety glasses are required. Failure to check out of laboratory upon withdrawal or for other reasons will incur a charge billed from the Student Accounting Department.

CHEZ 302. Organic Chemistry Laboratory II. 2 Hours.
Semester course; 4 laboratory hours. 2 credits. Prerequisites: CHEM 301 and CHEZ 301 with minimum grades of C. Pre- or corequisite: CHEM 302. Experimental work correlated with CHEM 302. Each student is charged for breakage incurred. Approved safety glasses are required. Failure to check out of laboratory upon withdrawal or for other reasons will incur a charge billed from the Student Accounting Department.

CHEZ 303. Physical Chemistry Laboratory I. 2 Hours.
Semester course; 4 laboratory hours. 2 credits. Prerequisites: CHEM 102 and CHEZ 102. Pre- or corequisites: CHEM 303, 309 and CHEZ 309. This course covers experiments in calorimetry, molecular and thermodynamic properties of gases and liquids, surfaces, electrochemistry, equilibria, polymers, phase diagrams, and biophysical chemistry. Extensive report writing, laboratory notebook writing and statistical analysis of data are emphasized. A final project may be required.

CHEZ 304. Physical Chemistry Laboratory II. 2 Hours.
Semester course; 4 laboratory hours. 2 credits. Prerequisites: CHEM 303, 309 and CHEZ 303, 309. Pre- or corequisite: CHEM 304. This course covers experiments in absorption and emission spectroscopy, infrared and Raman spectroscopy, NMR spectroscopy, kinetics, photochemistry, biophysical chemistry and modeling. Report writing, laboratory notebook writing and statistical analysis of data are emphasized. A final project may be required.

CHEZ 309. Quantitative Analysis Laboratory. 2 Hours.
Semester course; 1 lecture and 3 laboratory hours. 2 credits. Prerequisites: CHEM 102 and CHEZ 102 with minimum grades of C. Pre- or corequisite: CHEM 309. Laboratory associated with quantitative analysis. Includes practice in volumetric and instrumental laboratory techniques as applied to measurement sciences.

CHEZ 406. Inorganic Chemistry Laboratory. 2 Hours.
Semester course; 1 lecture and 3 laboratory hours. 2 credits. Prerequisites: CHEM 320 and CHEZ 102. Pre- or corequisite: CHEM 406. Examination of inorganic nonmetal, transition metal and organometallic compounds using modern inorganic methods of synthesis and characterization. Each student is charged for breakage incurred. Approved safety glasses are required. Failure to check out of laboratory upon withdrawal or for other reasons will incur a charge billed from the Student Accounting Department.

CHEZ 409. Instrumental Analysis Laboratory. 2 Hours.
Semester course; 4 laboratory hours. 2 credits. Prerequisites: CHEM 302, 304 and 309 with minimum grades of C; CHEZ 303 and 309 with minimum grades of C. Pre- or corequisite: CHEM 409. Practice of electrochemical, spectroscopic and chromatographic methods of analysis.

CHINESE (CHIN)

CHIN 101. Elementary Chinese. 4 Hours.
Continuous courses; 5 lecture/recitation hours. 4-4 credits. Prerequisite: completion of CHIN 101 to enroll in CHIN 102. Elementary grammar, reading and oral drill.

CHIN 102. Elementary Chinese. 4 Hours.
Continuous courses; 5 lecture/recitation hours. 4-4 credits. Prerequisite: completion of CHIN 101 to enroll in CHIN 102. Elementary grammar, reading and oral drill.

CHIN 110. Intensive Elementary Chinese. 8 Hours.
Semester course; 10 lecture and 10 laboratory hours. 8 credits. This intensive course combines CHIN 101 and 102 into a single-semester class. Students may receive credit toward graduation for either the CHIN 101-102 series or CHIN 110, but not both.

CHIN 201. Intermediate Chinese. 3 Hours.
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisite: completion of CHIN 201 to enroll in CHIN 202. Rapid review of the essentials of grammar, conversation and readings from Chinese literature.

CHIN 202. Intermediate Chinese. 3 Hours.
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisite: completion of CHIN 201 to enroll in CHIN 202. Rapid review of the essentials of grammar, conversation and readings from Chinese literature.

CHIN 210. Intensive Intermediate Chinese. 6 Hours.
Semester course; 6 lecture hours. 6 credits. This intensive course combines CHIN 201 and 202 into a single-semester class. Students may receive credit toward graduation for either the CHIN 201-202 series or CHIN 210, but not both.

CHIN 300. Chinese Vocabulary and Reading. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: completion of Chinese courses through the intermediate level or equivalent. Designed to increase written vocabulary and reading skills through an examination and discussion of literary works by famous Chinese writers. Conducted in Chinese.

CHIN 301. Practical Chinese Writing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: completion of Chinese courses through the intermediate level or equivalent. Designed to develop students' writing techniques and skills in several types of technical writing in Chinese (business, financial and law documents, memos and resumes). Conducted in Chinese.

CHIN 391. Topics in Chinese. 1-4 Hours.
Semester course; variable hours. 1-4 credits. May be repeated with different topics for a maximum of 16 credits. Prerequisite: CHIN 202 or 210. An in-depth study of selected topics in Chinese. See the Schedule of Classes for specific topics to be offered each semester.

CINEMA (CINE)

CINE 100. Visual Storytelling. 2 Hours.
Semester course; 1 lecture and 2 studio hours. 2 credits. Screenplay and mise en scene course examines the relationship of the performer and narrative to the cinematic frame without the use of an edit to disrupt the time/space relations in the shot. The student will write seven short scripts to explore the classical mise en scene concept and then produce, shoot or direct a final scene as part of a production team.

CINE 101. Visual Storytelling. 2 Hours.
Semester course; 1 lecture and 2 studio hours. 2 credits. Screenplay and mise en scene course examines the relationship of the performer and narrative to the cinematic frame with the use of linkage editing. The student will write a new script based on a classic scene and, working with performers, will block, shoot and edit their scene. The editing will consist of no more than four cuts.

CINE 200. Cinema Form and Concept I. 2 Hours.
Semester course; 2 lecture and 2 studio hours. 2 credits. Open only to B.A. in Cinema majors or with permission of instructor. Concepts, issues and processes involved in feature and short-form narrative filmmaking.

CINE 201. Cinema Form and Concept II. 2 Hours.
Semester course; 2 lecture and 2 studio hours. 2 credits. Open only to B.A. in Cinema majors or with permission of instructor. Concepts, issues and processes involved in feature and short-form narrative screenwriting and filmmaking.

CINE 300. Cinema Form and Concept III. 2 Hours.
Semester course; 2 lecture and 1 studio hours. 2 credits. Prerequisite: UNIV 200 or HONR 200. Open only to B.A. in Cinema majors or with permission of instructor. Concepts, issues and processes involved in feature and short-form narrative filmmaking including screenplay treatments and storyboards.

CINE 301. Cinema Form and Concept IV. 2 Hours.
Semester course; 2 lecture and 1 studio hours. 2 credits. Open only to B.A. in Cinema majors or with permission of instructor. Concepts, issues and processes involved in feature and short-form narrative filmmaking including the roles of dialogue and light.

CINE 390. Digital Cinema Production Intensive I. 15 Hours.
Semester course; 30 lecture and 10 studio hours. Additional evening and weekend hours for location filming and postproduction. 15 credits. Prerequisites: CINE 200 and 201 or permission of instructor. Open only to B.A. in Cinema majors or with permission of instructor. Production and postproduction of narrative short films using digital technology for camera, editing and sound, with an emphasis on the relationships among production crew roles and departments.

CINE 392. Independent Study in Film. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May be repeated for a maximum total of 6 credits. Prerequisites: junior standing as a major in cinema and approval of department chair and instructor. Individual instruction and supervision of a special project.

CINE 401. Advanced Cinema Production. 4 Hours.
Semester course; 2 lecture and 4 studio hours. 4 credits. Prerequisite: CINE 390 or permission of instructor. Open to junior and senior B.A. in Cinema majors. Lecture and workshop in the production, theory, business and historical context of film.

CINE 490. Digital Cinema Production Intensive II. 15 Hours.
Semester course; 30 lecture hours and 10 studio hours. Additonal evening and weekend hours for location filming and postproduction. 15 credits. Prerequisites: CINE 300, 301 and 390 or permission of instructor. Open only to B.A. in Cinema majors or with permission of instructor. Advanced production and postproduction of narrative short films using digital technology for camera, editing and sound, with the development of budgets, production schedules and rehearsals with performers.

CINE 491. Special Topics in Cinema. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated for 6 credits. Prerequisites: ARTH 270 and 271 or permission of instructor. An in-depth examination of selected topics. See the Schedule of Classes for specific topics to be offered each semester.

CINE 493. Film Internship. 3 Hours.
Semester course; variable hours. 3 credits. May be repeated up to a maximum of 6 credits. Open only to B.A. in Cinema majors or with permission of instructor. Supervised work experience related to the film industry.

CINE 495. Cinema as Art. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTH 270 and 271 or permission of instructor. An analysis of cinema as art, image, narrative and philosophy.

CINE 496. Advanced Screenwriting Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CINE 390. Open to junior and senior B.A. in Cinema majors. A study of the screenwriting process and writers on the subject including Aristotle, Joseph Campbell, David Mamet and Lajos Egri.

CINE 497. Expanded Cinema. 3 Hours.
Semester online course; 3 lecture hours. 3 credits. Open to junior and senior B.A. in Cinema majors or with permission of instructor. A lecture and workshop exploring film techniques that push the boundaries of conventional narratives through structure, content and ideas. Students examine filmmakers as film theorists and multimedia artists as filmmakers. Films studied range from feature narratives to short experimental films of all styles and genres.

CLINICAL AND TRANSLATIONAL RESEARCH (CCTR)

CCTR 520. Fundamentals of Research Regulation. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Focuses on the regulations that govern translational and clinical research. There will also be a series of discussions on the influence of international policies and research guidelines on the conduct of research. Topics include, but are not limited to, the history and current role of the FDA and the OHRP within the research arena; informed consent regulations relevant to federally funded research i.e., the common rule; informed consent regulations relevant to investigations conducted in support of a new drug application or an expanded marketing indication; good clinical practice guidelines; international conference on harmonization (ICH) conduction of research guidelines; HIPPA rules and regulations relevant to the conduction of research on human subjects; fiscal accountability/responsibility; and clinical trial registration and results reporting guidelines.

CCTR 630. Design Implications in Clinical Trials. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course focuses on designing intervention studies to achieve research objectives by selecting appropriate study samples, end points and trial designs. Specific topics include efficacy versus effectiveness trials and critiquing clinical trial protocols, with emphasis on evaluating strengths and weaknesses of trial design.

CCTR 631. Adaptive Clinical Trials. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: CCTR 630 or BIOS 571. This course is intended for the research scientist who is interested in advancing innovative trial designs and wishing to incorporate adaptations, modifications and changes to the clinical trial process. The goal is to enhance comprehension and methodologic skills in designing adaptive clinical trials for clinical investigators. The course provides an overview of the theoretical framework and key concepts of adaptive design methods in clinical trials. The design and implementation process are discussed through real-world examples. The feasibility, validity, integrity and efficiency of the trial designs will be stressed through comparisons between traditional fixed and adaptive trials. Graded as pass/fail.

CCTR 640. Team Science: Theories and Practice. 2 Hours.
Semester course; 2 lecture hours. 2 credits. In this seminar-style course, students will keep current by participating in presentations, discussion and writing on the topic of the science of team science. This course is designed to introduce students to research in the social sciences and to help build skills in critical-thinking, leading discussions, writing and providing succinct presentations. Teamwork is difficult and it is pervasive. Whether engaging in collaborative research or collaborating with others within a chosen profession, students will better understand how to be more effective at being team members as well as leading a team. Graded as pass/fail.

CCTR 690. Research Seminar in Clinical and Translational Sciences. 1 Hour.
Semester course; 1 lecture hour. 1 credit. The course will include student presentations and discussion of research topics and published papers of current interest within the broad field of the biomedical and biobehavioral sciences, focusing on interdisciplinary and systems-related research. Students will be required to make an oral presentation on their research the final semester they enroll in the course for credit. Students will keep current on new findings in the biomedical and biobehavioral sciences and, through presentations and the constructive critiques of course participants, will develop verbal research communication skills. Graded as S/U/F. M.S. students will be enrolled for three semesters; Ph.D. students for four semesters.

CCTR 691. Special Topics in Translational Research. 1-6 Hours.
Semester course; variable hours. 1-6 credits. Restricted to graduate students in clinical and translational sciences programs or by permission of instructor. Translational research improves the "bench-to-bedside" trajectory of health research and is a rapidly evolving field. This course provides exposure opportunities to learn about the latest issues surrounding translational research in various disciplines. Graded S/U/F.

CCTR 692. Special Topics in Translational Research. 1-6 Hours.
Semester course; variable hours. 1-6 credits. Restricted to graduate students in clinical and translational sciences programs or by permission of instructor. Translational research improves the "bench-to-bedside" trajectory of health research and is a rapidly evolving field. This course provides exposure opportunities to learn about the latest issues surrounding translational research in various disciplines.

CCTR 697. Directed Research in Clinical and Translational Sciences. 1-15 Hours.
Semester course; variable hours. 1-5 credits. May be repeated for credit. Research leading to the M.S. or Ph.D. degree and elective research projects for other students. Graded S/U/F.

CCTR 700. Master's Capstone Project. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course is the final "capstone" product for which a student should enroll after successfully completing 27 credits of didactic course work and directed research hours. Enrollment requires the approval of the program director and student's adviser. Students may select one of two options: 1) and NIH-style grant application demonstrating knowledge of the translational and clinical processes and the regulatory environment in which research is conducted or 2) a scientific research article to be submitted to a peer-reviewed journal. Students will demonstrate that they are able to integrate the core competencies of the master's program into problem resolution as evidenced by the development of a sound, well-written research project grant proposal or research article. Graded as S/U/F.

CCTR 702. Statistics for Genetic Studies I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to students in the psychiatric, behavioral and statistical genetics track of the clinical and translational sciences doctoral program or by permission of instructor. Teaches students statistical methods for multidisciplinary research, specifically presenting the mathematical components that underlie statistical analysis and including probability theory, statistical distributions, inference and linear models.

CCTR 703. Statistics for Genetic Studies II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to students in the psychiatric, behavioral and statistical genetics track of the clinical and translational sciences doctoral program or by permission of instructor. Builds upon the quantitative statistical methods from CCTR 702. Students will learn the mathematical components that underlie statistical analysis with a focus on maximum-likelihood methods and structural equation modeling. These components provide the necessary foundation for clinical and translational research and the advanced statistical genetic methods for understanding how genetic and environmental factors impact the development of psychiatric and substance abuse disorders.

CCTR 801. Clinical Practicum. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Designed to equip students with knowledge of the translational and clinical research processes and the environments in which research is conducted. Through participation in these practica, the student will observe and develop an appreciation for the role of clinical or translational scientists in the design, conduction and analysis aspects of human research, including data collection, analysis or monitoring; case management of protocol participants; recruitment and enrollment of human subjects; protection of subjects and subjects rights; development of informed consent documents; preparation of adverse event experience reports; construction or monitoring of case report forms; grand and budget development; report preparation; and education of other health care professionals, patients or families regarding clinical and translational studies, protocol development and program administration. Graded S/U/F.

CCTR 802. Research Practicum I. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Designed to equip students with knowledge of the translational and clinical research processes and the environments in which research is conducted. Through participation in these practica, the student will observe and develop an appreciation for the role of clinical or translational scientists in the design, conduction and analysis aspects of human research, including data collection, analysis or monitoring; case management of protocol participants; recruitment and enrollment of human subjects; protection of subjects and subjects' rights; development of informed consent documents; preparation of adverse event experience reports; construction or monitoring of case report forms; grand and budget development; report preparation; and education of other health care professionals, patients or families regarding clinical and translational studies, protocol development and program administration. Graded as S/U/F.

CCTR 803. Research Practicum II. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Designed to equip students with knowledge of the translational and clinical research processes and the environments in which research is conducted. Through participation in these practica, the student will observe and develop an appreciation for the role of clinical or translational scientists in the design, conduction and analysis aspects of human research, including data collection, analysis or monitoring; case management of protocol participants; recruitment and enrollment of human subjects; protection of subjects and subjects' rights; development of informed consent documents; preparation of adverse event experience reports; construction or monitoring of case report forms; grand and budget development; report preparation; and education of other health care professionals, patients or families regarding clinical and translational studies, protocol development and program administration. Graded as S/U/F.

CCTR 898. Dissertation Research in Clinical and Translational Sciences. 1-10 Hours.
Semester course; variable hours. 1-10 credits. Students will be required to complete a minimum of 15-30 credits under this course number directed toward completion of a dissertation. Prerequisite: admission to candidacy. Dissertation research with a strong interdisciplinary focus, as facilitated by the composition of the research advisory committee. Graded as S/U/F.

CLINICAL LABORATORY SCIENCES (CLLS)

CLLS 201. Introduction to Clinical Laboratory Science. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Open to students on the Monroe Park Campus who are interested in clinical laboratory science/medical technology as a career. Presentation and discussion of clinical laboratory science including an introduction to each of the specific areas of concentration, job opportunities in the profession and a tour of a hospital laboratory. Graded as pass/fail.

CLLS 300. Basic Concepts. 1.5 Hour.
Semester course; 1 lecture and 1 laboratory hours. 1.5 credits. An introduction to the basic concepts/techniques applicable to all laboratory science areas. Includes optical physics, quality control, laboratory safety, medical terminology and pipetting techniques along with other basic subjects.

CLLS 301. Hematology. 2-7.5 Hours.
Continuous courses; 4.5 lecture and 6 laboratory hours. 2-7.5 credits. Prerequisite: completion of CLLS 301 to enroll in CLLS 302. A study of the blood and blood-forming tissues. Emphasis is placed on hematologic techniques, accurate identification of normal and abnormal cells and their correlation with normal or pathologic conditions. An introduction to the hemostatic mechanism also is presented.

CLLS 302. Hematology. 1-4 Hours.
Continuous courses; 4.5 lecture and 6 laboratory hours. 2-7.5 credits. Prerequisite: completion of CLLS 301 to enroll in CLLS 302. A study of the blood and blood-forming tissues. Emphasis is placed on hematologic techniques, accurate identification of normal and abnormal cells and their correlation with normal or pathologic conditions. An introduction to the hemostatic mechanism also is presented.

CLLS 304. Urine and Body Fluid Analysis. 1-2 Hours.
Semester course; 1.5 lecture and 1 laboratory hours. 1-2 credits. A study of the principles and practices of urinalysis, kidney function, cerebrospinal fluid and other body fluids.

CLLS 306. Immunohematology. 2.5-4.5 Hours.
Semester course; 2.5 lecture and 4 laboratory hours. 2.5-4.5 credits. Prerequisite: CLLS 310. A study of the theory and principles of blood banking with an emphasis on methods and techniques used in the laboratory for cell typing, cross-matching and antibody identification.

CLLS 307. Introduction to Pathogenic Microbiology. 1-3 Hours.
Semester course; 3 lecture hours. 1-3 credits. May be taken as 1 credit each for study of basic parasitology, mycology or virology. Includes fundamentals of parasites, fungi and viruses as potentially pathogenic microorganisms.

CLLS 308. Pathogenic Bacteriology. 3-5 Hours.
Semester course; 3 lecture hours and 4 laboratory hours. 3-5 credits. Emphasis is placed on pathogenic bacteria, techniques, pathogenesis, epidemiology, isolation and identification, and antimicrobial susceptibility testing.

CLLS 310. Clinical Immunology. 3-4.5 Hours.
Semester course; 3.5 lecture and 2 laboratory hours. 3-4.5 credits. Introduces the basic principles of immunology, serology and molecular diagnostics. Emphasis is placed on laboratory evaluation of the immune response including both cellular and humoral aspects. Serologic techniques are practiced in the laboratory sessions.

CLLS 311. Clinical Chemistry and Instrumentation I. 3-5 Hours.
Semester course; 3 lecture and 4 laboratory hours. 3-5 credits. A study of human physiology and metabolism in health and various disease states. Topics include energy and nitrogen metabolism and proteins in body fluids. Emphasis is placed on the application of quantitative analytical methods and instrumentation for the chemical characterization of body fluids to provide clinically useful information for the diagnosis and treatment of diseases.

CLLS 312. Clinical Chemistry and Instrumentation II. 4-5 Hours.
Semester course; 4 lecture and 2 laboratory hours. 4-5 credits. Prerequisite: CLLS 311 or permission of the instructor. A study of human physiology and metabolism in health and various disease states. Topics include water and ion balance, clinical enzymology, therapeutic drug monitoring, and toxicology. Emphasis is placed on the application of quantitative analytical methods and instrumentation for the chemical characterization of body fluids to provide clinically useful information for the diagnosis and treatment of diseases.

CLLS 337. Clinical Education. 1 Hour.
Semester course; 120 clock hours. 1 credit. Supervised clinical experience in hospitals across the state is designed to give the student a broader clinical education and to provide venipuncture experience. In addition to the application of academically acquired knowledge, this affiliation provides an opportunity for the student to correlate each area of study into one composite picture for final laboratory diagnosis. Closer working relationships with other allied health personnel is an important aspect of this affiliation. Graded as pass/fail.

CLLS 407. Interpretive Immunohematology. 2-2.5 Hours.
Semester course; 2.5 lecture hours. 2-2.5 credits. Prerequisites: CLLS 306 and 310, or permission of instructor. Advanced study of the principles of immunohematology and immunology with major emphasis on blood group systems and blood components. Includes the application of laboratory data and techniques to solve problems in blood banking and immunology.

CLLS 408. Advanced Microbiology. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisites: CLLS 307 and 308, or permission of instructor. Advanced study of the principles of pathogenic microbiology. Includes the application of laboratory data and techniques to solve problems in the clinical microbiology laboratory.

CLLS 409. Interpretive Hematology. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisites: CLLS 301-302 and 485, or permission of instructor. Advanced study of the principles of hematopoiesis and their pathophysiological correlation to hematological disorders. Interpretation of morphological findings are correlated with case histories. Includes homeostatic problems.

CLLS 410. Advanced Clinical Chemistry and Instrumentation. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisites: CLLS 311-312, or permission of instructor. Presents an advanced study of (1) the principles of clinical chemistry as related to intermediary metabolism and pathology and (2) laboratory and hospital information systems. Includes the application of laboratory data and technologies to solve problems in analytical methods and instruments.

CLLS 411. Principles of Education/Management. 2.5-3.5 Hours.
Semester course; 3 lecture hours. 2.5-3.5 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 of these theories in the clinical laboratory.

CLLS 412. Senior Seminar. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Seminars are presented on various aspects of professionalism, experimental design and critical evaluation of scientific literature. A simulated registry exam is given at the conclusion. Graded as pass/fail.

CLLS 415. Special Topics in Clinical Laboratory Sciences. 1-6 Hours.
Semester course; 1-6 credits. Course provides for tutorial studies, laboratory experience and/or library assignments in specialized areas for those students who have previous course work or laboratory experience in a specific subject.

CLLS 438. Research Paper. 1 Hour.
Semester course; 1 lecture hour. 1 credit. This course is designed to introduce the student to the fundamentals of scientific writing.

CLLS 483. Biochemistry Practicum. 1-4.5 Hours.
Semester course; 40-180 clock hours. 1-4.5 credits. Prerequisites: CLLS 311-312. Individual participation in hospital chemistry laboratories. Students gain practical experience in the use of procedures and instruments by working with the staff. After gaining competence, students are expected to perform and sign out routine laboratory work under supervision. Graded as pass/fail.

CLLS 485. Hematology Practicum. 1-4.5 Hours.
Semester course; 40-180 clock hours. 1-4.5 credits. Prerequisites: CLLS 301-302. Individual participation in hospital hematology laboratories. Students gain practical experience in the use of procedures and instruments by working with the staff. After gaining competence, the students are expected to perform and sign out routine laboratory work under supervision. Graded as pass/fail.

CLLS 493. Clinical Microbiology Practicum. 1-4.5 Hours.
Semester course; 40-180 clock hours. 1-4.5 credits. Prerequisites: CLLS 307-308. Individual participation in hospital bacteriology laboratories. Students gain practical experience in the performance and use of procedures by working with the clinical staff. After gaining competence, the students are expected to properly perform and sign out routine laboratory work under supervision. Graded as pass/fail.

CLLS 494. Miscellaneous Clinical Practicum. 1-4.5 Hours.
Semester course; 40-180 clock hours. 1-4.5 credits. Prerequisites: CLLS 301-302, 308, 310, 311-312 or permission of instructor. Students gain practical experience in the use of instruments and the performance of procedures by working with the clinical staff. After gaining competence, students are expected to properly perform and sign out routine laboratory work under supervision. Graded as pass/fail.

CLLS 496. Blood Bank Practicum. 1-4.5 Hours.
Semester course; 40-180 clock hours. 1-4.5 credits. Prerequisite: CLLS 306. Individual participation in hospital blood bank laboratories and Virginia Blood Services. Students gain practical experience in the use of procedures and instruments by working with the staff. Donor drawing and component preparation is observed. After gaining competence, the students are expected to properly perform and sign out routine laboratory work under supervision. Graded as pass/fail.

CLLS 500. Concepts and Techniques in Clinical Laboratory Science. 3 Hours.
Semester course; 2 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. 2-4 Hours.
Semester course; 2 lecture and 4 laboratory hours. 2-4 credits. Prerequisite: Permission of instructor. A study of modern research and clinical laboratory instrumentation and procedures. Principles, theory and comparison of laboratory instruments are discussed along with the 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. 2-4 Hours.
Semester course; 2 lecture and 4 laboratory hours. 2-4 credits. Prerequisite: Permission of instructor. A study of modern research and clinical laboratory instrumentation and procedures. Principles, theory and comparison of laboratory instruments are discussed along with the factors affecting their operation. Laboratory exercises are designed to demonstrate the practical applications of the instruments in research and clinical laboratory. Areas covered include electrophoresis, chromatography, particle counters, radio-isotope counters and clinical laboratory automation.

CLLS 580. Principles of Education/Management. 1-3 Hours.
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. 1-4 Hours.
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 perform and sign out routine laboratory work under supervision. Based on adviser's recommendation and student's past experience, the course may be taken for less than four credits. Graded as pass/fail.

CLLS 601. Theoretical Blood Banking. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to students in the M.S. in Clinical Laboratory Sciences' advanced master's 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. 2-4 Hours.
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 608. Laboratory Diagnosis of Infectious Diseases. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: permission of instructor. Applies an organ system approach to the laboratory diagnosis of infectious diseases. Emphasizes diagnostic methods to verify infections because of pathogenic micro-organisms and includes related diagnostic microbiology laboratory issues. Utilizes a distance learning format.

CLLS 610. Interpretative Clinical Hematology. 2 Hours.
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 611. Analytical Techniques for Clinical Mass Spectrometry. 2 Hours.
6-week summer session; 12 lecture and 36 laboratory contact hours. 2 credits. Enrollment restricted to student admitted to the M.S. in Clinical Laboratory Sciences program or by permission of the instructor. Focuses on the proper utilization of chemicals and equipment required for the calibration, quality control and operation of clinically relevant mass spectrometry systems. Emphasizes calculations and demonstration of proficiency with quantitative techniques.

CLLS 612. Mass Spectrometry Systems for Clinical Analyses. 4 Hours.
Semester course; 3 lecture and 2 laboratory hours. 4 credits. Prerequisite: CLLS 611 or permission of the instructor. Focuses on the principles of chemical and instrumental analysis relevant to the detection and quantitation of clinically relevant analytes using mass spectrometry systems. Emphasizes the clinical laboratory applications of different types of mass spectrometry systems, preanalytical sample preparation, and integration of chromatography and mass spectrometry.

CLLS 613. Mass Spectrometry Assay Development for In Vitro Diagnostics. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisites: CLLS 611 and CLLS 612 or permission of the instructor. Focuses on the principles of assay development and evaluation of methods for the measurement of clinically relevant analytes using chromatography-mass spectrometry systems. Emphasizes “best practices” as found in CLSI, SOFT and FDA guidance documents.

CLLS 627. Advanced Concepts in Immunology and Immunohematology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CLLS 306, 310 and 496. Presents advanced topics in clinical immunology and immunohematology. Focuses on the integration of advanced concepts in the evaluation of laboratory data and solving clinical and methodological problems related to autoimmune diseases, ABO discrepancies, compatibility testing, hemolytic disease of the fetus and newborn and transfusion reactions.

CLLS 628. Advanced Concepts in Microbiology. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisites: CLLS 307 and 308; and CLLS 496 or 595. Advances study of pathogenic microbiology principles. Includes application of laboratory data and techniques to solve clinical microbiology problems.

CLLS 629. Advanced Concepts in Hematology. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisites: CLLS 302, and CLLS 485 or 595. Focuses on developing and expanding the knowledge acquired in the prerequisite courses in hematology and hemostasis. Incorporates case study evaluations, challenging current hematology topics in the literature and the integration of assessing laboratory data and clinical problems. Emphasizes the development of skills in critical thinking and analyzing clinical data.

CLLS 630. Advanced Concepts in Clinical Chemistry and Instrumentation. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisites: CLLS 311 and 312; and CLLS 483 or 595. Focuses on advanced concepts in clinical chemistry, including endocrinology, measurement of vitamins and tumor markers, method evaluation and laboratory and hospital information systems. Integrates the basic knowledge and skills acquired in the undergraduate sequence of courses with advanced concepts in clinical chemistry/instrumentation to analyze the more complex clinical and analytical problems presented by the aforementioned topics. Includes the design and conduct of library research and laboratory experiments, and data analysis to generate recommendations that are practical and applicable in a real clinical chemistry service.

CLLS 690. Clinical Laboratory Sciences Seminar. 1 Hour.
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. 1-4 Hours.
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. 8 Hours.
Semester course; 640 clock hours. 8 credits. Prerequisite: 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. 4 Hours.
Semester course; 320 clock hours. 4 credits. Prerequisite: 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. 2 Hours.
6 laboratory hours. 2 credits. Prerequisite: permission of instructor. A laboratory course with practical experiences in resolving complex blood group serological problems and discussion of these problems. Donor phlebotomy, processing of donor units, component preparation and instruction of undergraduate clinical laboratory sciences students also are performed.

CLLS 761. Research Methodology in Clinical Laboratory Sciences. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Focuses on the principles of scientific research as applicable to problems encountered in the clinical laboratory sciences. Also focuses on developing a draft research proposal that would be the foundation for a project that would satisfy the research requirement for the master's degree in clinical laboratory sciences.

CLLS 790. Research in Clinical Laboratory Sciences. 1-15 Hours.
Semester course; 1-15 credits. Research leading to the M.S. degree.

CLINICAL RADIATION SCIENCES (CLRS)

CLRS 101. Introduction to Clinical Radiation Sciences. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Open to students on the Academic Campus who are interested in clinical radiation sciences as a career. Presentation and discussion of the art and science of medical imaging. The use of ionizing radiation will be explored from its discovery to its current application in therapy and medical diagnosis. Radiography, nuclear medicine and radiation therapy will be discussed in terms of career specialties within the profession.

CLRS 201. Radiographic Imaging and Exposure I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CLRS 205. Corequisite: CLRZ 201. Introduction to radiographic equipment and the imaging process. Covers topics including equipment operation and manipulating radiation exposure to produce quality radiographs. Presents information that prepares students for clinical practice. Emphasizes clinical problem-solving as it relates to patient variables, pathology and technical exposure factors.

CLRS 203. Pathophysiology I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Presentation of the principles of disease and an introduction to various conditions of illness involving body systems.

CLRS 204. Pathophysiology I and II. 3 Hours.
Continuous courses; 3-3 lecture hours. 3-3 credits. Prerequisites: BIOL 205, PHIS 206 and PHIZ 206. Completion of CLRS 203 to enroll in CLRS 204. Presentation of the principles of disease and an introduction to various conditions of illness involving body systems.

CLRS 205. Exploring Radiation Sciences. 1 Hour.
Semester course; 1 lecture hour. 1 credit. A general overview of the wide variety of imaging and treatment modalities in radiation sciences will be presented. Emphasis will be on understanding how these modalities are utilized in today's complex health care environment, as well as the role of the technologist/therapist.

CLRS 206. Cross-sectional Anatomy. 2 Hours.
Semester course; 4 laboratory hours. 2 credits. Prerequisite: permission of instructor. A general overview of cross-sectional anatomy at representative levels will be presented. Emphasis will be on identifying major muscles, organs, bones and vessels on diagrams, photographs and images.

CLRS 208. Foundations of Patient Care. 4 Hours.
Semester course; 3 lecture and 2 laboratory hours. 4 credits. Legal, ethical and technical foundations of patient care will be explored with emphasis on the application of these principles to common radiologic situations.

CLRS 211. Radiographic Procedures I. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisite: CLRS 208 with a minimum grade of C. Combines the study of anatomy and physiology and positioning for diagnostic radiographic examinations of the upper extremity, thorax, abdomen, lower extremity, spine and pelvis. Requires demonstration of competence in radiographic procedures, including positioning of simulated patients, manipulation of radiographic equipment and evaluation of radiographs.

CLRS 212. Radiographic Procedures II. 2 Hours.
Semester course; 1 lecture and 3 laboratory hours. 2 credits. Prerequisite: CLRS 211 with a minimum grade of C. Continuation of CLRS 211 with emphasis on anatomy and physiology and positioning for diagnostic radiographic examinations of routine contrast studies and basic headwork. Requires students to demonstrate competence in radiographic procedures, including positioning of simulated patients, manipulation of radiographic equipment and evaluation of radiographs.

CLRS 232. Radiation Safety. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Provides an overview of radiation protection as it applies to the radiation sciences. Emphasizes radiation sources, detection and regulations. Discusses radiation protection responsibilities of the radiologic technologist for patients, personnel and the public.

CLRS 294. Introduction to Clinical Education I. 0.5 Hours.
Semester course; 60 clinical hours. 0.5 credit. Prerequisite: CLRS 208 with a minimum grade of C. Introduction to clinical experience supervised by clinical faculty and affiliate facility staff. Introduces students to the clinical process and equipment, and provides practical experience in routine, basic procedures.

CLRS 295. Introduction to Clinical Education II. 1 Hour.
Semester course; 120 clinical hours. 1 credit. Prerequisites: CLRS 201, 211, 232 and 294 with a minimum grade of C in all. Continued introduction to clinical experience supervised by clinical faculty and affiliate facility staff. Provides additional practical experience in routine, basic procedures.

CLRS 303. Orientation to Nuclear Medicine. 2 Hours.
Semester course; 1 lecture and 2 clinical hours. 2 credits. Prerequisites: CLRS 208 and CLRS 232 both with a minimum grade of C. Designed to acquaint the student with the field of nuclear medicine in general and the Program in Nuclear Medicine Technology in particular. It also provides an introduction to clinical practice.

CLRS 305. Orientation to Radiation Therapy. 2 Hours.
Semester course; 1 lecture and 2 laboratory hours. 2 credits. Prerequisites: CLRS 208 and CLRS 232, both with a minimum grade of C. Introduction to the clinical process, equipment and history of radiation therapy. Information will be presented that prepares the student to begin clinical practice. Clinical rotations and lab exercises are designed to expose the student to various aspects of radiation therapy.

CLRS 309. Oncologic Patient Care. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: CLRS 208 with a minimum grade of C. Pre- or corequisite: CLRS 305. Covers the basic concepts of patient care specific to radiation therapy, including consideration of physical and psychological conditions. Patient interactions, patient examinations, asepsis, local and systemic reactions, nutrition and medications are discussed. Factors influencing patient health during and following a course of radiation will be identified.

CLRS 312. Radiographic Procedures III. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: CLRS 212 with a minimum grade of C. Continuation of CLRS 211 and 212 to cover additional and alternative positions for routine radiographic examinations as well as special studies of circulatory, reproductive, urinary, skeletal and central nervous systems. Discusses equipment, procedures and strategies for performing pediatric, trauma, mobile and operating room radiographic exams. Includes small group simulation opportunities.

CLRS 314. Pathology and Treatment Principles I. 4 Hours.
Semester course; 3 lecture and 2 laboratory hours. 4 credits. Prerequisites: CLRS 309 and CLRS 323 with a minimum grade of C in both. Presents the fundamentals of the disease processes for cancer of the following: skin, thorax, genitourinary, gynecological, head and neck, central nervous system, and breast. Discusses malignant condition, etiology and epidemiology, patient workup, and methods of treatment. Attention to patient prognosis, treatment results and the effects of combined therapies. Requires demonstration of competence in selected radiotherapeutic procedures, including positioning of simulated patients and the manipulation of equipment.

CLRS 317. Nuclear Medicine Procedures I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequistie: two semesters of general chemistry. Pre- or corequisite: CLRS 303. Presents the techniques employed in the performance of routine nuclear medicine procedures. Topics include anatomy and physiology, pathology, patient preparation, contraindications, radiopharmaceuticals, dose route of administration, biodistribution, imaging protocols, equipment setup, and common findings.

CLRS 318. Nuclear Medicine Procedures II. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: CLRS 317 with a minimum grade of C. Presents the techniques employed in the performance of routine nuclear medicine procedures. Topics include anatomy and physiology, pathology, patient preparation, contraindications, radiopharmaceuticals, dose route of administration, biodistribution, imaging protocols, equipment setup, and common findings.

CLRS 319. Nuclear Medicine Procedures III. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CLRS 318 with a minimum grade of C. Presents the techniques employed in the performance of routine nuclear medicine procedures. Topics include anatomy and physiology, pathology, patient preparation, contraindications, radiopharmaceuticals, dose route of administration, biodistribution, imaging protocols, equipment setup, and common findings.

CLRS 320. Radiographic Imaging and Exposure II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CLRS 201 and CLRZ 201 both with a minimum grade of C. Emphasizes federal regulations and monitoring of the imaging system components that may affect radiographic quality through improper functioning. Provides in-depth exploration of digital imaging.

CLRS 321. Nuclear Medicine Physics and Instrumentation I. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Pre- or corequisite: CLRS 303. Corequisite: CLRZ 321. Presents the physical principles of atomic structure, electromagnetic spectrum, units of measurement, radioactive decay and attenuation in matter. Operation of radiation equipment will include statistical applications and quality control procedures.

CLRS 322. Nuclear Medicine Physics and Instrumentation II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CLRS 317, CLRS 321 and CLRZ 321 with a minimum grade of C in all. Corequisite: CLRZ 322. Presents advanced applications in physics and the operating principles of nuclear medicine imaging devices and related quality control procedures.

CLRS 323. Radiation Therapy, Techniques and Applications. 4 Hours.
Semester course; 4 lecture hours. 4 credits. Pre- or corequisite: CLRS 305. Presents the basic concepts of dosimetry and treatment planning. Various external beam techniques and applications, depth dose data and summation of isodose curves are discussed. Modalities of treatment, patient setup, dose measurement and verification also are included.

CLRS 331. Radiographic Imaging Equipment. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CLRS 320 with a minimum grade of C. Presents the principles and operation of general and specialized X-ray equipment. Emphasizes the equipment necessary to perform radiographic, fluoroscopic and tomographic examinations.

CLRS 332. Radiographic Pathology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CLRS 204 and CLRS 393 with a minimum grade of C or permisison of instructor. Provides introduction to the study of radiographic pathology through reading and observation of film interpretation. Emphasizes recognition of common disease processes as demonstrated radiographically and, via advanced imaging modalities; where appropriate, understanding how to vary positioning and techniques to produce optimally diagnostic images; and the role of different imaging modalities in the evaluation of disease.

CLRS 341. Radiation Physics. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisites: PHYS 101, PHYZ 101 or PHYS 201 and CLRS 232 with a minimum grade of C. Discusses fundamentals of the atom, electricity and magnetism. Emphasizes the production of X- and gamma rays, and the interaction of radiation with matter.

CLRS 342. Physics for Radiation Therapy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CLRS 323 and CLRS 341 with a minimum grade of C in both. Includes a discussion of the properties of electromagnetic and particulate radiation. Details of production, interactions, treatment units, measurement of radiation, radioactivity and brachytherapy are presented.

CLRS 390. Research Methods in the Radiation Sciences. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Pre- or corequisites: STAT 210 and junior standing or permission of instructor. The fundamentals of the research process will be presented for analysis and discussion. Elements of research appropriate to the radiation sciences will be reviewed. Emphasis will be on the ability to critically review research studies along with the selection and design of a research project.

CLRS 393. Clinical Education I. 2-5 Hours.
Semester course; variable clinical hours (120 hours per credit). 2-5 credits. Prerequisites: CLRS 208 and CLRS 232 with a minimum grade of C in both and CLRS 201 with a minimum grade of C or CLRS 303 or CLRS 305. Clinical experience supervised by clinical faculty and affiliate facility staff. Students gain practical experience in routine, basic procedures and observe more advanced procedures.

CLRS 394. Clinical Education II. 2-4 Hours.
Semester course; variable clinical hours (120 hours per credit). 2-4 credits. Prerequisite: CLRS 393 with a minimum grade of C. Clinical experience supervised by clinical faculty and affiliate facility staff. Students gain practical experience in routine, basic procedures and observe more advanced procedures.

CLRS 395. Clinical Education III. 2-6 Hours.
Semester course; variable clinical hours (120 hours per credit). 2-6 credits. Prerequisite: CLRS 394 with a minimum grade of C. Clinical experience supervised by clinical faculty and affiliate facility staff. Students gain additional practical experience in routine as well as advanced procedures.

CLRS 398. Introduction to Research. 1 Hour.
Semester course; 1 credit. Prerequisite: CLRS 390. Provides students the opportunity to explore and investigate a topic of special interest in their area of concentration under the supervision of a faculty adviser. Emphasizes the application of research concepts to writing a research project proposal.

CLRS 403. Advanced Patient Care for the Imaging Professional. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CLRS 208 with a minimum grade of C and junior standing or permission of instructor. Explores advanced patient care techniques and age-specific considerations in the radiation sciences. Emphasizes the application of advanced patient care principles.

CLRS 405. Principles of Mammography. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisites: CLRS 201 and CLRS 320 with a minimum grade of C in both and senior standing or permission of instructor. Presentations and discussions designed to provide an overview of the principles of mammography. Topics include history, anatomy, physiology and pathology of the breast; exposure techniques; and quality control. Focuses on routine and specialized positioning of the breast and image evaluation to prepare students for practical experience in mammography.

CLRS 406. Introduction to MRI. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CLRS 341 with a minimum grade of C or permission of instructor. An introduction to the elements of magnetic resonance imaging, including instrumentation, physical principles, image production and quality, MR safety, magnetic resonance angiography and imaging applications.

CLRS 407. Introduction to PET/CT. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: CLRS 408. Overview of PET and PET/CT focusing on instrumentation, radiopharmaceuticals and its diagnostic application in neurology, oncology and cardiology.

CLRS 408. Introduction to Computed Tomography (CT). 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: CLRS 341 with a minimum grade of C or permission of instructor. Provides the student with an overview of computed tomography. Topics include computed tomography physical principles, data acquisition/image reconstruction, equipment and terminology. Patient care issues (i.e., preparation, monitoring) and basic quality control will be introduced.

CLRS 410. Routine Computed Tomography Procedures. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisites: CLRS 206 and 408, or permission of instructor. Presents routine procedures used in computed tomography imaging. Reviews examinations and protocols involving the head, chest, abdomen and extremities.

CLRS 412. Radiation Therapy Treatment Planning. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisites: CLRS 323 and CLRS 342 with a minimum grade of C in both or permission of instructor. An introduction to routine 2-D and 3-D treatment planning for the most common forms of cancer including prostate, rectum, lung, breast, and head and neck regions. Simulated lab training using a treatment planning system will be included. Emphasis will be on the rationale and process of treatment planning for patients undergoing radiation therapy.

CLRS 415. Pathology and Treatment Principles II. 4 Hours.
Semester course; 3 lecture and 2 laboratory hours. 4 credits. Prerequisite: CLRS 314 with a minimum grade of C. A continuation of CLRS 314. Presents the fundamentals of the disease process for the following cancers: gastrointestinal, lymphomas and hematological malignancies, bone tumors, childhood tumors, and eye and orbital tumors. Discusses patient workup and prognosis, treatment results, and the effects of combined therapies. Radiotherapeutic emergencies, palliation and combined modality treatment also will be discussed. Emphasis will be placed on traditional and advanced technology and its applications in treatment delivery in radiation oncology. Requires demonstration of competence in selected radiotherapeutic procedures, including positioning of simulated patients and the manipulation of equipment.

CLRS 417. Nuclear Medicine Procedures IV. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CLRS 319 with a minimum grade of C. Presents the techniques employed in the performance of advanced nuclear medicine procedures. Topics include anatomy and physiology, pathology, patient preparation, contraindications, radiopharmaceuticals, dose route of administration, biodistribution, imaging protocols, equipment setup, and common findings.

CLRS 420. Introduction to Vascular-Interventional Radiology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: departmental approval. Introduction to the basic techniques of vascular and interventional radiologic procedures with emphasis on the anatomy demonstrated, equipment, contrast agents, and the role and responsibilities of the technologist.

CLRS 421. Vascular-Interventional Radiology Procedures. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CLRS 420. Enrollment restricted to clinical radiation science majors or by permission of department chair. Presents an overview of common vascular-interventional radiology procedures to include arteriography (abdominal, peripheral, pulmonary, cardiac and carotid/cerebral) as well as vascular and nonvascular interventions (filter placement, embolization, venous access and management of fluid collection, urinary disease and biliary disease). Emphasis is placed on instrumental, technique and imaging parameters.

CLRS 430. Radiobiology. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisites: CLRS 232 with a minimum grade of C and senior standing or permission of instructor. Presents the principles of biologic responses to radiation, including factors influencing radiation effects, tissue sensitivity and tolerance. Clinical application in radiography, nuclear medicine and radiation therapy are reviewed.

CLRS 453. Quality Management in Nuclear Medicine. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisites: CLRS 322 and CLRZ 322 with a minimum grade of C in both. Explores the quality assurance parameters in a nuclear medicine department. Emphasis is given to the performance of tests to assess survey meters, spectrometers, dose calibrators, gamma cameras and SPECT imaging systems. Additionally, quality assurance is discussed in terms of radiopharmaceuticals, radioimmunoassay laboratories and patient management.

CLRS 455. Quality Management in Radiation Therapy. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisites: CLRS 323 and CLRS 342 booth with a minimum grade of C. Designed to provide the student with knowledge of the concepts and principles of quality assurance. The performance of various tests including purpose, sources of malfunction and action guidelines will be discussed.

CLRS 461. Radiopharmaceutical: Preparation and Quality Control. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisites: CLRS 319, CLRS 322 and CLRZ 322, all with a minimum grade of C. Provides the technical knowledge necessary for the preparation and quality control of radiopharmaceutical agents for in-vivo and in-vitro nuclear medicine studies.

CLRS 471. Radiology Imaging Procedures for Radiologist Assistants I and II. 3 Hours.
Continuous courses; 3-3 lecture hours. 3-3 credits. Prerequisites: CLRS 332, CLRS 403, CLRZ 403 and permission of instructor. Completion of CLRS 471 to enroll in CLRS 472. Establishes a framework for radiologist assistants' participation in patient examinations for diagnostic inspection and/or therapeutic treatment. Emphasizes establishment of fundamental radiology procedures that follow American College of Radiology Standards for principles and practices producing high-quality radiographic care. Includes basic radiology procedures in genitourinary, gastrointestinal, pediatric, thoracic, musculoskeletal selections and vascular/interventional specialties. Addresses legal, ethical and professional issues concerning radiologist assistants.

CLRS 472. Radiology Imaging Procedures for Radiologist Assistants I and II. 3 Hours.
Continuous courses; 3-3 lecture hours. 3-3 credits. Prerequisites: CLRS 332, CLRS 403, CLRZ 403 and permission of instructor. Completion of CLRS 471 to enroll in CLRS 472. Establishes a framework for radiologist assistants' participation in patient examinations for diagnostic inspection and/or therapeutic treatment. Emphasizes establishment of fundamental radiology procedures that follow American College of Radiology Standards for principles and practices producing high-quality radiographic care. Includes basic radiology procedures in genitourinary, gastrointestinal, pediatric, thoracic, musculoskeletal selections and vascular/interventional specialties. Addresses legal, ethical and professional issues concerning radiologist assistants.

CLRS 475. Medical Imaging Fundamentals for Radiologist Assistants. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CLRS 332, CLRS 403, CLRZ 403 and permission of instructor. Promotes an understanding of methods and techniques for the systematic observation of static and dynamic diagnostic images for the purpose of evaluating the presence of abnormalities, anomalies and pathological conditions. Includes protocols for drafting memoranda of initial observations based on image assessment.

CLRS 480. Applied Radiology Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: departmental approval. Relates basic concepts in management to the radiologic environment and explores the relationship between the radiologic facility and the health care system.

CLRS 481. Applied Pharmacology for Radiation Sciences. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: departmental approval. Covers general pharmacology including the study of drug groups, dosages, administrations and reactions of drugs common to patients. Special emphasis on contrast media and other agents commonly used in medical imaging and therapy.

CLRS 488. Senior Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: senior standing in department. Designed to allow students to integrate the various individual courses into a single perspective as it relates to the radiation sciences. Addresses timely professional issues, including the need for lifelong learning and participation in professional organizations, as well as preparing for certification and future employment.

CLRS 492. Directed Study: Radiation Sciences. 1-4 Hours.
Semester course; 1-4 credits. Maximum of 6 credits can apply to graduation requirements. Prerequisite: permission of department chair. Provides the opportunity for individualized research projects, tutorial studies, special clinical work or other topics not available in formal course work.

CLRS 493. Clinical Education IV. 1-5 Hours.
Semester course; variable clinical hours (120 hours per credit). 1-5 credits. Prerequisite: CLRS 395 with a minimum grade of C. Clinical experience supervised by clinical faculty and affiliate facility staff. Students gain additional practical experience in routine, basic and advanced procedures.

CLRS 494. Clinical Education V. 1-5 Hours.
Semester course; variable clinical hours (120 hours per credit). 1-5 credits. Prerequisite: CLRS 493 with a minimum grade of C. Clinical experience supervised by clinical faculty and affiliate facility staff. Students gain additional practical experience in routine, basic and advanced procedures.

CLRS 498. Senior Project. 2 Hours.
Semester course; 2 credits. Prerequisites: CLRS 390, 398 and senior standing in department. Provides students the opportunity to investigate a topic of special interest in their area of concentration. Emphasizes the application of research concepts in the design, implementation and presentation of a project under the supervision of a faculty adviser.

CLINICAL RADIATION SCIENCES LAB (CLRZ)

CLRZ 201. Radiographic Imaging and Exposure I Laboratory. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Prerequisite: CLRS 205. Pre- or corequisite: CLRS 201. Designed to introduce students to the fundamentals of radiographic image production. Requires performance of laboratory exercises to become familiar with equipment operation and manipulate radiation exposure variables to produce quality images.

CLRZ 321. Nuclear Medicine Physics and Instrumentation Laboratory I. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Pre- or corequisite: CLRS 303. Corequisite: CLRS 321. Presentation of the applications and techniques employed in the operation of nuclear medicine non-imaging devices. Labs will emphasize the use of survey meters, dose calibrator and scintillation counting device.

CLRZ 322. Nuclear Medicine Physics and Instrumentation Laboratory II. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Prerequisites: CLRS 321 and CLRZ 321 with a minimum grade of C in both. Corequisite: CLRS 322. Evaluation of applications of different imaging techniques and computer processing utilized in nuclear medicine. Emphasizes the use of single and multiple channel analyzers, planar and SPECT acquisition, and image processing.

CLRZ 403. Advanced Patient Care for the Imaging Professional. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Prerequisite: CLRS 208 or permission of instructor. Pre- or corequisite: CLRS 403. This course provides simulated experience in performing advanced patient care techniques related to the radiation sciences. Topics include cardiac rhythm interpretation, advanced cardiac life support, urinary catheterization, tracheostomy care, basic laboratory skills, basic respiratory therapy skills, pulse oximetry, IV therapy and pharmacology, and conscious sedation.

CLRZ 405. Principles of Mammography Lab. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Prerequisites: CLRS 201 and CLRS 320, or permission of instructor. Pre- or corequisite: CLRS 405. Provides simulated experience in performing positioning of the breast. Students will be expected to demonstrate competence in positioning the breast phantom for a variety of routine and specialized projections. In addition, quality control procedures specific to mammography will be performed.

CLRZ 461. Radiopharmacy Laboratory. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Prerequisites: CLRS 319, CLRS 322 and CLRZ 322, all with a minimum grade of C. A simulated radiopharmacy laboratory will focus on operation of laboratory equipment in the compounding of radiopharmaceuticals.

COMMUNICATION ARTS (COAR)

COAR 200. Visual Studies: Drawing. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: ARTF 131. A course in drawing from direct observation of specific references: visual analysis, surface light and color, structure, and context. Various painting and drawing media will be explored. Assignments will incorporate applicable references to the history of art and contemporary developments.

COAR 201. Drawing Studies: The Figure Observed. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: successful completion of the Art Foundation Program. Students will study and explore how to draw from direct observation using the figure as the primary means to understand proportion, volume and spatial relationships. Class will include skeletal structure, basic anatomy and physical aspects of the figure. Various drawing and painting media will be explored. Specific assignments will be informed by the reference and use of the figure in the history of art and contemporary developments.

COAR 202. Drawing Studies: The Figure in Context. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: COAR 201. Drawing from direct observation using the figure as the primary means to understand proportion, volume and spatial relationships. Specific problems will include the figure as a dynamic element in different lighting, spatial and conceptual contexts. Various drawing and painting media will be explored. Assignments will incorporate applicable references to the history of art and contemporary developments.

COAR 210. Visual Studies: Design. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisites: ARTF 132 and 133. A course in which an understanding of the relationship between form and communication is developed. The student will develop an awareness and appreciation for visual imagery as a tool for the transmission of information and ideas.

COAR 211. Fundamentals of Typography. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: ARTF 132. An introduction to the study of typography as used in communication arts. Course will include the study of hand-drawn and digital letterforms and their context. Students will be introduced to professional digital methods (e.g., Illustrator).

COAR 300. Illustration: Drawing and Painting. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: COAR 202. Explores and addresses formal, conceptual and technical considerations and issues involved in the use of drawing and painting. Various drawing and painting media will be explored.

COAR 301. Drawing Studies: The Figure (Intermediate). 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. May be repeated for up to 6 credits. Prerequisite: COAR 201. Drawing from direct observation at the intermediate level using the figure as the primary means to understand proportion, volume and spatial relationships. Various drawing and painting media will be explored.

COAR 302. Print Media. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: COAR 202. An intermediate course in the use of printing processes and techniques to develop communicative imagery. Assignments will incorporate applicable references to the history of art and contemporary developments.

COAR 303. Color Theory and Practice. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: COAR 300. An intermediate course in the application of color theory to specific illustrative problems. A number of color theories, both historical and contemporary, will be studied and applied.

COAR 304. Illustration Media and Techniques. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisites: COAR 200 and 202. Explores various mixed-media techniques, including both two- and three-dimensional approaches to illustrative problems.

COAR 305. Figure in Illustration. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: COAR 202. An introduction to the visual representation of the human form as it applies to illustration.

COAR 307. The Face. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisites: COAR 200 and COAR 202. Employing a variety of drawing media, students will explore the nuances of the human face as a subject. This course focuses on both process and the realization of final projects.

COAR 311. Type and Image. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: COAR 211. An advanced course that explores graphic design with an introduction to digital methods as a means to express and communicate ideas. Assignments will incorporate applicable references to the history of art and contemporary developments.

COAR 312. Art Direction. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisites: COAR 210 and COAR 211. An introduction to the creative and logistical concerns of art direction, with special focus on the methodological best practices for developing compelling visual concepts, organizing work flow and arriving at unique design solutions. The course includes an introduction to professional-level digital tools and their relevant application.

COAR 320. Concept Drawing. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: COAR 202. Explores the use of drawing as a tool to communicate concepts. Various painting and drawing media will be explored. Assignments will incorporate applicable references to the history of art and contemporary developments.

COAR 321. Sequential Imaging. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: junior standing in communication arts. Sequential imagery as applied to books, graphic novel and film storyboarding. Various painting and drawing media will be explored. Assignments will incorporate applicable references to the history of art and contemporary developments.

COAR 325. Botanical Drawing. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: COAR 300. This course explores plant life from direct observation and analytical drawing. Students examine the major divisions and structures of plants and how to depict their unique form.

COAR 326. Imagery for Science Fiction and Fantasy. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisites: COAR 300 and 320. This course focuses on assignments for science fiction/fantasy subject matter and its various commercial applications.

COAR 327. Comics and Graphic Novels I. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisites: COAR 201 and COAR 202. This course develops skills essential for visual storytelling through comics and graphic novels.

COAR 328. Comics and Graphic Novels II. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: COAR 327. This course further develops skills essential to expanding understanding of visual storytelling through comics and graphic novels.

COAR 331. Photographic Principles in Visual Communications. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: COAR 210. A studio course that explores the use of the camera, from pinhole photography to digital imaging, and includes the introduction of digital methods (e.g., Photoshop) as tools used in visual communications.

COAR 332. Digital Drawing. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: COAR 200. An intermediate course exploring the use of computer and peripheral devices in the creation of raster (grid/pixel) and vector (mathematical) -based drawing. Students will be introduced to professional digital methods (e.g., Illustrator, Photoshop).

COAR 333. Web Page Design. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisites: COAR 210, COAR 211 and permission of instructor. A course developing the design of websites. Emphasis is placed on the visual design, navigation, development, communication and authoring of websites.

COAR 341. Scientific Illustration. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Corequisite: COAR 202. An introductory course in the development of accurate representational imagery for recording scientific observations and ideas.

COAR 352. History of Visual Communications I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTH 103 and 104. An examination of the historical developments in visual communications from cave paintings to modernism.

COAR 353. History of Visual Communications II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTH 103 and 104. An examination of the historical developments in visual communications from modernism to the contemporary era.

COAR 391. Communication Arts Topics. 1-3 Hours.
Semester course; variable hours. 1-3 credits per semester. May be repeated for a maximum of 9 credits. Topical lectures in design issues and visual communications.

COAR 392. Research/Individual Study. 1-6 Hours.
Semester course; 1-2 lecture and 3-6 studio hours. 1-6 credits. May be repeated for a total of 6 credits. Enrollment requires permission of instructor, approval of faculty adviser and chair. The structuring, research, execution and presentation of an independent project in visual communications under the direction of a faculty adviser. The student will be encouraged to become a self-generating problem seeker and solver with the ability to carry out self-stated goals.

COAR 401. Drawing Studies: The Figure (Advanced). 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. May be repeated for up to 12 credits. Prerequisite: COAR 301 or permission of instructor. Drawing from direct observation at an advanced level using the figure as the primary means to understand proportion, volume and spatial relationships. Various drawing and painting media will be explored.

COAR 407. Senior Project. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisites: COAR 300 and COAR 320. Enrollment restricted to students with senior status in communication arts. Focuses on the assessment and advancement of studio techniques, methods and practices. Students document and share their decision-making processes in the generation of creative projects.

COAR 420. Graphic Essay. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisites: UNIV 200 or HONR 200 and COAR 320. An advanced course that explores the relationship between text and image, and their potential as tools to enable us to create and communicate effectively. Assignments will incorporate applicable references to the history of art and literature.

COAR 421. Imagery for Children. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisites: COAR 300 and 320. An advanced course developing both fiction and nonfiction illustrations intended for the preschool and elementary school children's publishing market.

COAR 422. Editorial Illustration II. 4 Hours.
Semester course; 3 lecture and 3 studio hours. 4 credits. Prerequisites: COAR 300 and 320. An advanced course developing the student's skill at interpreting an author's manuscript. The major emphasis is given to illustrations appearing in books and magazines.

COAR 432. 3-D Image and Movement. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Course restricted to majors in the School of the Arts. Course addresses current technological tools to explore the relationship between image, object and movement.

COAR 433. Game Design, Theory and Practice. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: COAR 432. Students will study the history, theory and design of games, gaming concepts and narrative from past to present.

COAR 435. Organic 3-D Modeling for Concept Design. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: COAR 432. A focus on the use of high polygraph 3-D graphics software as tools to create highly detailed computer models for concept design, movies, broadcast media and games.

COAR 441. Scientific Illustration II. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: COAR 341. An advanced course in the development and creation of accurate documentation and representation of scientific information and imagery including plant taxonomy, insect morphology, and physiological and pathological processes.

COAR 450. Business of Communication Arts. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 200 or HONR 200. The study of business management with an emphasis on ethics and the standards of fair practice including financial and contractual guidelines.

COAR 462. Projects in Illustration. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisites: senior standing in communications arts and permission of the instructor. An advanced-level course in conceptualization, execution, realization and documentation as realized through a series of projects in illustration. Students will be required to create, acquire and structure projects that will test their conceptual and technical abilities. Project work will be exhibited, documented or printed. Various drawing, painting and mixed media will be explored. Assignments will incorporate applicable references to the history of art and contemporary developments.

COAR 463. Communication Arts Honors Studio. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. May be repeated for up to 12 credits. Prerequisites: junior standing in communication arts, 3.0 GPA and permission of the CA faculty. An advanced course for selected students. Expectations include to work on individual and group projects at a professional level.

COAR 464. Senior Portfolio. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisites: COAR 300 and COAR 320. Enrollment restricted to students with senior status in communication arts. Focuses on the curation and evolution of a portfolio that aligns with the student's professional goals. Integrates effective oral, written and visual communication, critical-thinking and advanced studio and professional practices.

COAR 491. Studio Topics in Communication Arts. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. May be repeated for credit. Topical studio focusing on research and experimentation in specialized visual communication media.

COAR 492. Communication Arts Internship. 1-6 Hours.
Semester course; 1-6 credits. May be repeated for a maximum of 12 credits. Prerequisites: senior standing, 3.0 GPA or permission of the chair. Supervised pragmatic work experiences. Training is provided under the direction and supervision of qualified professional practitioners.

COMMUNITY STUDIES (CMST)

CMST 210. Health Careers Exploration. 1-3 Hours.
Semester course; variable hours. 1-3 credits. Open only to high school students enrolled in programs partnering with VCU's Health Sciences Academy. High school students will learn college-success skills, how to make informed decisions about the health careers they wish to pursue and plan college-level courses and extracurricular activities to achieve their career goals. Material is presented through lectures from health care workers in various specialties, hands-on activities and exposure to college mentors.

CMST 300. The Foundations of Community Engagement. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Course content includes theories of citizenship, social movements, civic leadership, social justice, civil discourse, service and social capital. The survey course is foundational for subsequent seminars.

CMST 301. Neighborhood Research Seminar. 1 Hour.
Semester course; 1 credit. Prerequisite: CMST 300. Enrollment restricted to VCU ASPiRE students. Community engagement knowledge and skills are applied to studying the character, history and social issues that impact Richmond neighborhoods through group and individual projects.

CMST 310. Orientation to Service-learning. 1.5 Hour.
Seven-week course; content delivered online. 1.5 credits. Prerequisite: permission of instructor. Interactive, online orientation training designed to introduce students to the historical and theoretical foundations of service-learning. Students will also become familiar with indicators of high-quality community engagement practices. Course content is available through Blackboard, and the class will not meet face-to-face. Students are expected to complete assignments and activities for course modules by the due dates specified on Blackboard.

CMST 391. Topics in Community Studies. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. May be repeated for a maximum of six credits with different topics. Open only to students enrolled in the ASPiRE living-learning program. An in-depth study of a selected topic in community studies. See the Schedule of Classes for specific topics to be offered each semester.

CMST 400. The Community Engagement Seminar. 1 Hour.
Semester course; 1 credit. Prerequisite: CMST 301. Discipline-based knowledge and skills are applied to assessed community needs. A service-learning component of 25 hours is included.

CMST 401. The Capstone Community Engagement Seminar. 1 Hour.
Semester course; 1 credit. Prerequisite: CMST 400. Community-identified needs are addressed by discipline-specific interventions that result in documented social change. A service-learning component of 25 hours is included.

CMST 410. Service-learning Teaching Assistant Supervision. 1.5 Hour.
Semester course; 2.5 laboratory hours. 1.5 credits. Enrollment requires permission of instructor. Corequisite: CMST 310. Provides undergraduate students with support and instruction during their first semester of service as teaching assistants to VCU service-learning courses. Requirements include a minimum of five hours per week of teaching assistance activities within a designated service-learning course, attendance at monthly group supervision meetings and participation in service-learning group activities. Supervision meetings are designed to help students build important community leadership skills such as team facilitation, ethical problem-solving and diversity awareness/appreciation.

CMST 411. Advanced Service-learning Teaching Assistant Supervision. 1 Hour.
Semester course; 2 laboratory hours; 1 credit. Prerequisites: CMST 310 and CMST 410. This course emphasizes effective techniques and strategies for advanced service-learning teaching assistants to increase their impact on student development and community outreach in service-learning courses. Students serve as peer mentors and facilitators for SLTAs in their first semester of service in addition to providing invaluable technical support to their instructors. The course will provide advanced SLTAs with individualized leadership assessments designed to enhance their leadership skills and emphasize the role of student leaders in successful service-learning courses.

CMST 491. Special Topics in Community Studies. 1-3 Hours.
Semester course; 1-3 variable hours. 1-3 credits, Prerequisite: permission of instructor. An in-depth study of a selected topic related to community studies. See the Schedule of Classes for specific topics to be offered each semester. If several topics of different content are offered, students may elect to take more than one.

CMST 492. Independent Study in Community Studies. 1-3 Hours.
Semester course; 1-3 variable hours. 1-3 credits. Prerequisite: permission of instructor. Intensive study or research under supervision of a faculty member in an area not covered in-depth or contained in the regular curriculum.

CMST 493. The Community Engagement Internship. 1-3 Hours.
Semester course; 1-3 variable hours. 1-3 credits. May be repeated a maximum of two times with program approval. Prerequisite: CMST 300. Civic leadership and responsibility are emphasized in workplace internships established with community partners. A service-learning component of 45 hours per credit hour is included.

CMST 691. Special Topics in Community Studies. 1-3 Hours.
Semester course; 1-3 variable hours. 1-3 credits. May be repeated for a maximum of 6 credits. Prerequisite: permission of instructor. Provides an in-depth study of a selected topic related to community studies. See the Schedule of Classes for specific topics to be offered each semester. If several topics of different content are offered, students may elect to take more than one.

CMST 692. Independent Study in Community Studies. 1-3 Hours.
Semester course; 1-3 variable hours. 1-3 credits. Prerequisite: permission of instructor. Intensive study or research under supervision of a faculty member in an area not covered in-depth or contained in other VCU graduate-level courses.

COMPUTER AND INFORMATION SYSTEMS SECURITY (CISS)

CISS 609. Advanced Computational Intelligence. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: an undergraduate course in artificial intelligence, or equivalent background with permission of instructor. Exploration of issues related to application of computational intelligence techniques to system security, particularly in the detection of anomalous system behavior. Of particular interest are issues associated with the automated detection of anomalies caused by authorized users through intended malicious behavior or through accidental misuse, and issues associated with automated user authentication. Crosslisted as: CMSC 609.

CISS 616. Data Warehousing. 3 Hours.
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 and data mining. Crosslisted as: INFO 616.

CISS 618. Database and Application Security. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Theory and practice of database and software security focusing in particular on some common database software security risks and on the identification of potential threats and vulnerabilities. Crosslisted as: CMSC 618.

CISS 622. Network and Operating Systems Security. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CISS 624. Studies the principles of network security and secure operating systems. Included are topics relating to the use of intrusion detection, intrusion prevention and other related tools. Crosslisted as: CMSC 622.

CISS 624. Applied Cryptography. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides a comprehensive survey of modern cryptography. Included are techniques of enciphering and deciphering messages using cryptographic algorithms, block ciphers and block cipher modes, hash functions and message authentication codes, public key cryptography and digital signatures, and steganography. Crosslisted as: CMSC 620.

CISS 634. Ethical, Social and Legal Issues in Computer and Information Systems Security. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Analyzing socio-political and ethical issues surrounding computer and information systems security. Topics include privacy laws, identity theft, information collection and retention policies, and enforcement.

CISS 644. Principles of Computer and Information Systems Security. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 640 or INFO 661. Explores issues related to protecting information resources of a firm. Various tools and techniques useful for assessing CISS security concerns in organizations are introduced. Principles and models for CISS security and security management are presented and selected computer and CISS security topics are introduced. Material is presented and discussed from a management frame of reference. Crosslisted as: INFO 644.

CISS 646. Computer and Information Systems Access Control. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Detailed discussion of access control, including administration, identification and authentication techniques, methodologies and implementations, methods of attack, monitoring, and penetration testing.

CISS 654. Business Continuity and Disaster Recovery Planning. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Fundamentals of business continuity and disaster recovery planning. Includes risk assessment, physical facility protection, data recovery planning, strategies for network backup, desktop recovery, emergency decision making, and maintenance and testing of the plan and its components.

CISS 693. Practice of Computer and Information Systems Security. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Students will undertake practical research projects. Written reports of the investigations are required. This course is intended to be taken at the end of the program.

CISS 697. Guided Study. 1-3 Hours.
Semester course; variable hours. 1-3 credits. Intended for graduate students in the Computer and Information Systems Security program wishing to do research on problems in computer and information systems security. Approval of proposed work is required by the director of graduate programs of the Department of Information Systems or of the Department of Computer Science no later than the 10th week of the prior semester. Each student will work with an appropriate faculty member on an approved research proposal. The student will submit a written report on the research conducted as the final product for the course. This course is intended to be taken near the end of the student's degree program.

COMPUTER SCIENCE (CMSC)

CMSC 101. Introduction to Computer Science. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 141 or the equivalent with a minimum grade of C. An introduction to the work of computer scientists, including an overview of current research and application areas as well as career opportunities. Topics include problem-solving, the basics of computer organization, the software engineering life cycle, research resources and social and ethical aspects of technology. Additional topics also include binary, hexadecimal, two's complement, floating point representation, ASCII and Unicode.

CMSC 191. Topics in Computer Science. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated for credit. Prerequisite: permission of the instructor. This course will teach selected topics in computer science. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

CMSC 245. Introduction to Programming Using C++. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 151 or satisfactory score on the Mathematical Placement Test. Students registering for CMSC 245 must have taken the VCU Mathematics Placement Test within the one-year period immediately preceding the beginning of the course. An exception to this policy is made in the case in which the stated alternative prerequisite course has been completed at VCU. Students are expected to have fundamental computer skills. Introduction to the concepts and practice of structured programming using C++. Problem-solving, top-down design of algorithms, objects, basic C++ syntax, control structures, functions and arrays. This course is intended for engineering majors.

CMSC 246. Advanced Programming Using C++. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CMSC 245. Advanced programming in C++. Topics include program design, objects, classes, inheritance, files, strings, linked lists, stacks, queues, binary trees, recursion, and basic searching and sorting techniques. This course is intended for engineering majors.

CMSC 255. Introduction to Programming. 4 Hours.
Semester course; 3 lecture and 2 laboratory hours. 4 credits. Prerequisite: calculus-level placement on the VCU Mathematics Placement Test within the one-year period immediately preceding enrollment in the couse, or MATH 151 or equivalent. Students are expected to have fundamental computer skills. Introduction to object-oriented programming using Java. Topics include problem-solving, top-down design of algorithms using control structures, methods, arrays, basic I/O, basic concepts of objects and classes in Java, Java classes for manipulating strings, and introduction to program testing, UML notation and integrated development environments. Students may not receive credit for both CMSC 255 and INFO 250.

CMSC 256. Data Structures and Object Oriented Programming. 4 Hours.
Semester course; 3 lecture and 2 laboratory hours. 4 credits. Prerequisite: CMSC 255 with a minimum grade of C; corequisite: CMSC 302. Advanced programming using Java. Topics include introduction to object-oriented design, inheritance, polymorphism, exceptions, interfaces, linked lists, stacks, queues, binary trees, recursion, and basic searching and sorting techniques. Continued focus on program testing and UML notation. Students may not receive credit for both CMSC 256 and INFO 350.

CMSC 257. Computer Systems. 4 Hours.
Semester course; 3 lecture and 2 laboratory hours. 4 credits. Prerequisite: CMSC 256 with a minimum grade of C. Topics include UNIX essentials; system programming in C; machine-level representation and organization of programs/data, arrays and pointers; types, structs and unions; strings; bit/byte operations; memory management; shell programming; input/output, including file handling; debugging; signals; network programming using sockets; program concurrency using forks and threads; experiments on program performance and optimization techniques.

CMSC 302. Introduction to Discrete Structures. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CMSC 255 with minimum grade of C. Combinatorial and sequential circuits, algorithms and algorithm analysis, recursion, recurrence relations, graphs, trees.

CMSC 303. Introduction to the Theory of Computation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CMSC 302 or the equivalent with a grade of C or better. Complexity classes, grammars, automata, formal languages, Turing machines, computability.

CMSC 311. Computer Organization. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CMSC 302 with minimum grade of C; corequisite: CMSC 257. Introduction to the basic organization of computers including elementary digital logic design, processor and arithmetic/logic unit design, data paths, memory hierarchy, I/O devices, instruction set architecture and addressing modes.

CMSC 312. Introduction to Operating Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CMSC 311 or EGRE 364. Computer systems design, I/O processing, secondary memory organization, command languages, memory management and job scheduling. Students will work in teams to design and implement an operating system simulation.

CMSC 355. Software Engineering: Specification and Design. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CMSC 256 or EGRE 246, either with a minimum grade of C. Provides an overview of the software engineering process and software life-cycle models. Gives a detailed study of the analysis, specification and design phases. Students will work in teams to gain experience in software development methodology, developing specification and design documents and developing a prototype.

CMSC 391. Topics in Computer Science. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated for credit. Prerequisite: permission of the instructor. This course will teach selected topics in computer science. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

CMSC 401. Algorithm Analysis with Advanced Data Structures. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CMSC 256 with a grade of C or better and CMSC 302 with a grade of C or better. Introduction to algorithm analysis and complexity classes. Advanced data structures topics including multiple linked lists, height-balanced trees, B-trees, hashing and graph representation; incorporating data structures into object-oriented design. Analysis of various searching and sorting algorithms. Algorithm design topics include divide-and-conquer, dynamic programming and greedy methods.

CMSC 403. Programming Languages. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CMSC 256 with a grade of C or better and CMSC 303. Survey of representative modern programming languages. Formal definition of programming languages including specifications of syntax and semantics. Precedence, infix, prefix and postfix notation. Global properties of algorithmic languages. Sub-routines, co-routines and tasks. List processing, string manipulation, data description and simulation languages. Run-time representation of program and data structures.

CMSC 404. Compiler Construction. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CMSC 401 and 403. A first course in compiler theory and construction. Formal description of languages, underlying theory and design techniques for compilers, lexical analysis, syntax analysis, syntax-directed translation, intermediate languages, run-time system management, code generation, code optimization, compiler-building tools.

CMSC 409. Artificial Intelligence. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CMSC 401 with a minimum grade of C and MATH 310. Covers problem spaces, problem-solving methods, game playing, knowledge representatives, expert systems, natural language understanding.

CMSC 411. Computer Graphics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CMSC 355 and MATH 310. Presents mathematical techniques for graphic development and transformation, curve and surface approximation and projections, graphical languages and data structures and their implementation, graphic modeling.

CMSC 412. Social Network Analysis and Cybersecurity Risks. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CMSC 401 with a minimum grade of C. Covers network models, link prediction and analysis, centrality measures, random networks, power-laws and preferential attachment, small world phenomenon and decentralized search, community structure, information propagation in networks, and security and privacy issues in OSNs.

CMSC 413. Introduction to Cybersecurity. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CMSC 401 with a minimum grade of C. This course provides introduction and basic concepts of computer security, cyber attacks, cyber defense, cyber forensics and cyber ethics.

CMSC 414. Computer and Network Security. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CMSC 401 with a minimum grade of C. Corequisite: CMSC 312. This course covers the best practices of computer systems and network security. Key topics include security architecture, cryptographic systems and security management tools.

CMSC 415. Introduction to Cryptography. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CMSC 401 with a minimum grade of C. This course provides a rigorous and theoretical introduction to modern cryptography. Key topics include symmetric key encryption and authentication, public key encryption, and digital signatures.

CMSC 416. Introduction to Natural Language Processing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CMSC 401 with a minimum grade of C. Covers rule-based and statistical methods for creating computer programs that analyze, generate and understand human language. Topics include regular expressions and automata, context-free grammars, probabilistic classifiers, and machine learning. Word-level, syntactic and semantic processing are all considered. Application to real-world problems such as spell-checking, Web search, automatic question answering, authorship identification and developing conversational interfaces.

CMSC 420. Software Engineering: Project Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CMSC 355 with a minimum grade of C. Study of the logistics of team software development. Students work in teams to gain experience in software management and develop the components of a larger software product. Topics include risk management, project planning, quality management, configuration management and software testing.

CMSC 428. Mobile Programming: iOS. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CMSC 355, with a minimum grade of C. This course covers the fundamentals of Swift, Xcode and iOS for programming and design of iOS applications. Background in object-oriented programming and access to a computer with Xcode platform is required.

CMSC 435. Introduction to Data Science. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CMSC 401 with a minimum grade of C. This course covers understanding, representation, storage, retrieval, preprocessing and analysis of data. Specific topics include data quality and preprocessing, database management systems, data warehouses, selected methods for scalable unsupervised and supervised data analysis, and assessment of results generated by these methods. Students will be engaged in analysis of real-life data from data preprocessing, through data analysis, to the assessment of a knowledge product.

CMSC 451. Senior Project. 3 Hours.
Semester course; 3 laboratory hours. 3 credits. Prerequisites: senior standing in the computer science department; 24 credits in computer science, including CMSC 355 and CMSC 508, both with minimum grades of C; UNIV 200 or HONR 200 or equivalent. Capstone project or experience for the computer science major; research and presentation methods in computer science. Each student will participate, either individually or as part of a team, in a project or other experience approved by the course coordinator or sponsored by another computer science faculty member. Each student will write and revise a research paper on a technical topic associated with his or her project or experience. Students will submit a detailed written description of their proposed project or experience and will present orally some aspect of what they have learned and/or done during the semester. (This course cannot be counted as upper-level CMSC electives for students graduating under bulletins prior to 2008-09.).

CMSC 452. Senior Project. 3 Hours.
Semester course; 1 lecture and 2 laboratory hours. 3 credits. Prerequisites: senior standing in the computer science department; CMSC 451 with a minimum grade of C. Capstone project or experience for the computer science major; research and presentation methods in computer science; ethical, legal and social issues in computing; and professional responsibilities of computer scientists. Each student will participate, either individually or as part of a team, in a project or other experience approved by the course coordinator or sponsored by another computer science faculty member. Each student will write and revise a research paper on a technical topic associated with his or her project or experience. Students must continue on the same project that was started in CMSC 451. A final project report and presentation, which will include a discussion of associated legal, social and/or ethical issues, are due at the conclusion of the two-semester project or experience. (This course cannot be counted as upper-level CMSC electives for students graduating under bulletins prior to 2008-09.).

CMSC 491. Topics in Computer Science. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May be repeated for credit with different content. Prerequisite: permission of instructor. This course will cover selected topics in computer science. See the Schedule of Classes for specific topics to be offered each semester.

CMSC 492. Independent Study. 2-4 Hours.
Semester course; variable hours. 2, 3 or 4 credits per semester. Maximum 4 credits per semester; maximum total of 6 credits. Generally open only to students of junior or senior standing who have acquired at least 12 credits in the departmental discipline. Determination of the amount of credit and permission of instructor and department chair must be procured prior to registration of the course. The student must submit a proposal for investigating some area or problem not contained in the regular curriculum. The results of the student's study will be presented in a report.

CMSC 493. Computer Science Internship. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May be repeated for up to 3 credits. Prerequisites: CMSC 401 and CMSC 403. Approval of Computer Science Undergraduate Credentials Committee is required prior to registration. A minimum of 30 clock hours per credit in an information technology environment. The internship is designed to provide practical experience in the computing industry. Student must present a written report reflecting upon internship experience. Graded as pass/fail. Not applicable toward the computer science major.

CMSC 501. Advanced Algorithms. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CMSC 401 or equivalent; graduate standing or acceptance into acclerated B.S. to M.S. program in computer science. Advanced graph algorithms, advanced data structures, applied numerical algorithms, optimization methods, approximation methods for hard graph and string problems, and computational geometry algorithms.

CMSC 502. Parallel Algorithms. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CMSC 312 and CMSC 401, graduate student standing or acceptance into the five-year accelerated B.S. and M.S. program in computer science. Software and hardware mechanisms for providing mutual exclusion in uniprocessor and multiprocessor environments. Architectural issues including pipeline design, superscalar computers, multiprocessors, memory systems, peripherals, interfacing techniques, networks, performance and software issues. 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 (as well as on individual projects) to design and implement parallel algorithms.

CMSC 506. Computer Networks and Communications. 3 Hours.
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. Crosslisted as: EGRE 526.

CMSC 508. Database Theory. 3 Hours.
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. Students will be required to complete a design project and give an oral presentation of the project. Not applicable toward M.S. in Computer Science or the Ph.D. in Engineering, computer science track.

CMSC 510. Regularization Methods for Machine Learning. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to students with graduate standing in computer science or related discipline such as bioinformatics or acceptance into five-year accelerated program in computer science. The course will assume undergraduate-level background in algorithms, linear algebra, calculus, statistics and probability. Upon successful completion of this course, the student will be able to understand recent advances in machine learning and apply machine-learning tools that go beyond learning from data, as well as have the ability to incorporate additional knowledge about the learning problem. Topics covered will include optimization-based view of supervised machine learning; classical regularization approaches including weight decay and Lasso; regularization terms incorporating additional knowledge about structures in the feature space, including group lasso and graph-based regularization terms; semi-supervised learning using graphs linking unlabeled and labeled samples.

CMSC 512. Advanced Social Network Analysis and Security. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Pre- or corequisites: CMSC 412 and CMSC 501. Enrollment requires graduate student standing in computer science or related discipline such as bioinformatics, or acceptance into five-year accelerated program in computer science. The purpose of the course is to teach algorithms for analyzing social networks and complex systems. The focus will be on understanding the inner workings of algorithms using in-network analysis and security threats in online social network sites. Topic covered will include modeling social and technological networks, methods for analyzing structure and dynamical processes on the network, and security and privacy issues in online social networks such as inference attacks, network anonymization, sybil attacks and defense, social bots.

CMSC 516. Advanced Natural Language Processing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to graduate students in computer science or related discipline, or acceptance into five-year accelerated program in computer science. Upon successful completion of this course, the student will be able to understand recent advances in natural language processing and apply NLP algorithms and techniques for processing unstructured text. Word-level, syntactic and semantic processing will be considered. Specific topics include rule-based and statistical methods for creating computer programs that analyze, generate and understand human language. Regular expressions and automata, context-free grammars, probabilistic classifiers and machine learning. Applications to real-world problems such as spell-checking, Web search, automatic question answering, authorship identification and developing conversational interfaces.

CMSC 525. Introduction to Software Analysis, Testing and Verification. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CMSC 401 and 403, graduate student standing or acceptance into the five-year accelerated B.S. and M.S. program in computer science. 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 flow, data flow and error flow analyses. Testing strategies including random, structural, mutation and error flow. Software metrics.

CMSC 526. Theory of Programming Languages. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CMSC 403, graduate student standing or acceptance into the five-year accelerated B.S. and M.S. program in computer science. 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated for credit. Prerequisites may vary. Permission of the instructor required. Course is open to graduate students and students accepted into the five-year accelerated B.S. and M.S. program in computer science. A study of selected topic(s) in computer science at the graduate level. See the Schedule of Classes for specific topics to be offered each semester.

CMSC 601. Convex Optimization. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CMSC 501 or permission of instructor. Enrollment restricted to students with graduate standing in computer science or related discipline. A background in undergraduate-level linear algebra is assumed. Convex sets and functions. Convex optimization problems: Linear, quadratic, semi-definite and cone programs. Duality theory. Approximation algorithms for NP-complete integer optimization problems via semi-definite relaxations and rounding schemes. Algorithms for optimization, such as gradient descent, proximal descent, alternating directions method of multipliers, interior point methods.

CMSC 602. Operating Systems. 3 Hours.
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 603. High Performance Distributed Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to students with graduate standing in computer science or related discipline or acceptance into five-year accelerated program in computer science. The course will assume undergraduate-level background in algorithms, data structures and parallel programming. Upon successful completion of this course, the student will be able to understand the concepts underlying distributed systems; analyze problems to identify performance bottlenecks, parallelization opportunities and concurrency issues in a distributed environment; create distributed and scalable implementations using multiple hosts/GPUs; design and implement algorithms using Hadoop, Spark and CUDA.

CMSC 605. Advanced Computer Architecture. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGRE 426 or with permission of instructor. This course will focus on the design and analysis of high performance computer architectures. Topics investigated include pipeline design, superscalar computers, multiprocessors, memory systems, peripherals, interfacing techniques, networks, performance and software issues. Crosslisted as: EGRE 635.

CMSC 608. Advanced Database. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CMSC 508. Topics discussed include: handling of missing information; the relationship between relational calculus, relational algebra and SQL; logic databases; distributed databases; outer joins; and transaction processing. Emphasis is placed on theoretical issues involved in these topics. In addition students will work in teams to develop a working database application.

CMSC 609. Advanced Computational Intelligence. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: an undergraduate course in artificial intelligence, or equivalent background with permission of instructor. Exploration of issues related to application of computational intelligence techniques to system security, particularly in the detection of anomalous system behavior. Of particular interest are issues associated with the automated detection of anomalies caused by authorized users through intended malicious behavior or through accidental misuse, and issues associated with automated user authentication. Crosslisted as: CISS 609.

CMSC 610. Algorithmic Foundations of Bioinformatics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: Graduate student standing or acceptance into five-year accelerated program in computer science or related discipline such as bioinformatics. The purpose of the course is to teach algorithms for analyzing biological and medical data. The focus will be on understanding the inner workings of algorithms used in bioinformatics tools. Topic covered will include algorithms for assembling and searching biological sequences, finding patterns associated with disease, and exploring biological networks.

CMSC 611. Computer Multimedia. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: permission of instructor. Study of computer multimedia techniques relating to images, sound, video and text. Emphasis on compression techniques and standard storage formats. This course is programming-intensive.

CMSC 612. Game Theory and Security. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CMSC 401, graduate student standing or acceptance into the five-year accelerated B.S. and M.S. program in computer science. The course will provide an introduction to game theory and mechanism design concepts. Lectures cover topics such as introduction of games, equilibrium concepts, computation of game-theoretic solution concepts, mechanism, and issues in game theory and mechanism design.

CMSC 615. Cryptocurrency and Blockchain Techniques. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment is restricted to students with graduate standing in computer science or a related discipline. The course will assume undergraduate-level background in algorithms, data structures and programming. Upon successful completion of this course, the student will be able to understand the major concepts about cryptocurrency and blockchain techniques; be familiar with major blockchain applications as well as real-world issues; understand the underlying consensus mechanisms in the Bitcoin system and other alternative cryptocurrency systems; analyze the security of Nakamoto consensus; understand, write and execute smart contracts using an Ethereum-like platform.

CMSC 618. Database and Application Security. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Theory and practice of database and software security focusing in particular on some common database software security risks and on the identification of potential threats and vulnerabilities. Crosslisted as: CISS 618.

CMSC 619. The Design and Specifications of User Interfaces. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: Graduate standing and permission of instructor. Requires 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 620. Applied Cryptography. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides a comprehensive survey of modern cryptography. Included are techniques of enciphering and deciphering messages using cryptographic algorithms, block ciphers and block cipher modes, hash functions and message authentication codes, public key cryptography and digital signatures, and steganography. Crosslisted as: CISS 624.

CMSC 621. Theory of Computation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: graduate student standing and permission of instructor. Discussion of the complexity and computability of problems and programs. Topics will include unsolvability, universal programs and abstract complexity.

CMSC 622. Network and Operating Systems Security. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CISS 624. Studies the principles of network security and secure operating systems. Included are topics relating to the use of intrusion detection, intrusion prevention and other related tools.

CMSC 623. Cloud Computing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CMSC 622. Provides an introduction to cloud computing architecture and cloud computing security. The course covers the basic concepts of cloud computing, including memory virtualization, device virtualization and related security problems in cloud computing.

CMSC 624. Software Quality Assurance. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: a course in software engineering and graduate standing in computer science, or permission of instructor. A study of issues that affect the quality of software and of methodology to assure that software products are of the desired quality. This also includes issues in assessing product quality as well as the process by which the software is produced. Topics include various methodologies, standards, metrics and tools.

CMSC 625. Advanced Software Analysis, Testing and Verification. 3 Hours.
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 628. Mobile Networks: Applications, Modeling and Analysis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment is restricted to students with graduate standing in computer science or related discipline. The course will assume undergraduate-level background in algorithms, data structures, programming and networks. Upon successful completion of this course, the student will be able to understand the major concepts about mobile networks such as device-to-device communication technologies, mobility models and coverage; be familiar with various mobile network types (e.g., mobile social networks, delay tolerant networks, overlay networks, vehicular networks and cellular networks) and devices (e.g., smartphones, femtocells, WiFi), learn how to model mobile networks with stochastic processes and real datasets; be able to use different networking simulators; and understand various routing algorithms and analyze their behavior.

CMSC 630. Image Analysis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to students with graduate standing in engineering or science or by permission of instructor. Introduces theoretical and practical aspects of computer vision for image processing and understanding. It provides a comprehensive walkthrough from basics of image preparation to using computational intelligence tools for knowledge discovery from images. The course will cover basics of image processing and computer vision, including image sampling and quantization, color, pixel-based operations, image filtering, morphological image processing, and image transforms; information extraction including segmentation and feature extraction; pattern recognition for computer vision: classification, novelty and object detection, image understanding, learning from video streams, and tensor-based methods. Examples will include medical image analysis, object recognition in ground and aerial photographs and hyperspectral imaging.

CMSC 635. Knowledge Discovery and Data Mining. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CMSC 401 or corequisite: CMSC 501. Enrollment restricted to students with graduate standing in computer science or related discipline such as bioinformatics or acceptance into five-year accelerated program in computer science. Covers knowledge discovery and data mining concepts, tools and methods; provides hands-on experience based on a project involving analysis of large real-life data. Topics include the knowledge discovery process, data storage and representation, preprocessing algorithms for missing data imputation, feature selection and discretization; unsupervised learning algorithms for clustering and association mining; supervised learning algorithms including decision trees, Bayesian models and introduction to support vector machines and neural networks; ensemble learning; protocols and measures for validation of predictive models; and data security and privacy issues.

CMSC 636. Artificial Neural Networks and Deep Learning. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to students with graduate standing in computer science. The course will assume undergraduate-level background in programming, algorithms, linear algebra, calculus, statistics and probability. Topics ranging from fundamental learning rules, functional, cascade correlational, recurrent and gradient descent networks, to neocognitron, softmax, deep convolutional networks, autoencoders and pretrained deep learning (restricted Boltzmann machines). Students will be required to work in teams on a class paper.

CMSC 678. Statistical Learning and Fuzzy Logic Algorithms. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH/STAT 309 or 310. The course considers two central problems in modern science and engineering: i) the problem of statistical learning from examples (empirical data) and ii) the problem of embedding existing human knowledge into workable mathematics. Topics include: examples of multivariate functional mapping, basics of classic classification and regression, support vector machines as a learning paradigm based on structural risk minimization, fuzzy logic algorithms, basics of multi-class classification over high dimensional spaces, curve and surface fittings, multivariate function approximation and nonlinear optimization; fuzzy logic systems; crisp and fuzzy sets, linguistic variables, fuzzy set theory; if-then rules, fuzzy interference, fuzzification and defuzzification, neuro-fuzzy paradigms.

CMSC 691. Special Topics in Computer Science. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated for credit. Prerequisites: at least one graduate-level computer science course pertaining to the topic area and permission of instructor. An advanced study of selected topic(s) in computer science at the graduate level. See the Schedule of Classes for specific topics to be offered each semester.

CMSC 692. Independent Study. 1-3 Hours.
Semester course; 1-3 variable hours (to be arranged). 1-3 credits. Enrollment restricted to students with graduate standing and consent of instructor. Independent study done under the supervision of a faculty member. The student must identify a faculty member willing 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. Graded as Pass/Fail.

CMSC 697. Directed Research. 1-15 Hours.
Semester course; variable hours (to be arranged). 1-15 credits. May be repeated for credit. A total of 3 credits may be used to fulfill the M.S. in Computer Science thesis requirement. Prerequisite: graduate standing. Independent research culminating in the writing of the required thesis or dissertation. 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. Graded as S/U/F.

CMSC 701. Research Methods. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: Ph.D. standing or permission of instructor. Covers the principles of conducting a research project, reporting the findings in the form of a journal paper and promoting the research through public presentations. Students learn to write grant proposals and practice reviewing research papers and grant proposals. The main emphasis of the course is writing a paper and a grant proposal in a format compliant with NSF, NIH or DoD guidelines.

COOPERATIVE EDUCATION (COOP)

COOP 298. Cooperative Education Experience. 0 Hours.
Semester course; the student works a maximum of 20 hours per week, completes all off-campus/on-campus assignments. No credit. Open to students who have been placed in an approved co-op position with an agency, business, industry or institution.

COOP 398. Cooperative Education Experience. 0 Hours.
Semester course; the student works a maximum of 40 hours per week, completes all off-campus/on-campus assignments. No credit. Open to students who have been placed in an approved co-op position with an agency, business, industry or institution.

COUNSELOR EDUCATION (CLED)

CLED 501. A Survey of the Counseling Profession. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Course restriction: Students must have, at minimum, senior class status before taking this course. An introductory course for any student interested in pursuing a career as a counselor. An overview of the counseling profession and counselor professional identity.

CLED 520. Gender Issues in Counseling. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Overview of gender issues and their relationship to the counseling process. Class focuses on understanding the unique issues men and women bring to counseling and providing appropriate counseling interventions. Focus is on appropriate gender developmental tasks and how diversity in age, religion, race, ethnicity, socioeconomic status and sexual orientation relates to relationships and to counseling men and women.

CLED 600. Professional Orientation and Ethical Practice in Counseling. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: admission to counselor education program or permission of instructor. An introductory course for all students in counselor education that provides an overview of the counseling profession and explores ethical and legal standards in the counseling field. The course focuses on ethical standards of professional organizations, federal and state legal mandates and the application of ethical and legal considerations in counseling practice.

CLED 601. Theories of Counseling. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: admission to counselor education program or permission of instructor. Selected theories upon which counseling is based, with particular attention placed on the research underlying the theories. Primary focus on providing students with a theoretical foundation upon which to base their personal counseling approaches.

CLED 602. Techniques of Counseling. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment requires admission to counselor education program or permission of instructor. Theory and practice of counseling with emphasis on skill development.

CLED 603. Group Procedures in Counseling. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Pre- or corequisites: CLED 600, CLED 601 and CLED 602. Analyzes the theories and practice of group work, the relationship of group activities to counseling, and specific skills in group techniques.

CLED 604. Practicum: School Counseling. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CLED 603; and CLED 613 or CLED 622. Seminar and supervised field experience in individual and group counseling and classroom group guidance.

CLED 605. Career Information and Exploration. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CLED 600 and 601. Designed to provide the potential counselor with an understanding of theoretical approaches to career development in grades K-adult. Emphasis will be given to the relationship between counselor and student(s) in the career development process. A review of occupational, educational and personal/social information resources will be made.

CLED 606. Assessment Techniques for Counselors. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CLED 600 and 601. Principles and techniques involved in selecting, scoring and interpreting standardized and nonstandardized assessment instruments used by counselors.

CLED 607. Multicultural Counseling in Educational Settings. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: instructor approval. A study of personal, social, political, affective and behavioral considerations of diversity. Multicultural competencies including awareness, knowledge and skills in counseling are emphasized. Efforts will be made to provide school counselors and postsecondary student affairs professionals with practical skills, strategies and techniques for use when working with students and families from a variety of cultural backgrounds.

CLED 608. Practicum: College Student Development and Counseling. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CLED 603, CLED 605 and CLED 660; and CLED 620 or CLED 631. Seminar and supervised field experience in student services in postsecondary educational settings.

CLED 610. Counseling in Elementary and Middle Schools. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CLED 600 and 601. An intensive study of school counseling programs for children and young adolescents. Emphasizes the role of elementary and middle school counselors in developmental guidance. Methods for classroom guidance will be discussed.

CLED 612. Seminar in Counseling. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: admission to counselor education program or permission of instructor. A survey course that introduces various theories and strategies that support wellness and development. Topics include counselor and client wellness, supervision, psychopathology, crisis intervention, suicide prevention and theories on addictions.

CLED 613. Data-driven Comprehensive School Counseling Programs. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to students admitted to counselor education program or with permission of instructor. Considers the history of the pro¬fession, current issues and future trends. Addresses professional organizations and ethical guidelines and will focus on the role of school counselors in becoming advocates for students and leaders in the school environment.

CLED 615. Lifespan Development: A Gender Perspective. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Overview of human development theories and the impact of cultural gender messages on the developmental process. Crosslisted as: EDUS 615.

CLED 620. Student Development Services in Higher Education. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Pre- or corequisites: CLED 600 and CLED 601 or by permission of instructor. An overview of the organization and management of student services in postsecondary institutions. Areas such as admissions, career services, academic advising, residential life, financial aid, student development services, student union programming and management, and student activities are reviewed.

CLED 621. Secondary School Counseling Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CLED 600 and 601. An advanced course designed to provide a means for intensive study of secondary school counseling. The approach will be to integrate professional knowledge and skills from various disciplines as they relate to the work of the secondary school counselor.

CLED 622. School Counseling Services. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to students admitted to counselor education program or with permission of instructor. Focuses on the organization, administration and delivery of school counseling services in pre-K-12 schools.

CLED 630. Clinical Supervision in the Counseling Profession. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Selected theories upon which clinical supervision in the counseling field is based, with particular attention placed on the research underlying the theories. Primary focus on providing students with a theoretical foundation upon which to base their supervision practice.

CLED 631. American College and University. 3 Hours.
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. Crosslisted as: EDUS 631.

CLED 633. Academic Leadership in Higher Education. 3 Hours.
Semester course; 3 lecture hours. 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. Crosslisted as: EDUS 633.

CLED 640. Marriage, Couples and Family Counseling. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CLED 600 and CLED 601. This course provides students with an overview of the processes and theories involved with counseling couples and families. The focus is on preparing students to think systemically and to learn about family concepts, development, dynamics, theories, assessments and techniques. Counseling experience and feedback from the instructor and classmates will be provided. Students will use critical reflection throughout the semester while meeting the requirements of this course.

CLED 642. Organization and Administration of Guidance Services. 3 Hours.
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 community resources that can contribute to more efficient guidance services.

CLED 650. Addiction Counseling. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course is an entry-level graduate course that provides counselors and other human service workers with an overview of the addictive process. Theories of addiction counseling and application of these theories will comprise a significant part of this course, particularly with how they apply to work with individuals, couples, families and groups. Co-occurring disorders, such as process addictions and mental illnesses will also be addressed. Students will develop conceptual knowledge, practical skills and self-awareness concerning the etiology of addiction, assessment strategies (including the use of wraparound assessment and intervention services), wellness strategies for facilitating optimal development and preventing clinician burn-out, and diagnosis and treatment planning. This will be accomplished through assigned readings, seminar discussions, videotapes, lectures, case presentations, guest speakers and student assignments.

CLED 660. Mental Disorders, Diagnosis and Treatment Planning. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Pre- or corequisite: CLED 603. The course examines the history, paradigms, theory and practice of mental health diagnosis, with primary emphasis on the identification of issues related to thinking (cognition), feeling (affect) and acting (behavior) upon which diagnoses are based. The purpose of this course is for students to become familiar with the study of mental disorders and learn the system of classification of mental disorders, the DSM-5.

CLED 672. Internship. 1-6 Hours.
Semester course; variable hours. 1-6 credits. Must be repeated for a total of at least six credit hours. Enrollment requires completion of all other CLED courses required for program. Seminar and supervised field instruction experience for counselors in K-12 settings or professionals in postsecondary settings. Designed to extend professional competencies under supervision of an approved licensed professional school counselor (K-12 settings) or approved student services professional (postsecondary settings). A total of 600 clock hours is required.

CLED 720. Counselor Education Doctoral Seminar I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to students admitted to counselor education concentration of the Ph.D. in Education program. Theories and skills of leadership, advocacy models, advocacy action planning and social change theories. Models and methods of program evaluation are examined and evaluations designed and implemented as part of leadership and advocacy efforts. Students demonstrate the ability to provide or contribute to leadership efforts of professional organizations/programs and to advocate for the counseling profession and its clientele.

CLED 721. Counselor Education Doctoral Seminar II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to students admitted to counselor education concentration of the Ph.D. in Education program. Instructional theory, counselor education methods and multicultural pedagogy, and the roles, responsibilities and activities of counselor educators. Students demonstrate course design, delivery and evaluation methods. Students also develop their professional writing skills and demonstrate the ability to write for journals, newsletters, presentation proposals and grant proposals related to the teaching and training of counselors.

CLED 730. Advanced Counseling Theories and Practicum. 3 Hours.
Semester course; 3 lecture hours and 100 on-site hours. 3 credits. Pre- or corequisite: CLED 720. Restricted to students admitted to counselor education concentration of the Ph.D. in Education program. Theories pertaining to the principles and practice of counseling, systems work, consultation and responding to crises, disasters and other trauma-causing events. Students demonstrate, at an advanced level, effective application of multiple counseling theories and interventions across diverse populations and settings, as well as advanced case conceptualization. This course includes a supervised 100-hour doctoral-level practicum.

CLED 740. Supervision in Counseling. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CLED 730; pre- or corequisite: CLED 721. Restricted to students admitted to counselor education concentration of the Ph.D. in Education program. Purposes, theoretical frameworks, models, roles of relationship, and practices of counselor/ clinical supervision. Students develop and demonstrate the application of theory and skills of clinical supervision as they refine their personal style of supervision.

CLED 750. Advanced Group Counseling. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CLED 740. Restricted to students admitted to counselor education concentration of the Ph.D. in Education program. Therapeutic factors of group work, theories of group work, including group counseling, evaluation of group work, group leadership characteristics, styles and behaviors. Students will demonstrate advanced group work skills and the ability to evaluate group climate, group leadership, group process and group outcomes.

CLED 760. Advanced Career Counseling and Development. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CLED 740; pre- or corequisite: CLED 750. Restricted to students admitted to counselor education concentration of the Ph.D. in Education program. Principles and practice of career counseling, career counselor supervision and career program development beyond the beginning level. Students will demonstrate advanced career counseling work with a client, and beginning-level career counseling supervision. Part of this course includes developing and writing an article for publication based upon a theory-based career intervention structured in social justice and advocacy.

CLED 810. Counselor Education Doctoral Internship. 1-4 Hours.
Semester course; variable hours. 1-4 credits. May be taken for a total of 6 credits. Prerequisite: CLED 760. Restricted to students admitted to counselor education concentration of the Ph.D. in Education program. Supervised experiences in counselor education and supervision (e.g., clinical practice, supervision, research and/or teaching). Internship is at the discretion and approval of the doctoral adviser and is based on student experience, training and career goals. The setting, goals, site supervisor and plan for the internship must be approved by the doctoral adviser. Students receive weekly supervision from their site supervisor and group supervision from a counselor education faculty member.

CRAFT AND MATERIAL STUDIES (CRAF)

CRAF 211. Jewelry. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. Prerequisite: successful completion of the Art Foundation Program. Investigation of basic jewelry making processes such as construction, chasing, surface embellishment and basic stone setting. Research in contemporary and historical jewelry forms.

CRAF 221. Woodworking Techniques. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. Prerequisite: successful completion of the Art Foundation Program. Introduction to techniques of woodworking. Includes the use of hand tools; hand and machine joinery; shaping and carving; finishing; and techniques involving jigs and fixtures. Students participate in studio work.

CRAF 240. Introduction to Ceramics. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. Prerequisite: successful completion of the Art Foundation Program. Introduction to beginning processes of wheel throwing and hand-built construction techniques, design, aesthetics and the creative development of clay objects examining cultural, historical and personal modes of expression. Demonstrations and slide presentations are given for assignments along with handouts to assist in illustrating techniques and processes. Students will be introduced to various ceramic aesthetics in contemporary, social and historical context.

CRAF 250. Introduction to Glass Fabrication. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. Prerequisite: successful completion of the Art Foundation Program. An introduction and investigation into the physical and associative material properties of glass. Students will explore a variety of methodologies for hot, cold and casting glass fabrication. The history and modern application of each technique will be covered through lectures, demonstrations and studio work.

CRAF 260. Introduction to Textiles. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. Prerequisite: successful completion of the Art Foundation Program. An introduction to basic textile techniques, tools and materials. This course introduces dyeing, weaving, felt-making, embroidery, sewing and related techniques. The history and modern application of each technique will be covered through lectures, demonstrations and studio work.

CRAF 282. Sophomore Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: successful completion of the Art Foundation Program. Introduction to the fields within the Department of Craft and Material Studies, critique practices, planning for arts career and writing within the field.

CRAF 301. Advanced Metal Fabrication: Forming. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. May be repeated for a maximum of 12 credits. Prerequisite: CRAF 211 with a minimum grade of C. This course introduces students to various metal forming techniques. While cultivating respect for craft, the underlying theme of the course explores form as a means of expression for both functional and nonfunctional work. It is designed to develop skill, craftsmanship and sensitivity to design in working with metal. The history and modern application of each technique will be covered through lectures, demonstrations and studio work.

CRAF 302. Advanced Metal Fabrication: Mechanisms. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. May be repeated for a maximum of 12 credits. Prerequisite: CRAF 211 with a minimum grade of C. This course introduces students to various fabrication techniques, findings and mechanisms related to the production of jewelry and small-scale objects. It is designed to develop skill, craftsmanship and sensitivity to design in working with metal. The history and modern application of each technique will be covered through lectures, demonstrations and studio work.

CRAF 303. Advanced Metal Fabrication: Surface Techniques. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. May be repeated for a maximum of 12 credits. Prerequisite: CRAF 211 with a minimum grade of C. This course introduces students to various surface treatments employed in the production of jewelry and metal objects. It is designed to develop skill, craftsmanship and sensitivity to design in working with metal. While cultivating respect for craft, the underlying theme of the course explores form as a means of expression for both functional and nonfunctional work. The history and modern application of each technique will be covered through lectures, demonstrations and studio work.

CRAF 304. Advanced Metal Fabrication: Casting and Stone Setting. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. May be repeated for a maximum of 12 credits. Prerequisite: CRAF 211 with a minimum grade of C. This course introduces students to casting and stone setting techniques employed in the production of jewelry and metal objects. It is designed to develop skill, craftsmanship and sensitivity to design in working with metal. While cultivating respect for craft, the underlying theme of the course explores form as a means of expression for both functional and nonfunctional work. The history and modern application of each technique will be covered through lectures, demonstrations and studio work.

CRAF 320. Furniture Design. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. May be repeated for a maximum of 8 credits. Prerequisite: CRAF 221 with a minimum grade of C. The course explores the development of ideas through drawings, mock-ups and the planning and execution of a small furniture object utilizing basic and specialized woodworking techniques.

CRAF 321. Advanced Woodworking and Furniture Design. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. May be repeated for a maximum of 12 credits. Prerequisite: CRAF 320 with a minimum grade of C. Advanced design and construction investigation of varied materials and machine processes.

CRAF 322. Advanced Woodworking and Furniture Design. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. May be repeated for a maximum of 12 credits. Prerequisite: CRAF 320 with a minimum grade of C. Advanced design and construction investigation of varied materials and machine processes.

CRAF 341. Advanced Ceramics. 4,6 Hours.
Semester courses; 2 lecture and 6 or 12 studio hours. 4 or 6 credits. Each of the courses may be repeated for up to a maximum of 12 credits. Prerequisite: CRAF 240 with a minimum grade of C. Advanced problems in the design and production of functional and nonfunctional ceramic products.

CRAF 342. Advanced Ceramics. 4,6 Hours.
Semester courses; 2 lecture and 6 or 12 studio hours. 4 or 6 credits. Each of the courses may be repeated for up to a maximum of 12 credits. Prerequisite: CRAF 240 with a minimum grade of C. Advanced problems in the design and production of functional and nonfunctional ceramic products.

CRAF 343. The Figure in Clay. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. Prerequisite: CRAF 240 with a minimum grade of C. This course is a continuation of study in ceramics with a focus on the figure in clay. While cultivating respect for craft, the underlying theme of the course explores the figure in clay as a means of expression in an art-making medium. The history and modern application of each hand-building technique will be covered through lectures, demonstrations and studio work.

CRAF 344. Ceramics: Mold-Making. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. Prerequisite: CRAF 240 with a minimum grade of C. This course is a continuation of study in ceramics with a focus on prototyping and mold-making techniques. While focused on generating original artwork, the course will cover prototype development and serialized production using a variety of mold-forming processes. The history and contemporary application of ceramic mold-making techniques will be covered through student research, demonstrations and studio work.

CRAF 351. Intermediate Glass Fabrication/Hot. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. May be repeated for a maximum of 12 credits. Prerequisite: CRAF 250 with a minimum grade of C. A deeper and broader delving into hot and cold glass fabrication techniques, with an introduction to the utilization and application of color processes will be explored.

CRAF 352. Intermediate Glass Fabrication/Kiln Forming. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. May be repeated for a maximum of 12 credits. Prerequisite: CRAF 250 with a minimum grade of C. A deeper exploration of warm glass (kiln forming) processes that will involve advanced mold-making techniques.

CRAF 353. Glassworking: Lampworking. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. May be repeated for a maximum of 12 credits. Prerequisite: CRAF 250 with a minimum grade of C. Provides an opportunity for further investigation, specialization and technical mastery in glass lampworking design.

CRAF 354. Intermediate Glass Fabrication. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. May be repeated for a maximum of 12 credits. Prerequisite: CRAF 250 with a minimum grade of C. A deeper and broader delving into hot and cold glass fabrication techniques, with an introduction to the utilization and application a multigenerational approach to image realization will be extensively investigated.

CRAF 361. Intermediate Textiles: Tapestry/Weaving. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. May be repeated for a maximum of 12 credits. Prerequisite: CRAF 260 with a minimum grade of C. An introduction to the floor loom with an emphasis on tapestry weaving. Concentrated studio work in contemporary and traditional loom techniques along with continuing individual investigation of other textile techniques.

CRAF 362. Intermediate Textiles: Pattern Weaving. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. May be repeated for a maximum of 12 credits. Prerequisite: CRAF 260 with a minimum grade of C. An introduction to the floor loom with an emphasis on pattern weaving. Concentrated studio work in contemporary and traditional loom techniques along with continuing individual investigation of other textile techniques.

CRAF 363. Fabric Design I. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. May be repeated for a maximum of 12 credits. Prerequisite: CRAF 260 with a minimum grade of C. Exploration of dye and pigment techniques for fabric along with pattern development and conceptual use of fabric.

CRAF 364. Fabric Design II. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. May be repeated for a maximum of 12 credits. Prerequisite: CRAF 260 with a minimum grade of C. Exploration of dye and pigment techniques for fabric along with pattern development and conceptual use of fabric.

CRAF 367. Tapestry. 4 Hours.
Semester courses; 2 lecture and 6 studio hours. 4, 4 credits. Prerequisite: permission of instructor. Origins of tapestry forms and execution of techniques.

CRAF 368. Tapestry. 4 Hours.
Semester courses; 2 lecture and 6 studio hours. 4, 4 credits. Prerequisite: permission of instructor. Origins of tapestry forms and execution of techniques.

CRAF 369. Ancient Peruvian Textile Techniques. 4 Hours.
Semester course; 2 lecture and 6 or 12 studio hours. 4 credits. Prerequisite: permission of instructor. An examination of textile techniques perfected in ancient Peru and their application to contemporary fiber work. Pre-Columbian cultures will be studied to understand textile development. Course includes student duplication of techniques to better understand "structure" and the production of a personal object(s) utilizing these techniques and information.

CRAF 382. Junior Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CRAF 282 and UNIV 200 or HONR 200. Continued investigation of the craft field, critique practices, planning for careers through the lens of creativity and exploration, and a continuation of writing in the field.

CRAF 446. Glaze Technology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: permission of instructor. Development, formulation and application of ceramic glazes. The technology includes high, medium and low firing ranges as well as color and analysis of glaze materials.

CRAF 447. Ceramic Technology: Clay, Claybodies and Slips. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: permission of instructor. Study of clay from geological origins to practical application. Course includes development and application of clay bodies in different firing ranges, englobes and slips.

CRAF 455. Glass Through Time. 3 Hours.
Semester course; 2 lecture and 1 studio hours. 3 credits. Prerequisite: permission of instructor. This class will be an in-depth examination of the application and utilization of the material glass throughout time. An inquiry into present and future artistic and architectural applications of the material will be explored.

CRAF 456. Survey of Glass. 3 Hours.
Semester courses; 3 lecture hours. 3, 3 credits. Prerequisite: permission of instructor. An examination of significant technological developments in glass from the past to present. First semester: ancient to 16th century. Second semester: 17th century to contemporary. Illustrated lectures.

CRAF 480. Senior Studio/Critique Course. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. May be repeated for a maximum of 8 credits. Prerequisites: CRAF 382; and CRAF 301, 302, 303, 304, 320, 321, 322, 341, 342, 343, 344, 351, 352, 353, 354, 361, 362, 363, 364 or 369, both with a minimum grade of C. Corequisite: CRAF 301, 302, 303, 304, 320, 321, 322, 341, 342, 343, 344, 351, 352, 353, 354, 361, 362, 363, 364 or 369. Focuses on the development of independent interests aimed at creating a cohesive series/body of work.

CRAF 481. Senior Studio/Critique Course. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. Prerequisite: CRAF 480 with a minimum grade of C. The course will focus on the continuation of creating a cohesive series/body of work begun during CRAF 480.

CRAF 482. Senior Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: senior standing in the major and CRAF 382. Capstone course focusing on the continued investigation of the craft field with emphasis on the student's media area(s) of focus and professional practices.

CRAF 491. Topics in Craft/Material Studies. 1-3 Hours.
Semester course; 1-3 credits. May be repeated for a maximum of 9 credits. Prerequisite: permission of instructor. A seminar or workshop on a selected issue or topic in the field of crafts. See the Schedule of Classes for specific topics to be offered each semester.

CRAF 492. Independent Study. 1-3 Hours.
Semester course; 1-3 credits. May be repeated for a maximum of 6 credits. Prerequisites: senior standing in the major and permission of the instructor. The student will pursue advanced, individually directed study on a subject to be formulated in writing by the student and instructor.

CRAF 493. Fieldwork. 3 Hours.
Semester courses; 135 clock hours. 3 credits. Prerequisites: senior standing in the major and permission of department chair. Opportunity for practical work experiences. Senior students are placed with professionals who offer supervised work or research experience appropriate to their major interests. Participation requires the approval of both the department chair and field supervisor. Students must work 135 clock hours and maintain a daily log of their experiences. Field supervisor will plan student's work and evaluate performance.

CRAF 494. Fieldwork. 6 Hours.
Semester course; 270 clock hours. 6 credits. Prerequisites: senior standing in the major and permission of department chair. Opportunity for practical work experiences. Senior students are placed with professionals who offer supervised work or research experience appropriate to their major interests. Participation requires the approval of both the department chair and field supervisor. Students must work 270 clock hours and maintain a daily log of their experiences. Field supervisor will plan student's work and evaluate performance.

CRAF 591. Special Topics and Practicum. 1-3 Hours.
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 curriculum. See the Schedule of Classes for specific topics to be offered each semester.

CRAF 601. Graduate Studies in Metal. 3-9 Hours.
Semester course; 9, 18 or 27 studio hours. 3, 6 or 9 credits. May be repeated for a maximum of 36 credits. Personal investigation of materials, processes and attitudes relating to the creative production of metal and/or jewelry forms.

CRAF 621. Graduate Studies in Wood. 3-9 Hours.
Semester course; 9, 18 or 27 studio hours. 3, 6 or 9 credits. May be repeated for a maximum of 36 credits. Design, research and experimentation in wood and varied materials relating to a body of work demonstrating the student's mastery of ideation and material.

CRAF 641. Graduate Studies in Clay. 3-9 Hours.
Semester course; 9, 18 or 27 studio hours. 3, 6 or 9 credits. May be repeated for a maximum of 36 credits. 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. Graduate Studies in Glass. 3-9 Hours.
Semester course; 9, 18 or 27 studio hours. 3, 6 or 9 credits. May be repeated for a maximum of 36 credits. This course is an intensive focus on glass experimentation and its associative properties with the expected outcome of the materialization and realization of each individual's original research into their studio practice.

CRAF 661. Graduate Studies in Fiber. 3-9 Hours.
Semester course; 9, 18 or 27 studio hours. 3, 6 or 9 credits. May be repeated for a maximum of 36 credits. Work in contemporary and traditional textile techniques.

CRAF 680. Graduate Critique. 3 Hours.
Semester course; 9 studio hours. 3 credits. May be repeated for a maximum of 12 credits. This course explores the meaning and application of critique as it is relates to both students' own work and the work of others as preparation for thesis or candidacy exhibitions. There will be emphasis placed on the production and presentation of artwork and artist statements.

CRAF 681. Candidacy Research. 3 Hours.
Semester course; 9 studio hours. 3 credits. May be repeated for a maximum of 6 credits. This course will provide directed studio work and research. Students will take risks, hone skills, figure out what questions, issues and ideas direct creative work and receive guidance and support from their graduate committee. To be taken the first two semesters of graduate program; in the second semester the student will work with their graduate committee to prepare for candidacy review and exhibition.

CRAF 682. Thesis Research. 3 Hours.
Semester course; 9 studio hours. 3 credits. May be repeated for a maximum of 6 credits. This course will provide directed studio work and research. Students will take risks, hone skills, figure out what questions, issues, and ideas direct creative work and receive guidance and support from the their graduate committee. To be taken the final two semesters of graduate program with approval of the department chair and graduate committee; in the second semester the student will work with their graduate committee to prepare for thesis exhibition and the written thesis according to the established written thesis timeline.

CRAF 690. Graduate Seminar. 1,3 Hour.
Seminar 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.

CRAF 692. Directed Research. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May be repeated for a maximum of 12 credits. Approval of supervising faculty member and department chair necessary prior to registration. This course will be limited to graduate students in the Department of Craft and Material Studies in high standing within the program. Learning experiences will be designed with the supervising faculty member in the form of a contract between student and instructor.

CRIMINAL JUSTICE (CRJS)

CRJS 181. Introduction to Criminal Justice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Comprehensive overview of criminal justice; assesses the extent of crime; reviews law enforcement, judicial and correctional processes at all levels of government; discusses history and philosophy of public safety; evaluates career opportunities.

CRJS 252. Juvenile Justice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CRJS 181 or permission of instructor. Examines all segments of juvenile justice and special procedures designed for young persons; recognizes the importance of proper handling of the juvenile by the police and the courts; reviews recent developments in juvenile rehabilitation.

CRJS 253. Introduction to Corrections. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CRJS 181. A survey of societal responses to the offender; traces the evolution of practices based on philosophies of retribution, punishment and rehabilitation; reviews contemporary correctional activities and their relationships to other aspects of the criminal justice system; introduces the emerging area of correctional programming within the community.

CRJS 254. Introduction to Policing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CRJS 181. A survey of different facets of law enforcement including the activities of public police agencies and private security organizations. Assesses changes in law enforcement philosophy and practices, police relationships with the public and the political arena and anticipated future trends in policing.

CRJS 255. Introduction to Legal Studies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Overview of the American legal system, processes, terminology; analysis of historical and philosophical bases of law. Examines the systems that adjudicate criminal and civil law; considers the role of law in the functioning of the justice system.

CRJS 300. Forensic Criminology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CRJS 181. The intersection of law, predictions of dangerousness, mental disorder and crime. Behavioral prediction, classification and the development of typologies of offenses and offending will be considered. Issues in the use of clinical and statistical prediction methods in criminal justice will be presented.

CRJS 302. Legal Writing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: UNIV 200 or HONR 200, and ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. Intensive practice in writing on subjects related to law or legal problems. Emphasis on organization, development, logical flow and clarity of style. May not be used to satisfy the literature requirement of the College of Humanities and Sciences. Crosslisted as: ENGL 302.

CRJS 305. Policing Theories and Practice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CRJS 181 and 254. An overview of the nature and application of law enforcement theory. Examines the theoretical underpinnings of a variety of law enforcement practices, with emphasis on evolving trends.

CRJS 320. Principles of Criminal Investigation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CRJS 181. Surveys the fundamentals of criminal investigation procedures and techniques. Examines crime scene management, searching, collecting, handling and preserving of evidence as applied to forensic crime scene investigation.

CRJS 324. Courts and the Judicial Process. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CRJS 181. Examines the systems that adjudicate criminal and civil law; includes constitutional authority, jurisdictions and trial processes, with particular emphasis on reform in court administration, disposition without trial and sentencing.

CRJS 350. Evaluation and Treatment of the Offender. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CRJS 181 and 253. An analysis of the issues and procedures involved in evaluating individual differences in offenders and among classes of offenders; current diagnostic and treatment methods are discussed; introduces the student to case analysis and correctional counseling techniques. Includes analysis of evaluation and treatment resources external to corrections.

CRJS 351. Community Corrections. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CRJS 181 and 253. A comprehensive review of various community-based rehabilitation and treatment efforts; includes analysis of probation, parole, work release, halfway houses and other methods of re-integrating the offender into society.

CRJS 352. Crime and Delinquency Prevention. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CRJS 181. Review and analysis of the problems associated with prevention of crime and delinquency, viewed in a total systems context. Programs and activities involving citizen, community and agency interrelationships will be developed and examined. Students are responsible for preparing and evaluating projects with crime preventive goals.

CRJS 355. Criminological Theory. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CRJS 181 or permission of instructor. Examines the intellectual underpinnings of the criminal justice system. Includes analysis of evolving values and ideas regarding social control, individual and collective responsibilities and rights, the role of punishment, politics and the law, practitioners as public servants, and criminological and other foundations of the criminal justice system.

CRJS 358. Lawyer's Role in the Justice System. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CRJS 181. Examines the multiple responsibilities of lawyers from an historical and contemporary perspective. The basic techniques of the lawyer's craft will be studied with emphasis placed on case advocacy, negotiation skills and legal reasoning, and problem-solving.

CRJS 360. Foundations of Criminal Law. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CRJS 181. Clarifies both the content and role of criminal law within criminal justice and its administration in America. Explores the moral, theoretical and historical foundations of American criminal law and jurisprudence; elements and classification of criminal conduct; burdens of proof; defenses to criminal culpability; and a variety of crime types focusing in particular on crimes against person and property.

CRJS 370. Criminalistics and Crime Analysis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CRJS 181. A comprehensive evaluation of current developments in research, instrumentation and laboratory technology utilized to detect, identify, analyze and compare evidence.

CRJS 373. Crime Scene Evidence: Law and Trial Procedure. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CRJS 181. Provides a fundamental understanding of evidence law. Examines the nature and admissibility of various forms of evidence. Provides an understanding of the investigator's role in the judicial process including the presentation of testimony and adversarial proceedings.

CRJS 380. Research Methods in Criminal Justice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CRJS 181 and STAT 210. Designed to familiarize the student with current and applied research methods in criminal justice, including the application of data and information processing techniques and procedures; analyzes research in criminal justice journals and government reports; and enhances the capability to evaluate contemporary research.

CRJS 382. Gender, Crime and Justice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CRJS 181 or permission of instructor. Examines the role of gender as it relates to crime and justice. Special attention will focus on the gendered experiences of practitioners, offenders and victims within the criminal justice system in terms of processing, adjudication and institutional responses. Crosslisted as: GSWS 382.

CRJS 400. Current Issues in Juvenile Justice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CRJS 181. Restricted to criminal justice majors. Examines key issues facing the modern American juvenile justice system. Integrates social science research, juvenile justice policy and legal scholarship pertaining to current law and policy controversies in juvenile justice.

CRJS 401. Sex Crime and Society. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CRJS 181. Restricted to criminal justice majors. Examines the nature and extent of sex offending, societal responses to sex crime, and the laws and policies enacted to reduce sexual offending. Explores the etiology of sex offending as well as methods to evaluate the efficacy of sex crime laws.

CRJS 405. Special Issues in Juvenile Detention. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CRJS 181. Restricted to criminal justice majors. Examines the operations of modern juvenile detention facilities with an emphasis on the special needs of youth detainees. Explores the challenges facing administrators, staff and youth residents within a juvenile correctional setting.

CRJS 406. Issues in Short-term Detention. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CRJS 181 and 253. Restricted to criminal justice majors. Examines issues encountered by corrections officers who work in jails and other short-term detention facilities. Explores the role of jails within the criminal trial process, the diverse nature of the jail inmate population and the challenges of pretrial detention for both offenders and staff.

CRJS 407. Urban Jails. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CRJS 181 and CRJS 253. Restricted to criminal justice majors. Examines issues encountered by corrections officers who work in urban short-term detention facilities. Explores the complexities of jails in urban settings as well as the diverse and dynamic offender population in urban jails.

CRJS 425. Violent Crime Scene Investigation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CRJS 181. Introduces students to specialized tools and scientific aids used in the criminal investigation of homicide and rape cases. Applies investigative techniques and preparation of trial evidence used in homicides and rape cases.

CRJS 432. Criminal Justice: Organizations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CRJS 181. Considers the behavioral dimensions of administrations in criminal justice and public safety agencies. Examines the concepts of leadership and decision-making and the effect of environmental dynamics in the management of the criminal justice system.

CRJS 434. Police Administration. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CRJS 181 and 254. Examines major management concepts and principles with special emphasis on consideration of law enforcement. Policies and procedures formulated and followed by managers in law enforcement settings will be evaluated from a structural as well as a functional perspective. Contemporary and anticipated future problems, challenges and trends facing police managers will be addressed.

CRJS 450. Cyber Crime and Computer Forensics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CRJS 181. Study of computer-related crime and related laws and policies. Focus on the investigation and processes of securing evidence for computer-related crimes.

CRJS 463. Comparative Criminal Justice Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CRJS 181. Study of national and international criminal justice systems with an emphasis on historical, cultural and operational comparisons. Contemporary research relating to law enforcement, adjudicative and correctional systems will be considered.

CRJS 468. Economic and Organized Crime. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CRJS 181. Analysis of the types of offenses which occur in the business and governmental work and the consequences of illegal practices. Primary attention will address the public sector through the methods utilized to detect and investigate criminal activities affecting governmental units. Relationships to organized crime will be described for each of the specific topics and techniques.

CRJS 475. Criminal Procedure. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CRJS 181 or permission of instructor. Analyzes criminal procedure regarding the courts and their supervisory role over prosecutions and the use of testimonial and non-testimonial evidence. Examines the judicial interpretive processes by which the public safety is balanced with individual rights.

CRJS 480. Senior Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CRJS 181 355 and 380. Restricted to seniors in criminal justice with at least 85 credit hours taken toward the degree. A capstone course designed to assist students to apply and to think critically about current knowledge regarding crime, crime trends, law, law enforcement, the adjudication process, corrections and crime prevention. Scenarios, research, projections and evaluation of different viewpoints will be employed to develop the student's ability to assess methods of argumentation, use information and apply existing knowledge to new fact situations.

CRJS 491. Topics in Criminal Justice. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Prerequisite: CRJS 181. In-depth examination of selected administration of justice topics. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

CRJS 492. Directed Individual Study. 1-3 Hours.
Semester course; variable hours. 1, 2 or 3 credits. Maximum total of 6 credits. Prerequisite: CRJS 181. Available to all other criminal justice students who are seniors and have a minimum GPA of 3.0 (with permission of department chair) as a substitute for a major elective course. Provides an independent study opportunity for the adult student who is (or was) employed in a criminal justice, safety or risk administration position and who does not require internship or volunteer experience.

CRJS 501. Principles of Criminal Justice. 3 Hours.
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 Hours.
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 decisions, defense strategy 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 591. Topic Seminar. 1-3 Hours.
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 612. Criminal Justice Politics and Planning. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Analyzes 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. Seminar in Criminology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examination and analysis of social, psychological, and economic theories and correlates of criminal behavior. Typologies of offenders. Crosslisted as: SOCY 620.

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

CRJS 623. Research Methods for Government and Public Affairs. 3 Hours.
Semester course; 3 lecture hours. 3 credits. 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. Crosslisted as: GVPA 623/PADM 623/URSP 623.

CRJS 624. Problems in Policing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment requires graduate status. Intended to provide an overview of the causes, nature and potential solutions to many of the most significant problems in modern American law enforcement. Problems include issues related to excessive force, corruption, police pursuit and other areas of police discretion.

CRJS 631. Criminal Justice Management and Leadership. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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 680. Forensic Psychiatry. 3 Hours.
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. Crosslisted as: FRSC 680.

CRJS 691. Special Topics in Criminal Justice and Public Policy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with different topics. Enrollment requires graduate status. Periodic seminar in contemporary criminal justice or policy topics. Topics to be determined.

CRJS 692. Directed Independent Study. 1-3 Hours.
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. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines the philosophical and historical underpinnings of the principles of justice and their relationship to equality, liberty, government and law.

CRJS 798. Thesis Research. 1,3 Hour.
Semester course; 3 credits with 1 credit extension. 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/F.

CRJS 799. Thesis. 1-3 Hours.
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/F.

DANCE AND CHOREOGRAPHY (DANC)

DANC 101. Modern Dance Technique I and Workshop. 3 Hours.
Continuous courses; 1 lecture and 6 studio hours. 3-3 credits. These courses may be repeated for a maximum total of 12 credits on the recommendation of the chair. Prerequisites: completion of DANC 101 to enroll in DANC 102. Dance major or departmental approval. Fundamental study and training in principles of modern dance technique. Emphasis is on body alignment, spatial patterning, flexibility, strength and kinesthetic awareness. Course includes weekly group exploration of techniques related to all areas of dance.

DANC 102. Modern Dance Technique I and Workshop. 3 Hours.
Continuous courses; 1 lecture and 6 studio hours. 3-3 credits. These courses may be repeated for a maximum total of 12 credits on the recommendation of the chair. Prerequisites: completion of DANC 101 to enroll in DANC 102. Dance major or departmental approval. Fundamental study and training in principles of modern dance technique. Emphasis is on body alignment, spatial patterning, flexibility, strength and kinesthetic awareness. Course includes weekly group exploration of techniques related to all areas of dance.

DANC 103. Survey of Dance History. 3 Hours.
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisites: completion of DANC 103 to enroll in DANC 104. Dance major or departmental approval. First semester: dance from ritual to the contemporary ballet and the foundations of the Western aesthetic as it relates to dance, and the development of the ballet. Second semester: Western concert dance from the aesthetic dance of the late 1800s to contemporary modern dance. These courses are the first two of a three-course sequence that fulfills one of the general education writing intensive requirements for dance majors.

DANC 104. Survey of Dance History. 3 Hours.
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisites: completion of DANC 103 to enroll in DANC 104. Dance major or departmental approval. First semester: dance from ritual to the contemporary ballet and the foundations of the Western aesthetic as it relates to dance, and the development of the ballet. Second semester: Western concert dance from the aesthetic dance of the late 1800s to contemporary modern dance. These courses are the first two of a three-course sequence that fulfills one of the general education writing intensive requirements for dance majors.

DANC 105. Improvisation. 2 Hours.
Continuous courses; 1 lecture and 2 studio hours. 2-2 credits. Prerequisite: completion of DANC 105 to enroll in DANC 106. An exploration of spontaneous body movement with the purpose of increasing body awareness, movement invention and movement creativity.

DANC 106. Improvisation. 2 Hours.
Continuous courses; 1 lecture and 2 studio hours. 2-2 credits. Prerequisite: completion of DANC 105 to enroll in DANC 106. An exploration of spontaneous body movement with the purpose of increasing body awareness, movement invention and movement creativity.

DANC 107. Music and Dance Forms. 2 Hours.
Semester course; 1 lecture and 2 studio hours. 2 credits. Prerequisites: DANC 101 and 105, or permission of instructor. An exploration of the various traditional and nontraditional concepts of music that are used in collaboration with dance. Course includes lecture, reading, listening and movement assignments. Focus will be on the dancer's understanding and use of music through movement analysis and improvisation.

DANC 111. Ballet Technique I. 2 Hours.
Continuous courses; 1 lecture and 2 studio hours. 2-2 credits. Prerequisites: completion of DANC 111 to enroll in DANC 112. Corequisites: DANZ 111-112. Dance major or departmental approval. These courses may be repeated for a maximum total of 8 credits on the recommendation of the chair. Fundamental study of the principles of ballet technique.

DANC 112. Ballet Technique I. 2 Hours.
Continuous courses; 1 lecture and 2 studio hours. 2-2 credits. Prerequisites: completion of DANC 111 to enroll in DANC 112. Corequisites: DANZ 111-112. Dance major or departmental approval. These courses may be repeated for a maximum total of 8 credits on the recommendation of the chair. Fundamental study of the principles of ballet technique.

DANC 121. Tap Technique I. 2 Hours.
Semester course; 1 lecture and 2 studio hours. 2 credits. Beginning study and training in the principles of tap technique with emphasis upon style, body alignment, spatial patterning, flexibility, strength and kinesthetic awareness to move the body in the style required for tap dancing. Crosslisted as: AFAM 121.

DANC 122. Tap Technique I. 2 Hours.
Semester course; 1 lecture and 2 studio hours. 2 credits. Beginning study and training in the principles of tap technique with emphasis upon style, body alignment, spatial patterning, flexibility, strength and kinesthetic awareness to move the body in the style required for tap dancing. Crosslisted as: AFAM 122.

DANC 126. African-Caribbean Dance I. 2 Hours.
Semester course; 1 lecture and 2 studio hours. 2 credits. Dance based on the movements and rhythms of Africa and the Caribbean. Crosslisted as: AFAM 126.

DANC 127. African-Caribbean Dance I. 2 Hours.
Semester course; 1 lecture and 2 studio hours. 2 credits. Dance based on the movements and rhythms of Africa and the Caribbean. Crosslisted as: AFAM 127.

DANC 133. Introduction to Ballet Technique I. 2 Hours.
Semester course; 1 lecture and 2 studio hours. 2 credits. This course may be repeated for a maximum total of 4 credits on the recommendation of the chair. For nonmajors. Introductory study of the principles of ballet technique.

DANC 134. Introduction to Ballet Technique II. 2 Hours.
Semester course; 1 lecture and 2 studio hours. 2 credits. Prerequisite: DANC 133 or permission of instructor. For nonmajors. This course may be repeated for a maximum total of 4 credits on the recommendation of the chair. Further introductory study of the principles of ballet technique.

DANC 141. Ballroom Dancing. 1 Hour.
Semester courses; 2 studio hours. 1, 1 credit. A study of basic ballroom dance steps and practice in their performance.

DANC 142. Ballroom Dancing. 1 Hour.
Semester courses; 2 studio hours. 1, 1 credit. A study of basic ballroom dance steps and practice in their performance.

DANC 151. Jazz Dance Technique I. 2 Hours.
Semester course; 1 lecture and 2 studio hours. 2 credits. Prerequisite: DANC 102 or permission of instructor. Study and training in the principles and concepts of jazz technique. Emphasis on body alignment, flexibility, balance, rhythmic awareness and mastery of isolated movements of body parts. The course includes the exploration of the relationship between jazz music and jazz dance. Crosslisted as: AFAM 151.

DANC 152. Jazz Dance Technique I. 2 Hours.
Semester course; 1 lecture and 2 studio hours. 2 credits. Prerequisite: DANC 102 or permission of instructor. Study and training in the principles and concepts of jazz technique. Emphasis on body alignment, flexibility, balance, rhythmic awareness and mastery of isolated movements of body parts. The course includes the exploration of the relationship between jazz music and jazz dance. Crosslisted as: AFAM 152.

DANC 161. Rehearsal and Performance. 1-3 Hours.
Semester course; hours to be arranged. 1-3 credits. Prerequisite: audition. May be repeated for a maximum of 4 credits. Dance rehearsals and production of work for a dance concert.

DANC 162. Rehearsal and Performance. 1-3 Hours.
Semester course; hours to be arranged. 1-3 credits. Prerequisite: audition. May be repeated for a maximum of 4 credits. Dance rehearsals and production of work for a dance concert.

DANC 171. T'ai Chi. 2 Hours.
Semester courses; 1 lecture and 2 studio hours. 2 credits. Study and practice of T'ai Chi, a Chinese exercise form, which is designed to bring one to full potential through balancing, aligning and breathing exercises. The short Yang form, based on Taoist principles, strengthens the body while allowing for deep relaxation to take place. Application of T'ai Chi to creative dance techniques is explored as a springboard for improvisation.

DANC 172. T'ai Chi. 2 Hours.
Semester courses; 1 lecture and 2 studio hours. 2 credits. Study and practice of T'ai Chi, a Chinese exercise form, which is designed to bring one to full potential through balancing, aligning and breathing exercises. The short Yang form, based on Taoist principles, strengthens the body while allowing for deep relaxation to take place. Application of T'ai Chi to creative dance techniques is explored as a springboard for improvisation.

DANC 183. Introduction to Modern Dance Technique. 2 Hours.
Semester course; 1 lecture and 2 studio hours. 2 credits. May be repeated for a maximum of 4 credits. For non-dance majors. Experiential introduction to basic movement principles, body alignment and the elements of modern dance.

DANC 184. Introduction to Modern Dance Technique. 2 Hours.
Semester course; 1 lecture and 2 studio hours. 2 credits. Prerequisite: DANC 183 or by audition on first day of class. May be repeated for a maximum of 4 credits. For non-dance majors. Experiential introduction to basic movement principles, body alignment and the elements of modern dance.

DANC 191. West African Dance Techniques. 2 Hours.
Semester course: 1 lecture and 2 studio hours. 2 credits. May be repeated for up to 4 credits. This course is designed to provide the student with movement skill(s) and knowledge of traditional dances of West Africa, with an emphasis on the acquisition of basic movement sequences, as well as traditional dance techniques aligned with the songs, instruments, rhythms and foundational understanding of the cultural and historical context in which the dance derived. This course is open to students of all skill levels, from beginner to the more advanced.

DANC 201. Modern Dance Technique II and Workshop. 3 Hours.
Continuous courses; 1 lecture and 6 studio hours. 3-3 credits. These courses may be repeated for a maximum of 12 credits on the recommendation of the chair. Prerequisites: dance major and DANC 102, or departmental approval; completion of DANC 201 to enroll in DANC 202. Further study and training in the principles of modern dance technique on an intermediate level with the expectation of better coordination of all elements into a sense of dance. Course includes weekly group exploration of techniques related to all areas of dance.

DANC 202. Modern Dance Technique II and Workshop. 3 Hours.
Continuous courses; 1 lecture and 6 studio hours. 3-3 credits. These courses may be repeated for a maximum of 12 credits on the recommendation of the chair. Prerequisites: dance major and DANC 102, or departmental approval; completion of DANC 201 to enroll in DANC 202. Further study and training in the principles of modern dance technique on an intermediate level with the expectation of better coordination of all elements into a sense of dance. Course includes weekly group exploration of techniques related to all areas of dance.

DANC 205. Composition. 3 Hours.
Continuous courses; 2 lecture and 2 studio hours. 3-3 credits. Prerequisites: dance major and DANC 105 and 107, or departmental approval; completion of DANC 205 to enroll in DANC 206. An introduction to the basic elements of choreography.

DANC 206. Composition. 3 Hours.
Continuous courses; 2 lecture and 2 studio hours. 3-3 credits. Prerequisites: dance major and DANC 105 and 107, or departmental approval; completion of DANC 205 to enroll in DANC 206. An introduction to the basic elements of choreography.

DANC 207. Studies in Music for Dance. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: dance major and DANC 107, or departmental approval. Study of the history, theory and aesthetics of music as it relates to dance. Course includes lecture, listening, reading, discussion, writing and oral presentations.

DANC 211. Ballet Technique II. 2 Hours.
Continuous courses; 1 lecture and 2 studio hours. 2-2 credits. This course may be repeated for a maximum total of 8 credits on the recommendation of the chair. Prerequisites: dance major and DANC 112, or departmental approval; completion of DANC 211 to enroll in DANC 212. Intermediate-level study, training and practice of ballet technique.

DANC 212. Ballet Technique II. 2 Hours.
Continuous courses; 1 lecture and 2 studio hours. 2-2 credits. This course may be repeated for a maximum total of 8 credits on the recommendation of the chair. Prerequisites: dance major and DANC 112, or departmental approval; completion of DANC 211 to enroll in DANC 212. Intermediate-level study, training and practice of ballet technique.

DANC 213. Beginning/Intermediate Pointe. 1 Hour.
Semester course; 2 studio hours. 1 credit. Course restricted to dance majors. Study and practice of pointe technique, including barre and center floor work using proper body alignment and safe movement mechanics.

DANC 221. Tap Technique II. 2 Hours.
Semester courses; 1 lecture and 2 studio hours. 2, 2 credits. Prerequisite: Audition or permission of instructor. Further study and training in the principles of tap technique.

DANC 222. Tap Technique II. 2 Hours.
Semester courses; 1 lecture and 2 studio hours. 2, 2 credits. Prerequisite: Audition or permission of instructor. Further study and training in the principles of tap technique.

DANC 251. Jazz Technique II. 2 Hours.
Semester courses; 1 lecture and 2 studio hours. 2, 2 credits. Prerequisites: DANC 151, 152, or permission of instructor. An in-depth study of movement styles and qualities in jazz dance. Advanced work on integrating music and movement with focus upon chronology of jazz music and corresponding dance forms.

DANC 252. Jazz Technique II. 2 Hours.
Semester courses; 1 lecture and 2 studio hours. 2, 2 credits. Prerequisites: DANC 151, 152, or permission of instructor. An in-depth study of movement styles and qualities in jazz dance. Advanced work on integrating music and movement with focus upon chronology of jazz music and corresponding dance forms.

DANC 253. Pilates. 1-2 Hours.
Semester course; 2-4 laboratory hours. 1-2 credits. Students engage in a physical practice: matwork of the Pilates system, built on the work of Joseph H. Pilates. The practice is designed to improve muscular-skeletal performance, strength, flexibility and endurance, while focusing on core stability, restoring the optimal curves of the spine, relieving tension and enhancing self-confidence. Basic muscular anatomy and kinesiology will also be integrated into instruction and cuing for greater body awareness.

DANC 254. Yoga. 1-3 Hours.
Semester course; 2-6 laboratory hours. 1-3 credits. Students engage in a physical practice based on yoga, taught from an experiential, philosophical and anatomic perspective, with an emphasis on dynamic flow that links breath and movement.

DANC 255. Hip Hop Dance. 2 Hours.
Semester courses; 1 lecture and 2 studio hours. 2, 2 credits. Prerequisite: dance major or permission of instructor. Intermediate-level dance technique class that draws on the hip hop aesthetic to create a movement experience that emphasizes individual style, rhythmic awareness and physical prowess.

DANC 256. Hip Hop Dance. 2 Hours.
Semester courses; 1 lecture and 2 studio hours. 2, 2 credits. Prerequisite: dance major or permission of instructor. Intermediate-level dance technique class that draws on the hip hop aesthetic to create a movement experience that emphasizes individual style, rhythmic awareness and physical prowess.

DANC 260. Dance Production Workshop. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: dance major or permission of instructor. An introduction to the basic principles of dance lighting and technical theatre through lecture, practical demonstration and discussion.

DANC 261. Rehearsal and Performance. 1-3 Hours.
Semester course; hours to be arranged. 1-3 credits. Prerequisite: audition. May be repeated for a maximum of 4 credits. Dance rehearsals and production of work for a major dance concert.

DANC 262. Rehearsal and Performance. 1-3 Hours.
Semester course; hours to be arranged. 1-3 credits. Prerequisite: audition. May be repeated for a maximum of 4 credits. Dance rehearsals and production of work for a major dance concert.

DANC 291. Topics in Dance. 1-4 Hours.
Semester course; 1-4 credits. May be repeated for a maximum of 8 credits. Prerequisite: permission of instructor. A seminar or workshop on a selected issue or topic in the field of dance. See the Schedule of Classes for specific topics to be offered each semester.

DANC 293. Professional Performance: Trainee Level First Year. 7 Hours.
Continuous course; 7 credits per semester. Prerequisite: official trainee status with an approved professional dance company and permission of the chair. Training, rehearsal and performance as a trainee with a professional dance company approved by VCU Dance.

DANC 294. Professional Performance: Trainee Level First Year. 7 Hours.
Continuous course; 7 credits per semester. Prerequisite: official trainee status with an approved professional dance company and permission of the chair. Training, rehearsal and performance as a trainee with a professional dance company approved by VCU Dance.

DANC 301. Modern Dance Technique III and Workshop. 3 Hours.
Continuous courses; 1 lecture and 6 studio hours. 3-3 credits. These courses may be repeated for a maximum of 12 credits on the recommendation of the chair. Prerequisites: dance major and DANC 202, or departmental approval; completion of DANC 301 to enroll in DANC 302. Advanced study and training in principles of modern dance technique. Movement studies demanding greater strength and flexibility. Spatial patterns demanding increased coordination, kinesthetic awareness and aesthetic sensitivity. Course includes weekly group exploration of techniques related to all areas of dance.

DANC 302. Modern Dance Technique III and Workshop. 3 Hours.
Continuous courses; 1 lecture and 6 studio hours. 3-3 credits. These courses may be repeated for a maximum of 12 credits on the recommendation of the chair. Prerequisites: dance major and DANC 202, or departmental approval; completion of DANC 301 to enroll in DANC 302. Advanced study and training in principles of modern dance technique. Movement studies demanding greater strength and flexibility. Spatial patterns demanding increased coordination, kinesthetic awareness and aesthetic sensitivity. Course includes weekly group exploration of techniques related to all areas of dance.

DANC 303. Choreography/Performance. 3 Hours.
Continuous courses; 2 lecture and 2 studio hours. 3-3 credits. Prerequisites: dance major, DANC 205-206 and 207, and successful completion of the sophomore readmittance evaluation; completion of DANC 303 to enroll in DANC 304. The craft of choreography and performing techniques are explored extensively as students develop solo and group pieces while rotating in the roles of choreographer/director and performer.

DANC 304. Choreography/Performance. 3 Hours.
Continuous courses; 2 lecture and 2 studio hours. 3-3 credits. Prerequisites: dance major, DANC 205-206 and 207, and successful completion of the sophomore readmittance evaluation; completion of DANC 303 to enroll in DANC 304. The craft of choreography and performing techniques are explored extensively as students develop solo and group pieces while rotating in the roles of choreographer/director and performer.

DANC 307. Music and Dance Forms for Trainees. 2 Hours.
Semester course; 1 lecture and 2 studio hours. 2 credits. Prerequisites: DANC 105 and 394, or permission of instructor. An exploration of the various traditional and nontraditional concepts of music that are used in collaboration with dance. Course includes lecture, reading, listening and viewing of choreography with writing and movement assignments.

DANC 311. Ballet Technique III. 2 Hours.
Continuous courses; 1 lecture and 2 studio hours. 2-2 credits. This course may be repeated for a maximum of 12 credits on the recommendation of the chair. Prerequisites: dance major and DANC 212, or departmental approval; completion of DANC 311 to enroll in DANC 312. Advanced training, study and practice of ballet technique focusing on the refinement and performance skills.

DANC 312. Ballet Technique III. 2 Hours.
Continuous courses; 1 lecture and 2 studio hours. 2-2 credits. This course may be repeated for a maximum of 12 credits on the recommendation of the chair. Prerequisites: dance major and DANC 212, or departmental approval; completion of DANC 311 to enroll in DANC 312. Advanced training, study and practice of ballet technique focusing on the refinement and performance skills.

DANC 313. Dance in World Cultures. 3 Hours.
Semester course; 2 lecture and 2 studio hours. 3 credits. Prerequisite: DANC 103-104 and UNIV 200 or HONR 200, or permission of instructor. This course is the third in a sequence that fulfills one of the general education writing intensive requirements for dance majors. Students learn and participate in dance styles of various world cultures as they study cultural traditions and how they are expressed in movement. No dance experience necessary. This course will include lectures, readings, research and discussion. Students will engage in the viewing and discussion of films, videos and dance concerts.

DANC 315. Contact Improvisation. 2 Hours.
Semester course; 1 lecture and 2 studio hours. 2 credits. May be repeated for a maximum total of 6 credits. Exploration of the technique of partnering and the exchange of weight in an improvisational format. Emphasis is on a shared process that explores gravity, lifting, and the give and take of body weight.

DANC 316. Contact Improvisation. 2 Hours.
Semester courses; 1 lecture and 2 studio hours. 2 credits. Prerequisites: DANC 101, 102, or permission of instructor. Exploration of the technique of partnering and the exchange of weight in an improvisational format. Emphasis is on a shared process that explores gravity, lifting, and the give and take of body weight.

DANC 317. Anatomy for the Dancer. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Prerequisite: dance major and UNIV 200 or HONR 200. A Web-based, self-study course designed for dance students. Integrates the study of anatomy with dance terminology, skills and concepts. Covers basic knowledge of skeletal, muscular and nervous systems of the body and applies this information to principles important to dance.

DANC 318. Dance Science. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisites: dance major and DANC 317. A team-taught lecture and laboratory course that applies anatomical and basic kinesiological concepts to dance technique. Students will analyze and assess dance movement using scientific principles as well as study the interplay between the aesthetic qualities and biomechanics of dance technique, and the role of this study in injury prevention.

DANC 319. Video/Choreography Workshop. 3 Hours.
Semester courses; 2 lecture and 2 studio hours. 3, 3 credits. Prerequisites: experience in movement, performance and/or video/film, or permission of instructor. Students gain practical skills as well as basic theoretical foundation in the principles of working with video and choreography.

DANC 320. Video/Choreography Workshop. 3 Hours.
Semester courses; 2 lecture and 2 studio hours. 3, 3 credits. Prerequisites: experience in movement, performance and/or video/film, or permission of instructor. Students gain practical skills as well as basic theoretical foundation in the principles of working with video and choreography.

DANC 321. Partnering. 2 Hours.
Semester course; 1 lecture and 2 studio hours. 2 credits. May be repeated for a maximum total of 4 credits. Enrollment restricted to dance majors. Investigation and practice of traditional to contemporary partnering concepts supporting the fundamental through advanced development of skills necessary for a dancer and choreographer.

DANC 360. Lighting Design for Dance. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: DANC 260 or permission of instructor. Open to qualified School of the Arts majors only. A study in the art of lighting design as it evolves from the choreographer/designer collaboration. The basic techniques of drafting, use of color and composition of space related to light and movement.

DANC 361. Rehearsal and Performance. 1-3 Hours.
Semester course; hours to be arranged. 1-3 credits. Prerequisite: audition. May be repeated for a maximum of 9 credits. Dance rehearsals and production of work for a major dance concert.

DANC 362. Rehearsal and Performance. 1-3 Hours.
Semester course; hours to be arranged. 1-3 credits. Prerequisite: audition. May be repeated for a maximum of 9 credits. Dance rehearsals and production of work for a major dance concert.

DANC 371. Repertory. 3 Hours.
Semester course; 2 lecture and 2 studio hours. 3 credits. Prerequisite: audition. May be repeated for a maximum of 9 credits. Study and rehearsal of roles in choreography produced by the faculty and/or guest artists, with the objective of achieving a performance level.

DANC 372. Repertory. 3 Hours.
Semester course; 2 lecture and 2 studio hours. 3 credits. Prerequisite: audition. May be repeated for a maximum of 9 credits. Study and rehearsal of roles in choreography produced by the faculty and/or guest artists, with the objective of achieving a performance level.

DANC 393. Professional Performance: Trainee Level Second Year. 8 Hours.
Continuous course; 8 credits per semester. Prerequisite: official apprentice status with an approved professional dance company and permission of the chair. Training, rehearsal and performance as an apprentice with a professional dance company approved by VCU Dance.

DANC 394. Professional Performance: Trainee Level Second Year. 8 Hours.
Continuous course; 8 credits per semester. Prerequisite: official apprentice status with an approved professional dance company and permission of the chair. Training, rehearsal and performance as an apprentice with a professional dance company approved by VCU Dance.

DANC 401. Modern Dance Technique IV and Workshop. 3 Hours.
Continuous courses; 1 lecture and 6 studio hours. 3-3 credits. These courses may be repeated for a maximum of 18 credits on the recommendation of the department chair. Prerequisites: dance major and DANC 302, or departmental approval; completion of DANC 401 to enroll in DANC 402. Preprofessional study and training in modern dance technique. Movement studies demanding a superior level of clarity, strength and flexibility. Movement patterns demanding a high level of coordination, deep kinesthetic awareness and aesthetic sensitivity. Exploration of a wide range of performance qualities. Course includes weekly group exploration of techniques related to all areas of dance.

DANC 402. Modern Dance Technique IV and Workshop. 3 Hours.
Continuous courses; 1 lecture and 6 studio hours. 3-3 credits. These courses may be repeated for a maximum of 18 credits on the recommendation of the department chair. Prerequisites: dance major and DANC 302, or departmental approval; completion of DANC 401 to enroll in DANC 402. Preprofessional study and training in modern dance technique. Movement studies demanding a superior level of clarity, strength and flexibility. Movement patterns demanding a high level of coordination, deep kinesthetic awareness and aesthetic sensitivity. Exploration of a wide range of performance qualities. Course includes weekly group exploration of techniques related to all areas of dance.

DANC 405. Composition for Trainees. 3 Hours.
Continuous courses; 2 lecture and 2 studio hours. 3-3 credits. Prerequisites: dance major and DANC 105 and 307, or departmental approval; completion of DANC 405 to enroll in DANC 406. Exploration and research of the elements of choreography.

DANC 406. Composition for Trainees. 3 Hours.
Continuous courses; 2 lecture and 2 studio hours. 3-3 credits. Prerequisites: dance major and DANC 105 and 307, or departmental approval; completion of DANC 405 to enroll in DANC 406. Exploration and research of the elements of choreography.

DANC 407. Teaching Methods for Dance. 3 Hours.
Semester course; 2 lecture and 2 studio hours. 3 credits. Prerequisite: dance major and DANC 302. The student learns to analyze and communicate movement in a variety of teaching situations. The student will have an opportunity to observe different teaching techniques and to practically apply learned teaching concepts and theories.

DANC 411. Ballet Technique IV. 2 Hours.
Continuous courses; 1 lecture and 2 studio hours. 2-2 credits. May be repeated for a maximum total of 12 credits. Prerequisites: dance major and placement audition or permission of the chair; completion of DANC 411 to enroll in DANC 412. Preprofessional study and practice of ballet technique focusing on the refinement of technical skills and the elements of dynamic performance in ballet.

DANC 412. Ballet Technique IV. 2 Hours.
Continuous courses; 1 lecture and 2 studio hours. 2-2 credits. May be repeated for a maximum total of 12 credits. Prerequisites: dance major and placement audition or permission of the chair; completion of DANC 411 to enroll in DANC 412. Preprofessional study and practice of ballet technique focusing on the refinement of technical skills and the elements of dynamic performance in ballet.

DANC 413. African American Presence in American Dance, Performance and Social Contexts. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: DANC 103-104 and UNIV 200 or HONR 200, or permission of instructor. This course is an option for the third course in a sequence that fulfills a writing intensive requirement for dance majors only. Examines African-American history, culture and aesthetics as they relate to dance in American social and performance contexts. Includes lectures, readings, research and video screenings.

DANC 414. Summer Dance Workshop. 1-3 Hours.
Semester courses; variable hours. 1 or 3 credits per semester. May be repeated for credit. Flexible course offerings in dance technique, improvisation, composition, rhythmic training and repertory. See the Schedule of Classes for specific topics to be offered each semester.

DANC 450. Professional Project. 2-9 Hours.
Semester course; 3-9 credits. May be repeated for a maximum of 12 credits. Prerequisite: dance major. An individualized program in research and/or practicum within a professionally-oriented organization, subject to approval of the department faculty.

DANC 451. Careers in Dance. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: dance major. Realistic aspects of the dance profession, as performer, teacher and researcher. The student's learning experience culminates in a final project that enhances and challenges the student in both areas of performance and choreography. The project must attain public performance status.

DANC 460. Business of Dance. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: UNIV 200. Enrollment restricted to dance majors. Investigation of diverse business models in dance performance, creation, production and administration.

DANC 490. Senior Project. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: dance major; DANC 302, 303 and 304; and departmental approval. The culmination of the student's learning experience in a final project that enhances and challenges the student in both areas of performance and choreography. The project must attain public performance status.

DANC 491. Topics in Dance. 1-4 Hours.
Semester course; 1-4 credits. May be repeated for a maximum of 8 credits. Prerequisite: permission of instructor. A seminar or workshop on a selected issue or topic in the field of dance. See the Schedule of Classes for specific topics to be offered each semester.

DANC 492. Independent Study in Dance. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May be repeated for a maximum total of six credits. Prerequisites: dance major status and approval of department chair and instructor. Individual instruction and supervision of a special project. Learning experiences should be designed with the supervising faculty member in the form of a contract between student and instructor. This course is limited to those students who have demonstrated an exceptional level of ability and intense commitment to their discipline.

DANCE AND CHOREOGRAPHY LAB (DANZ)

DANZ 111. Ballet Technique I Laboratory. 1 Hour.
Continuous courses; 2 studio hours. 1-1 credit. These courses may be repeated for a maximum of 4 credits on the recommendation of the chair. Prerequisites: completion of DANZ 111 to enroll in DANZ 112. Corequisites: DANC 111-112. Dance major or permission of instructor. Reinforcement in the study of ballet technique at the fundamental level. Emphasis focusing on alignment and in-depth practice of ballet steps. An extension of DANC 111-112 to be taken concurrently.

DANZ 112. Ballet Technique I Laboratory. 1 Hour.
Continuous courses; 2 studio hours. 1-1 credit. These courses may be repeated for a maximum of 4 credits on the recommendation of the chair. Prerequisites: completion of DANZ 111 to enroll in DANZ 112. Corequisites: DANC 111-112. Dance major or permission of instructor. Reinforcement in the study of ballet technique at the fundamental level. Emphasis focusing on alignment and in-depth practice of ballet steps. An extension of DANC 111-112 to be taken concurrently.

DANZ 211. Ballet Technique II Laboratory. 1 Hour.
Continuous courses; 2 studio hours. 1-1 credit. These courses may be repeated for a maximum total of 4 credits on the recommendation of the chair. Prerequisites: dance major and DANC/DANZ 112, or departmental approval; completion of DANZ 211 to enroll in DANZ 212. A reinforcement in the study of ballet techique at the intermediate level. An extension of DANC 211-212 to be taken concurrently.

DANZ 212. Ballet Technique II Laboratory. 1 Hour.
Continuous courses; 2 studio hours. 1-1 credit. These courses may be repeated for a maximum total of 4 credits on the recommendation of the chair. Prerequisites: dance major and DANC/DANZ 112, or departmental approval; completion of DANZ 211 to enroll in DANZ 212. A reinforcement in the study of ballet techique at the intermediate level. An extension of DANC 211-212 to be taken concurrently.

DANZ 311. Ballet Technique III Laboratory. 1 Hour.
Continuous courses; 2 studio hours. 1-1 credit. May be repeated for a maximum total of 6 credits on the recommendation of the chair. Prerequisites: completion of DANZ 311 to enroll in DANZ 312. Dance major and placement audition or permission of the chair. Reinforcement in the study of ballet technique at the advanced level. May be taken concurrently with DANC 311-312.

DANZ 312. Ballet Technique III Laboratory. 1 Hour.
Continuous courses; 2 studio hours. 1-1 credit. May be repeated for a maximum total of 6 credits on the recommendation of the chair. Prerequisites: completion of DANZ 311 to enroll in DANZ 312. Dance major and placement audition or permission of the chair. Reinforcement in the study of ballet technique at the advanced level. May be taken concurrently with DANC 311-312.

DANZ 411. Ballet Technique IV Laboratory. 1 Hour.
Continuous courses; 2 studio hours. 1-1 credit. May be repeated for a maximum total of 4 credits on the recommendation of the chair. Prerequisites: completion of DANZ 411 to enroll in DANZ 412. Dance major and placement audition or permission of the chair. Reinforcement in the study of ballet technique at the preprofessional level. An extension of DANC 411-412, which can be taken concurrently.

DANZ 412. Ballet Technique IV Laboratory. 1 Hour.
Continuous courses; 2 studio hours. 1-1 credit. May be repeated for a maximum total of 4 credits on the recommendation of the chair. Prerequisites: completion of DANZ 411 to enroll in DANZ 412. Dance major and placement audition or permission of the chair. Reinforcement in the study of ballet technique at the preprofessional level. An extension of DANC 411-412, which can be taken concurrently.

DECISION ANALYTICS (DAPT)

DAPT 611. Analysis and Design of Database Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Focuses on relational databases for structured data and includes entity relational diagram and extended entity relational diagram and transformation of ERD and EERD into relational schema. The course will give students competence in SQL and other search techniques, data validation and data cleansing.

DAPT 612. Text Mining and Unstructured Data. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Focuses on unstructured data and includes the topics: creation of XML documents, creating/validating ontology; identifying terms and their relationships and converting them into an ontology using an ontology editor such as Protégé; object-oriented programs; extracting keywords and key phrases; term similarity measure and term frequency.

DAPT 613. Tools for Business Intelligence. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Provides students with techniques and practices for modern decision-making in support of business/corporate performance. Includes hands-on experience with various information analysis, business intelligence and decision-support techniques and tools with applications to various business-problem scenarios, such as portfolio analysis, project selection, market research and supply-chain optimization.

DAPT 614. Advanced SQL. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: DAPT 611. This course is designed to prepare students for multiple table queries using structured query language and will provide advanced training in the application of SQL to real data problems.

DAPT 615. Emerging Technologies. 1 Hour.
Semester course; 1 lecture hour.1 credit. The course emphasizes the study of a variety of big data technologies to gain insight that will be used to get people throughout the enterprise to run the business more effectively and to provide better service to customers. The course focuses on big data solutions that are processed in a platform that can handle the variety, velocity and volume of data by using a family of components that require integration and data governance.

DAPT 621. Statistics for the World of Big Data. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Covers single variable and multivariable statistical techniques using commercial computer packages such as SAS and SPSS. Students will learn when different techniques are warranted, conceptually how techniques function, how to perform the analysis using commercial computer packages and how to interpret the program outputs.

DAPT 622. Statistics for the World of Big Data II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: DAPT 621. Continues an emphasis on data visualization and statistical modeling for different types of variables, including relationships between multivariable variables.

DAPT 631. Data Mining. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Data mining is the extraction of implicit, previously unknown and potentially useful information from data. Data mining tasks include classification and regression (pattern recognition), cluster analysis, association analysis, and anomaly detection. This class will introduce methods for each of these tasks, their implementation in relevant software and the interpretation of data mining results.

DAPT 632. Forecasting Methods and Applications for Managerial Decision-making. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Methods covered include moving average and exponential smoothing, seasonal adjustments, time-series, and forecast averaging. Particular emphasis on developing and implementing forecasting systems in an interactive organization and appreciation of issues and caveats.

DAPT 633. Introduction to Marketing and Customer Analytics. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Examines how firms make use of analytic tools to target advertising, improve customer response and service, and improve financial performance. The course will apply quantitative tools students have already seen (statistical analysis, simulation and regression analysis) to marketing and customer-response decisions.

DAPT 641. Introduction to Simulation Methods. 1 Hour.
Semester course; 1 lecture hour. 1 credit. An introduction to the application and theoretical background of simulation. Topics include Monte Carlo simulation and modeling systems using discrete event simulation. Theoretical topics include random variable generation, model verification and validation, statistical analysis of output, and decision-making via simulation. A high-level simulation language will be utilized.

DAPT 642. Introduction to Risk Analysis. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Presents a formal methodology for prescriptive decision-making under risk and uncertainty. Decision analysis applies to hard problems involving sequential decisions, major uncertainties, significant outcomes and complex values. The course includes building and solving influence diagrams and decision trees; modeling uncertainty with subjective probabilities; the value of information; and modeling risk preferences with utility functions. Decision and risk analysis applications in business and government are considered.

DAPT 643. Introduction to Optimization Models. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Mathematical optimization is used to support quantitative and logical decision-making by providing a prescription of choices that minimize cost or maximize profit. This class provides an introduction to using optimization tools to model, solve and interpret results of real-world decision problems. Examples of applications include loan allocation, workforce scheduling, multi-period financial models and portfolio optimization.

DAPT 651. Personal, Interpersonal and Organizational Awareness. 1 Hour.
Semester course; 1 lecture hour. 1 credit. This is an application-based course involving the understanding and application of communicating information in the personal, interpersonal/team and organizational setting. The focus is on barriers to communication, personal and audience awareness, listening skills, nonverbal communication behaviors, team-building and meetings management. A variety of practica and simulations will be used during this course.

DAPT 652. Professional Presentations: Strategy, Delivery and Technology. 1 Hour.
Semester course; 1 lecture hour. 1 credit. This is an application-based course involving the audience-centered design and application of effective oral presentations. The focus will be on the development and enhancement of public presentation skills in different types of formal and informal public situations. Further ability in appropriate presentation technology will be provided and assessment will be behavior-driven. A variety of practica and simulations will be used during this course.

DAPT 653. Written Communications: Strategy, Structure and Connection. 1 Hour.
Semester course; 1 lecture hour. 1 credit. This is an application-based course involving the audience-centered design and application of effective written communications. The focus will be on the development and enhancement of writing and English skills for different types of organization-required documents, including email, proposals, executive summaries, letters and formal reports. Further assessment in grammar and syntax will be provided through online and faculty feedback. A variety of practicum and simulations will be used during this course.

DAPT 654. Written Communications: Strategy, Structure and Connection II. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Continues topics and lessons from DAPT 653.

DAPT 661. Issues and Analytics. 1 Hour.
Semester course; 1 lecture hour. 1 credit. May be repeated for a total of three credits. Academic, business, government and NGO leaders discuss current issues and applications of analytics. Analytics is a dynamically changing and evolving field. Students will have an opportunity to discuss current issues directly with people on the front lines.

DAPT 670. Analytics Problem Formation. 1 Hour.
Semester course; 1 lecture hour. 1 credit. An introduction to problem formulation and the decision-making process that must precede the application of analytics. Topics include objectives generation, structuring objectives, decision diagrams for risk and uncertainty modeling, and qualitative approaches to decisions under risk and value tradeoffs.

DAPT 681. Analytics Practicum I. 1 Hour.
Sponsored project. 1 credit. This course will allow students to apply the concepts, theories and skills learned in other courses to a real analytics project from a sponsoring organization. Teams of students will formulate a problem based on discussions with management of the sponsoring organization; query the sponsor's and/or public databases for appropriate data; perform required statistical analysis; and present results in both a written report and oral presentation to sponsoring management.

DAPT 682. Analytics Practicum II. 2 Hours.
Semester course; sponsored project. 2 credits. Continues project from DAPT 682.

DENTAL HYGIENE (DENH)

DENH 301. Dental Hygiene Theory I. 5 Hours.
Semester course; 2 lecture and 6 laboratory/clinical hours. 5 credits. Designed to familiarize the student with the scope, role and responsibilities of the dental hygiene profession. Topics include an introduction to the educational and therapeutic services as well as the philosophy of preventive oral health and its relevance to the practice of dental hygiene. Also introduces the clinical knowledge and skills needed to perform fundamental clinical dental hygiene procedures, instrumentation and preventive services.

DENH 302. Dental Hygiene Theory II. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Continuation of DENH 301. Designed to provide the student with knowledge and skills necessary to provide patient care and includes instruction in some more advanced dental hygiene skills, including dental hygiene diagnosis, treatment planning, oral signs of abuse/neglect, topical medicaments and use of sonic and ultrasonic instrumentation.

DENH 312. Community Oral Health Promotion. 2 Hours.
Semester course; 2 lecture contact hours. 2 credits. Prerequisite: DENH 301. Enrollment restricted to students in the dental hygiene program. Introduces preventive oral health strategies, methods, materials and principles of instruction in health education and communication. Emphasizes oral health promotion as related to individual patients, community groups as well as professional peer-group presentations. Introduction to evidence-based decision-making in dental hygiene practice.

DENH 327. Clinical Dental Hygiene I. 5 Hours.
Semester course; 1 seminar and 12 laboratory/clinical hours per week. 5 credits. This course has two segments. The initial segment reinforces the knowledge and clinical skills learned in DENH 301. Additional laboratory experiences allow the student to re-assert technical skill proficiency prior to entry into the clinical education experience. The second segment introduces the clinical practicum and dental hygiene services as part of a comprehensive care model within the School of Dentistry. Students apply basic instrumentation and patient treatment skills in a clinical setting. Seminars provide opportunity for students to problem solve and critically discuss and assess clinical experiences.

DENH 342. Nutrition. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Designed to provide students with an overview of the chemistry of the major nutrients as well as provide a practical approach to the concepts of nutrition. Emphasis will be placed on developing positive preventive health behaviors and providing nutritional education to dental patients in a clinical setting. The interrelationships of diet, nutrition and dental and systemic diseases will be discussed along with current food trends, consumer aspects of food choices and basic nutrition principles. A general review of dietary supplements also will be provided.

DENH 401. Dental Hygiene Theory III. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Dental specialty content is presented: concepts and techniques in specialty areas that will enable the dental hygienist to consider implications for dental hygiene treatment planning with relation to periodontics, orthodontics, endodontics, preventive, cosmetic and restorative dentistry, pain control, oral surgery, prosthodontics, pediatric dentistry and implantology. Through case scenarios students develop treatment plans with regard to the dental hygiene process of care. Students discuss patient education needed for each phase of care appropriate for the informed consent of the patient.

DENH 402. Dental Hygiene Theory IV. 2 Hours.
Semester course; 2 lecture hours. 2 credits. This course is designed to present the principles of dental practice, including dental team management strategies, business office management, increasing use of computers in dentistry, OSHA and its impact on practice management, insurance coverage for dental care, and employment opportunities and career options.

DENH 407. Research Methods and Study Designs. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Designed to guide dental hygiene students in becoming competent in the use of scientific literature as a part of lifelong learning and evidence-based decision-making in patient care. Covers foundational materials in research design and biostatistics, including the development of testable hypotheses, data collection, data summary, and evaluation and interpretation of data found in scientific literature. Students will critique scientific literature from peer-reviewed journals and participate in reflection of current literature on assessment of patients with special needs. Students will also take part in an online Collaborative Investigator Training Initiative for protecting human subjects in research.

DENH 411. Introduction to Public Health. 2 Hours.
Semester course; 2 lecture hours. 2 credits. This hybrid course is intended to provide the dental hygiene student with an overview of the broad field of public health. Topics include the sciences of public health, the controversial nature of public health, powers and responsibilities of the government, social and behavioral factors in health, environmental issues in public health, medical care and public health, and public health challenges in the upcoming century. The course serves as a foundation for DENH 412. The course will also provide students with experiences that foster positive attitudes and behaviors regarding their responsibility to care for underserved populations, thereby providing insights on the impact of social and economic factors on dental health. Field experiences place emphasis on special populations, including elementary school children; geriatric, institutionalized and hospitalized clients; and individuals with mental and/or physical disabilities. The course and its field experiences will prepare the dental hygienist for the role of dental public health practitioner, educator and consultant, as well as a resource person in community settings.

DENH 412. Community Dental Health. 2 Hours.
Semester course; 1 lecture and 3 clinical/service-learning project hours. 2 credits. This hybrid course is designed to provide dental hygiene students with an introduction and overview of basic concepts of dental public health, community dental health education and community program planning. Course topics include oral health trends, dental indices, water fluoridation, prevention and control of oral diseases in a community, and community dental health programs. Students become involved in the application of concepts such as program assessment, design, implementation and evaluation. This course will prepare the dental hygienist for the role of dental public health practitioner, educator, and consultant and resource person in community settings. Field experience is designed to prepare students to function in a variety of community health settings. Emphasis on special populations of elementary school children, geriatric, institutionalized, hospitalized and individuals with mental and/or physical disabilities.

DENH 422. Current Issues, the Law and Ethics. 2 Hours.
Semester course; 2 lecture hours. 2 credits. This online course is designed to explore the ethics, jurisprudence and principles of dental hygiene practice. Students explore ethical issues and dilemmas in dental hygiene and health care delivery. This course strives to provide students with the foundations of ethical reasoning and decision-making in practices. The course fosters professional development and an understanding of the legal and ethical aspects of oral health care.

DENH 437. Clinical Dental Hygiene II. 5 Hours.
Semester course; 1 seminar and 12-15 clinical/laboratory hours. 5 credits. Prerequisite: DENH 327. A continuation of the clinical practicum; seminars and clinical experiences continue to prepare students to provide oral health care services in the private and public sector. Students participate in comprehensive care clinical experiences within the School of Dentistry as well as the specialty clinics via scheduled and supervised extramural rotations. Advanced dental hygiene procedures are initiated and patient assessment, management skills and self-assessment are emphasized. Skill development in dental hygiene procedures continues; patient management skills as well as decision-making and problem-solving in relation to patient assessment, treatment planning and evaluation are emphasized. Course sequence provides the student with the opportunity to use and further enhance the knowledge and skills of dental hygiene practice and procedures in a clinical model that emphasizes comprehensive patient care and a foundation for transference of those skills to the work environment in the private and public sector. Grade of PR required in DENH 437 for continuation in DENH 447.

DENH 447. Clinical Dental Hygiene III. 5 Hours.
Semester course; 1 seminar and 12-15 clinical/laboratory hours. 5 credits. Prerequisite: DENH 437 with a grade of PR. A continuation of the clinical practicum; seminars and clinical experiences continue to prepare students to provide oral health care services in the private and public sector. Students participate in comprehensive care clinical experiences within the School of Dentistry as well as the specialty clinics via scheduled and supervised extramural rotations. Advanced dental hygiene procedures are initiated and patient assessment, management skills and self-assessment are emphasized. Skill development in dental hygiene procedures continues; patient management skills as well as decision-making and problem-solving in relation to patient assessment, treatment planning and evaluation are emphasized. Course sequence provides the student with the opportunity to use and further enhance the knowledge and skills of dental hygiene practice and procedures in a clinical model that emphasizes comprehensive patient care and a foundation for transference of those skills to the work environment in the private and public sector.

DENH 449. Clinics in Dental Hygiene. 1-5 Hours.
Semester course; 1-3 credits. Clinical/laboratory experiences offering the opportunity to use and further develop the knowledge and skills of dental hygiene practice.

DENH 450. Independent Study. 1-5 Hours.
Semester course; 1-5 credits. Independent study projects planned to meet the learning objectives of the student.

DENH 457. Clinical Service-learning. 1 Hour.
Continuous course; 32 clinical sessions. 1 credit. Prerequisites: DENH 302, 327 and 342. Enrollment restricted to dental hygiene students only. Course must be repeated to fulfil requirements. (Requirement is for 32 clinical session over two semesters. Students will repeat for 2 credits.) This is a course-based, credit-bearing educational experience in which students participate in an organized service activity that meets community-identified needs. Students are assigned rotations in clinical practice settings in underserved areas, in which they are exposed to patients of varied ethnic, socioeconomic and demographic backgrounds, as well as special patient populations not typically encountered in the School of Dentistry clinics. While continuing clinical education, students have the opportunity to make oral health care more accessible to marginalized groups. Throughout this unique learning experience, students are exposed to the potential benefits of practice in public health dentistry. Students will reflect on the service activity to increase understanding and application of course content and to enhance a sense of civic responsibility. Students will also provide guided reflections on designated reading assignments. Graded P/F.

DENH 460. Individual Plan of Study. 1-6 Hours.
Semester course; variable hours. 1-6 credits. This course is designed on an individual basis to accommodate remediation of a failed course. The course director will design course material to include self-paced learning, assignments, tests and clinic or lab activities necessary to equal the failed course content. Graded as pass/fail.

DENH 477. Special Topics in Dental Hygiene. 1-3 Hours.
Semester course; 1-3 credits. Designed around the interests of students, faculty expertise and availability of educational resources. Format may include intensive mini-courses or workshops.

DENTAL SPECIAL TOPICS (DENS)

DENS 503. Introduction to Behavioral Science in Dentistry. 1 Hour.
Semester course; 16 didactic hours. 1 credit. Prerequisite: enrollment within a School of Dentistry degree program. Course consists of online lectures, discussion board activities, assigned readings and interactive activities centering on understanding health disparities and access to care issues as they relate to patient-centered care among diverse populations. Graded as pass/fail.

DENS 513. Foundations of Effective Interpersonal Skills During Patient Interactions I. 1.5 Hour.
Semester course; 1.5 lecture hours. 1.5 credits. Enrollment restricted to students in a School of Dentistry degree program. Course consists of online and face-to-face lectures, skill-building activities, student role-plays and a standardized patient assessment. Students will work both individually and in small groups for discussion and role-plays utilizing foundational motivational interviewing techniques. Graded as Pass/Fail.

DENS 515. Clinical Skills I. 1 Hour.
Semester course. 1 credit. Provides didactic information and practice opportunities to familiarize first-year dental students with patient management and selected clinical skills. The course runs concurrently with courses in periodontics and operative dentistry to provide the basis for initial entry into the dental clinic and patient care.

DENS 516. Clinical Skills II. 3.5 Hours.
4 laboratory and 15 clinical hours. 3.5 credits. Prerequisite: DENS 515. The second in a four-part series of courses designed to prepare dental students for entry into the clinical training environment. Students' learning experiences include didactic lectures, clinical practice and observation, and simple patient-based interactions and/or procedures performed while assisting more senior dental students. Enrollment is restricted to admitted dental students.

DENS 524. Evidence-based Dentistry and Critical Thinking I. 1 Hour.
1 credit. The fundamentals of evidence-based dentistry will be taught. Students will gain the ability to identify, retrieve and critically appraise dental literature.

DENS 550. Update in Practice Administration. 1 Hour.
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. 2 Hours.
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 603. Foundations of Effective Interpersonal Skills During Patient Interactions II. 1 Hour.
Yearlong course; 1 lecture hour. 1 credit. Prerequisite: DENS 513. The two-semester course consists of online and face-to-face lectures, skill-building activities, student role-plays and a standardized patient assessment (spring). Students will work both individually and in small groups for discussion and role-plays of cases utilizing foundational motivational interviewing techniques. Students receive CO grading in the fall semester and a Pass/Fail grade upon completion.

DENS 604. Selective Special Topics in Oral Research I. 0.5 Hours.
Semester course; 0.5 lecture hours. 0.5 credits. Open to any dental student with a minimum GPA of 3.0 and in good academic standing. This introductory course will introduce students to the basics of research and innovation. Lectures will provide a framework for students to pose a research question, formulate a methodology and conduct experiments. Assignments will introduce students to analyzing and presenting research. Students will also learn the fundamentals of innovation protection. Graded as pass/fail.

DENS 605. Selective Special Topics in Oral Research II. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: DENS 604 or permission of instructor. Enrollment restricted to dental students with a minimum GPA of 3.0 and in good academic standing. Students will be introduced to writing a fellowship proposal. Lectures and workshops will guide students through the process of applying for an AD Williams fellowship. Students will also begin their independent research. Graded as pass/fail.

DENS 606. Selective Special Topics in Oral Research III. 0.5-2 Hours.
Semester course; variable hours (3 research hours per credit). 0.5-2 credits. May be repeated for a maximum total of 16 credits. Prerequisite: DENS 605 or permission of instructor. Enrollment restricted to dental students with a minimum GPA of 3.0 and in good academic standing. Independent study and individual research experiences will be conducted under the guidance of a research mentor. Graded as pass/fail.

DENS 611. Introduction to Professionalism, Ethics and Ethical Decision-making. 1 Hour.
Semester course. 1 credit. Provides a review of the foundation of ethical principles, concepts of professionalism, professional student behavior and responsibilities, ethical issues guiding dentistry, and the development of an ethical decision-making model.

DENS 619. Evidence-based Dentistry and Critical Thinking II. 1 Hour.
1 credit. The fundamentals of evidence-based dentistry will be taught. Students will gain the ability to identify, retrieve and critically appraise dental literature.

DENS 621. Dental Occlusion. 1 Hour.
Semester course; 1 lecture and 3 laboratory hours. 1.0 credit lecture with 1.0 credit laboratory. Consists of lectures and laboratory components which expand on the basic concepts that were presented in the fundamentals of occlusion course. Focuses on the examination, diagnosis and treatment planning of various occlusal problems. The student will learn the skills needed to analyze the dental occlusion of patients and to plan successful occlusal therapy, including restorative procedures and fixed prosthodontics treatment.

DENS 623. Clinical Skills IV. 7 Hours.
Semester course; lecture and clinic contact hours. 7 credits. Fourth in the clinical skills series, this course is designed to develop students' familiarity with and confidence in the clinical setting prior to beginning clinical care of their own patient pool. Students will have the opportunity to assist more senior students within their practice group and to perform simple operative procedures.

DENS 625. Clinical Skills III. 5 Hours.
Semester course; lecture and clinic contact hours. 5 credits. Designed to evaluate the student's ability to perform specific clinical skills and to provide a variety of experiences to prepare for entry to the school's student clinical practice. Case-based, problem-oriented histories will provide the foundation for development of phased treatment plans and a series of mannequin exercises. Students will have simulated and patient-based experiences during assigned rotations in the school's patient care clinics. Experiences are provided to enhance the student's communication skills as an oral health professional functioning as a component of a health care team. Rotations are coordinated with the spring clinical skills IV course.

DENS 628. Evidence-based Patient Care I. 1 Hour.
1 credit. Students will learn to apply the fundamentals of evidence-based dentistry to practical application in patient care.

DENS 630. Orthodontic-Periodontic-AEGD Conference. 0.5 Hours.
Semester course; 8 seminar hours. 1 credit. Must be taken every semester of the program. Discusses treatment planning and analysis of patients requiring combined orthodontic, periodontic and restorative care. Presents topics of interest to orthodontists, periodontists and general dentists. Graded S/U/F.

DENS 642. Fundamentals of Treatment Planning. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Open only to second-year D.D.S. students. Designed to build upon the student's prior exposure to discipline-based treatment planning concepts. Students will develop an integrated, multidisciplinary approach to urgent and oral disease control phase patient treatment planning. The course will also cover the use of information technology applications to document treatment plans and strategies for effectively communicating treatment plans to patients. Graded P/F.

DENS 651. Preclinical General Practice Dentistry Lab. 5 Hours.
Semester course; 200 laboratory hours. 5 credits. Admission into VCU International Dentist Program required. Designed to prepare and transition a class of internationally trained dentists into the third year of dental school at VCU. All aspects of preclinical dentistry will be covered in this basic preparatory laboratory course. Graded P/F.

DENS 652. Preclinical General Practice Dentistry Lecture. 9 Hours.
Semester course; 144 lecture hours. 9 credits. Admission into VCU International Dentist Program required. Designed to prepare and transition a class of internationally trained dentists into the third year of dental school at VCU. All aspects of preclinical dentistry will be covered in this basic preparatory lecture course. Graded P/F.

DENS 653. Clinical General Practice Dentistry Lecture. 6 Hours.
Semester course; 96 lecture hours. 6 credits. Admission into VCU International Dentist Program required. Comprises clinical experiences prior to the third year of professional study. This course is designed to enhance the student's clinical experience in patient management, treatment planning, utilization of dental auxiliaries, consultation with other health care professionals and referral to appropriate dental specialists. Specialty subjects and techniques will be combined to form a general dentistry model for patient care. Guidance from faculty will encourage the student to synthesize and integrate materials, methods and techniques from previous courses into a logical and systematic approach to the delivery of oral health care. Small-group seminars will be provided to enhance the student's transition to dental health care at VCU. Graded P/F.

DENS 654. Clinical General Practice Dentistry Lab. 5 Hours.
Semester course; 200 laboratory hours. 5 credits. Enrollment requires admission into the VCU International Dentist Program. Prerequisite: DENS 652. Comprises clinical experiences prior to the third year of professional study. This course is designed to enhance the student's clinical experience in patient management, treatment planning, utilization of dental auxiliaries, consultation with other health care professionals and referral to appropriate dental specialists. Specialty subjects and techniques will be combined to form a general dentistry model for patient care. Guidance from faculty will encourage the student to synthesize and integrate materials, methods and techniques from previous courses into a logical and systematic approach to the delivery of oral health care. Small-group seminars will be provided to enhance the student's transition to dental health care at VCU. Graded pass/fail.

DENS 655. Preclinical General Practice Dentistry for Internationally Trained Dentists. 6 Hours.
Yearlong course; 6 lecture hours. 6 credits. Designed to support the integration of a class of internationally trained dentists into the second year at the VCU School of Dentistry, this course addresses special topics of concern for this cohort. The course will cover core didactic material and laboratory activities and will strengthen areas that have been previously identified as opportunities for growth in this student population. Students receive CO grading in the fall and a pass or fail grade and earned credit in the spring.

DENS 660. Interdisciplinary Care Conference. 0.5 Hours.
Continuing course; 7 hours. 1 credit. Must be taken every year of the program. Provides a forum for formal presentation and group discussion of the diagnosis, treatment planning, delivery and prognosis of interdisciplinary dental care. Designed for continuing enrollment for two academic semesters; graded CO in the fall and a final grade of Pass or Fail in the spring.

DENS 699. Thesis Guidance. 1-2 Hours.
Semester course; 18-36 seminar hours. 1-2 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 the findings in the form of a master's thesis, and prepares a manuscript for publication.

DENS 700. Basic Sciences and Graduate Dentistry. 3 Hours.
First year; spring course; 45 hours. 3 credits. Advanced level survey of topic areas related to the principles and practices of dentistry including: oral pathology, biochemistry and physiology, infection and immunity, pharmacology, biomaterials and genetics.

DENS 701. Remediation in Dentistry. 1-7 Hours.
Semester course; variable contact hours. Variable credits. This course is not part of the core D.D.S. curriculum. Students who must remediate a course, for any reason, will be enrolled in this course during their remediation period and credit hours will be assigned consistent with the course being remediated. A grade of pass/fail will be assigned at the completion of the remediation period.

DENS 702. Dental Clinics. 1-12 Hours.
Semester course; variable hours, clinical contact. 1-12 credits. May be repeated for credits. Restricted to students enrolled in D.D.S. program. This course is designed for students who need to remediate clinical experiences, make up clinical experiences or are off cycle with clinical work for any other reason. Credit hours, learning objectives and exact expectations/responsibilities will be identified in an individualized education plan for each student as determined by the school's deans for clinical education and academic affairs. Graded pass/fail.

DENS 703. Advanced Interpersonal Communications I. 1 Hour.
Yearlong course; 1 lecture hour. 1 credit. Enrollment restricted to students in a School of Dentistry degree program. This is a two-semester course which introduces third-year dental students to goal setting/change plans and advanced motivational interviewing techniques. The course consists of online and face-to-face lectures, skill-building activities, student role-plays and a patient assessment (spring). Students receive CO grading in the fall semester and a Pass/Fail grade upon completion.

DENS 704. Academic Dental Career Exploration Elective. 1 Hour.
Semester course; 3 laboratory hours. 1 credit. Exact contact hours will vary by student and their self-designed learning plan. Enrollment restricted to students in the D.D.S. program with permission of the course director. This is an elective course for D2, D3 or D4 dental students who are interested in learning more about academic dental teaching and/or research careers. The course matches each student with a faculty mentor who provides insight into the day-to-day life of an educator or researcher. This elective is modeled on the ADEA Academic Dental Careers Fellowship Program. Graded as Pass/Fail.

DENS 713. Advanced Interpersonal Communications II. 1 Hour.
Yearlong course; 1 lecture hour. 1 credit. Enrollment restricted to students in a School of Dentistry degree program. This is a two-semester course for fourth-year dental students to integrate behavioral science content, advanced motivational interviewing techniques and emotional intelligence skills into professional practice. The course consists of online and face-to-face lectures, skill-building activities, student role-plays and a patient assessment (fall). Students receive CO grading in the fall semester and a Pass/Fail grade upon completion.

DENS 730. Dental Practice Management III. 1 Hour.
Semester course; 1 credit. The third in a series of four courses required over the duration of the four-year DDS curriculum. The series will prepare the dental graduate for making decisions about the type of practice to pursue, planning to establish or purchase a practice and, ultimately, managing it once in operation. Topics covered are those appropriate to the third-year dental student and may include, but are not limited to, marketing a practice, selecting the right location, ergonomics and managing the dental office. Graded as P/F.

DENS 735. Patient Management and Professional Conduct. 2.5 Hours.
Semester course; clinical contact hours. 2.5 credits. May be repeated for credit. Designed for third-year dental students to understand and practice the concepts of ethical conduct, patient management, risk management and professional responsibility. This course is based upon the application of the VCU School of Dentistry Code of Professional Conduct, the ADA Principles of Ethics and Code of Professional Conduct, and the School of Dentistry's Patient Bill of Rights in the clinical setting and is designed to help the dental student strive to do what is right for their patients, now and into the future.

DENS 740. Dental Practice Management IV. 1 Hour.
Semester course; 1 credit. The fourth in a series of four courses required over the duration of the four-year DDS curriculum. The series will prepare the dental graduate for making decisions about the type of practice to pursue, planning to establish or purchase a practice and, ultimately, managing it once in operation. Topics covered are those appropriate to the senior dental student and may include, but are not limited to, writing a business plan and understanding the current economy and its impact on dental practice. Graded as P/F.

DENS 745. Patient Management and Professional Conduct. 2.5 Hours.
Semester course; clinical contact hours. 2.5 credits. May be repeated for credit. Designed for fourth-year dental students to understand and practice the concepts of ethical conduct, patient management, risk management and professional responsibility. This course is based upon the application of the VCU School of Dentistry Code of Professional Conduct, the ADA Principles of Ethics and Code of Professional Conduct, and the School of Dentistry's Patient Bill of Rights in the clinical setting and is designed to help the dental student strive to do what is right for their patients, now and into the future.

DENS 752. Clinical General Practice Dentistry. 14.5 Hours.
Yearlong course; 7-8 clinic sessions per week. 14.5 credits. Enrollment restricted to fourth-year dental students. Course encompasses all clinical patient care instruction within the School of Dentistry group practices. This course is designed to enhance the student's clinical experience in patient management, treatment planning, utilization of dental auxiliaries, consultation with other health care professionals and referral to appropriate dental specialists.

DENS 762. Clinical Service-learning. 6 Hours.
Yearlong course; 50 clinical sessions. 6 credits. A course-based, credit-bearing educational experience in which students participate in an organized service activity that meets community-identified needs. During the course, students are assigned rotations in clinical practice settings in underserved areas. In these settings, students are exposed to patients of varied ethnic, socioeconomic and demographic backgrounds, as well as special patient populations not typically encountered in the School of Dentistry clinics. Students have the opportunity to make oral health care more accessible to marginalized groups while continuing clinical education. Throughout this unique learning experience students are exposed to the benefits of potential practice in public health dentistry. Students will reflect on the service activity to increase understanding and application of course content and to enhance a sense of civic responsibility. Course graded as CO with no credit for fall semester; P/F and credit assigned for spring semester.

DENS 780. Functional Occlusion: From TMJ to Smile Design Selective. 1.5 Hour.
Yearlong course; 1 lecture and 1 laboratory hour. 1.5 credits. Enrollment restricted to selected D4 dental students and AEGD residents. The course consists of lectures and clinic/laboratory components, which expand on the basic concepts that were presented in core D.D.S. curriculum. Students receive CO grading in the fall and Pass/Fail grade and earned credit in the spring.

DENS 790. Selective: Applications of 3D Printing in Dentistry. 1 Hour. Semester course; 1 lecture and .5 clinic hours. 1 credit. Enrollment restricted to students admitted to D.D.S. program and selected by course faculty. The course has three components: 1) an online self-learning module on basic principles of 3D printing and its applications in biological science and health science, as well as principle and workflow for implant-guided surgery, 2) a workshop on implant treatment planning using commercially available software and 3D printing of models and surgical guide and 3) a patient-based observation experience in implant-guided surgery. The course is designed for students to use the most up-to-date digital technology to diagnose and treat real clinical cases. Graded as Pass/Fail.

DESIGN (DESI)

DESI 510. Materials and Methods Studio. 3 Hours.
Semester course; 6 studio hours. 3 credits. Prerequisite: permission of program director. Studio course that develops skills in the use of materials, methods and technologies relevant to a broad range of activities pertaining to design.

DESI 511. Studio in Digital Design and Fabrication Technology. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: permission of program director. A studio-based examination of design research methods with emphasis placed on new technology of three-dimensional digital design and fabrication. The studio will utilize recently installed and existing facilities, faculty and resources at Digital Fabrication Lab at VCUQatar.

DESI 512. Studio in Visual Communications. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: permission of program director. A studio-based examination of design research methods with emphasis placed on time-based media production. The course is designed to provide a lab/studio opportunity for students to develop media skills while focusing on individual production, collaborative projects and critical discussion. The studio will utilize recently installed and existing facilities, faculty, and resources at Media Lab at VCUQatar.

DESI 520. Design Research Methodologies. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: permission of program director. A studio-based examination of design research methods with emphasis placed on linking knowledge, comprehension and application of historic and emerging methods of experimentation to generative and iterative studies.

DESI 601. Interdisciplinary Design Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A seminar to examine the theories and practices related to the contemporary designer's role in the technological, psychological, cultural and aesthetic environment. The seminar will include exploration of historical and contemporary art, architecture, communications, cultural theory and design criticism. The course involves intensive professional debate of various aspects of interdisciplinary design practice, ongoing group discussion, and exercises in critical writing. Professionals at the university and outside of the university will be invited for participation.

DESI 605. Design Strategies and Ethics for Business. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An investigation of precedents and potentials for application of design methods and processes to the development of business strategies and ethics.

DESI 611. Design Studio One. 6 Hours.
Semester course; 12 studio hours. 6 credits. A topical studio focusing on research, experimentation and problem-solving methods from a cross section of design disciplines.

DESI 612. Design Studio Two. 6 Hours.
Semester course; 12 studio hours. 6 credits. Studio course focusing on interdisciplinary, team-based approaches to identifying and solving advanced design problems.

DESI 613. Design Studio Three. 6 Hours.
Semester course; 12 studio hours. 6 credtis. Prerequisites: successful completion of 30 credits of graduate study and permission of the program director. Studio course focusing on experimentation, analysis and development of creative projects that directly contribute to a design brief to be used as a basis for the final thesis.

DESI 620. Design Thesis Research and Formulation. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisites: successful completion of 30 credit hours of graduate study and permission of the program director. Students examine applied research methods with emphasis placed on comprehension and analysis of case studies and then apply design research methods to test original proposals in a studio environment. Through development of design processes, students define an individual or team project of complex scope and intensity.

DESI 621. Design Research Studio: Leadership and Entrepreneurship. 3 Hours.
Semester course; 1 lecture and 6 studio hours. 3 credits. Prerequisites: successful completion of 30 credit hours of graduate study and permission of the program director. Students evaluate emerging leadership methodologies by applying lessons from case studies and emerging fields of knowledge. Course provides collaborative and presentation opportunities.

DESI 630. Teaching Practicum in Design. 3 Hours.
Semester course; 1 lecture and 6 practicum hours. 3 credits. Prerequisite: completion of 18 credit hours of graduate study. Exploration of philosophical, informational and technical aspects of design education. Observation, instruction and practice in teaching. Topics include effective teaching strategies, curriculum development, learning styles and evaluation techniques. Graded as P/F.

DESI 631. Design Internship. 3 Hours.
Semester course; 1 lecture and 6 studio hours. 3 credits. Prerequisites: successful completion of 30 credit hours of graduate study and permission of the program director. Provides supervised practical work experience that is coordinated with professional designers under the guidance of the design faculty. Internship placement is based upon research interest. Graded as P/F.

DESI 690. Thesis Studio. 1-9 Hours.
Semester course; vairable hours (2 studio hours per credit; 1 seminar hour per 3 credits). 1, 3, 6 or 9 credits. Prerequisites: successful completion of 30 credit hours of graduate study and permission of the program director. This course will support and assist the student in the development and completion of the final thesis project. Executed under the supervision of a graduate adviser and review committee. Graded as S/U/F.

DESI 692. Interdisciplinary Design Research/Individual Study. 1-3 Hours.
Semester course; 3-9 studio hours. 1-3 credits. May be repeated. The structuring, research, execution and presentation of an independent project in interdisciplinary design under the guidance of a faculty member.

DRUG AND ALCOHOL STUDIES (IDAS)

IDAS 689. Independent Study in Addiction. 1-4 Hours.
Semester course; variable hours. 1-4 credits. Prerequisite: permission of program director. Independent study to be done with a faculty adviser.

EARLY CHILDHOOD SPECIAL EDUCATION (ECSE)

ECSE 500. Language/Communication Intervention for Young Children with Disabilities. 3 Hours.
Semester course; 3 lecture hours; 3 credits. Offered in hybrid format. Undergraduate students must have permission of the instructor prior to registration for this course. This course emphasizes how children learn to communicate and how to facilitate communication development. The course includes examination of language development, language differences and disorders, language facilitation, and relationship of language to literacy. Course content and assignments include information about evidence-based practices and promote critical reflection and problem-solving skills.

ECSE 541. Educational Foundations for Collaboration and Universally Designed Learning. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Course offered online. Undergraduate students must have permission of the instructor prior to registration for this course. This course focuses on the foundations for early intervention and education, with emphasis on early intervention research, typical and atypical development, family and community contexts for development, professional standard and current policy issues.

ECSE 542. Family/Professional Partnerships. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Undergraduate students must have permission of the instructor prior to registration for this course. Theory and practice relevant to working 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.

ECSE 601. Assessment of Infants and Young Children with Disabilities. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours; 3 credits. Offered in hybrid format. This course provides the knowledge, skills and methods necessary to deliver effective education to infants, toddlers and preschoolers with disabilities and their families. The course includes readings, discussions and activities on topics central to understanding the conceptual and theoretical foundations underlying current educational curricula and methods. The course emphasizes blending recommended practices from early childhood education and early childhood special education, family-centered service delivery, cultural competence, inclusive placements, and research-based intervention. Course content and assignments promote critical reflection, collaborative decision-making and problem-solving skills to be used in planning and implementing programs for young children with special needs and their families.

ECSE 603. Integrated Early Childhood Programs I. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Offered in hybrid format. Examines the needs, opportunities, resources and barriers to early intervention and inclusive early childhood programs in Virginia and local communities. State and federal laws and policies, research-based practices and local models will be studied to understand the context for systems change. A planning process that includes funding mechanisms, staffing patterns, curricula service models, family participation options, resource coordination and program evaluation procedures will be emphasized.

ECSE 604. Early Literacy and Augmentative Communication. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Designed to increase the professional knowledge and skills of early childhood special educators to meet the literacy needs of young children with disabilities through the use of technology.

ECSE 605. Integrated Early Childhood Programs II. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: ECSE 603. Examines the needs, opportunities, resources and barriers to early childhood intervention and inclusive early childhood programs in Virginia and local communities. State and federal laws and policies, research-based practices, and local models will be studied to understand the context for systems change. A planning process that includes funding mechanisms, staffing concerns, curricula service models, family participation options, resource coordination and program evaluation procedures will be emphasized.

ECSE 641. Interdisciplinary Methods in Early Intervention. 3 Hours.
Semester course; 3 lecture hours; 3 credits. Offered in hybrid format. This course focuses on the nature and characteristics of major disabling and at-risk conditions for infants and young children and the influence of interdisciplinary teamwork in service delivery. Emphasis is given to the medical aspects of young children with disabilities and the management of neurodevelopmental and motor disabilities. Review of adaptive equipment and its safe use, as well as selection and implementation of appropriate assistive technology will be covered. The importance and role of collaborative planning teams that include families and professionals from various disciplines, including health care, will be discussed. Essential teamwork skills will be learned and students will reflect on the application of those skills in practice.

ECSE 672. Internship in Early Development and Intervention. 1-6 Hours.
Semester course; 1 or 2 lecture hours. 1 or 2 credits. May be repeated. Designed to provide practical experience in different community programs that serve young children (birth to 5) from various cultural and linguistic backgrounds, who are at risk for or have developmental disabilities, and their families. These observation, participation and service-learning experiences are distributed across the graduate program, linked to other core content courses documented via portfolios and aligned with professional standards.

ECSE 700. Externship. 1-6 Hours.
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.

ECONOMICS (ECON)

ECON 101. Introduction to Political Economy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Seminar on the development of critical thought and economic analysis of policy issues. Focus is on how policy choices affect society and the individual, the economic methodology that guides policy choices, and the institutional and political environments within which policy is derived. Issues cover a broad range of topics including environmental issues, tax policy, inflation expectations, unemployment, foreign trade and the effectiveness of fiscal and monetary policies. Crosslisted as: INTL 102.

ECON 203. Introduction to Economics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of economic principles, institutions and problems. The course is designed to provide basic economic understanding for students who do not expect to major in economics or in the School of Business. Not applicable for credit toward economics and business majors. Also note that students may receive credit for only two of the following three courses: ECON 203, 210 or 211.

ECON 205. The Economics of Product Development and Markets. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introduction to some of the fundamental economic concepts necessary to effectively operate in today's marketplace. Basic elements of microeconomics, net present value analysis and market strategy will be covered in class. The goal is to provide students with a better understanding of how to approach business problems and of proven problem-solving techniques. Appropriate for engineering and non-engineering students.

ECON 210. Principles of Microeconomics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A course designed to acquaint the student with a theoretical and practical understanding of the economic institutions and problems of the American economy with a focus on microeconomics. Note that students may receive credit toward their degree requirements for only two of the following three courses: ECON 203, 210 and 211.

ECON 211. Principles of Macroeconomics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ECON 203 with minimum grade of a B or ECON 210. A course designed to acquaint the student with a theoretical and practical understanding of the economic institutions and problems of the American economy with a focus on macroeconomics. Note that students may receive credit toward their degree requirements for only two of the following three courses: ECON 203, 210 and 211.

ECON 291. Topics in Economics. 1-3 Hours.
Variable hours. Variable credit. Maximum of 3 credits per topic. Prerequisite: permission of instructor. An in-depth study of selected business topics. Graded as pass/fail at the option of the department.

ECON 300. Contemporary Economic Issues. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ECON 203 with a minimum grade of B or ECON 210; ECON 211; and junior standing. Students will learn to think critically about current policy issues using basic economic principles. Communication skills will be developed through presenting, discussing and debating alternative positions in class. Students will work in teams to outline the basic economic incentives and the direct and indirect costs and benefits associated with different policy actions. Through teamwork students will practice leadership skills and methods to manage group dynamics. Topics will vary by semester and may include the economics of discrimination, the environment, health care, cultural arts, education, business ethics, fiscal policy, monetary policy, globalization, inequality and immigration.

ECON 301. Microeconomic Theory. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ECON 203 with a minimum grade of B or ECON 210; and SCMA 212 or MATH 200. Analysis of the principles that govern production, exchange and consumption of goods and services. Topics include demand analysis, production and cost theory, price and output determination, theory of markets and distribution theory.

ECON 302. Macroeconomic Theory. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ECON 203 with a minimum grade of B grade or ECON 210; ECON 211; and SCMA 212 or MATH 200. A general survey of national income analysis and macroeconomic theory. Detailed study of public policies affecting price levels, employment, economic growth and the balance of payments.

ECON 303. Managerial Economics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ECON 203 with a minimum grade of B and ECON 211; or ECON 210 and ECON 211; and SCMA 212 or MATH 200. This course is restricted to students who have completed at least 54 credit hours (junior standing). Application of tools of economic analysis to allocation problems in profit and nonprofit organizations. Models for evaluating revenue, production, cost and pricing will be presented. Emphasis on developing decision rules for turning data into information for solving problems.

ECON 305. Public Finance - State and Local. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ECON 203 with a minimum grade of B or ECON 210. An economic analysis of state and local government budgeting, revenue sources and expenditures.

ECON 307. Money and Banking. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ECON 211. A study of money, financial markets and the financial structure with emphasis on commercial banks and the Federal Reserve System. Relationships between economic activity and money supply are introduced.

ECON 312. E-commerce and Markets for Information Goods. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ECON 203 with a minimum grade of B or ECON 210. This course surveys the ways that information and emerging information technologies affect market organization and market efficiency. Competitive strategies and regulatory policy for information markets also are considered. Topics include network effects, first mover advantages, auctions, price discrimination and organizational structure.

ECON 313. Economics of Transportation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ECON 203 with a minimum grade of B or ECON 210. An economic analysis of the transportation industry with special emphasis on regulation, public policy and urban transportation.

ECON 315. Economic Development. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ECON 203 with a minimum grade of B and ECON 211; or ECON 210 and ECON 211. An introduction to the process of economic development. Surveys development theory and experiences of underdeveloped countries of Africa, Asia, Latin America and the Caribbean and of developed countries. Explores obstacles to development and policies and tools for stimulating economic development. Crosslisted as: AFAM 315/INTL 315.

ECON 321. Urban Economics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ECON 203 with a minimum grade of B or ECON 210. An introduction to urban economics, with an emphasis on the economics of agglomeration and the role of externalities in the urban economy. Economic analysis of the provision of urban public services and urban public financing, especially in politically fragmented areas. Crosslisted as: URSP 321.

ECON 325. Environmental Economics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course is restricted to students who have completed at least 54 credit hours (junior standing). The application of economic analysis to externalities such as air and water pollution, pesticide control, land use planning and other environmental issues. The role of cost/benefit analysis in the decision-making process is developed. Efficiency and equity issues are evaluated.

ECON 329. International Economics. 3 Hours.
3 lecture hours. 3 credits. Prerequisites: ECON 203 with a minimum grade of B and ECON 211; or ECON 210 and ECON 211. An analysis of economic and political influences on exports and imports, balance of payments, foreign investment, exchange rates and international monetary systems. Crosslisted as: INTL 329.

ECON 333. Behavioral Economics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ECON 203 with a minimum grade of B or ECON 210. Identifies when behavior systematically violates mainstream models and provides alternative behavioral models which are psychologically and empirically plausible. Discusses a variety of violations including endowment effects, framing, dynamic inconsistency and the winner's curse.

ECON 338. Game Theory. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ECON 203 with a minimum grade of B or ECON 210. Analyzes strategic situations using game theory. Applies the analysis to a variety of settings and questions. Develops an understanding of the uses and limitations of the analysis.

ECON 344. Biodiversity and Ecological Economics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ECON 203 with a minimum grade of B or ECON 210. Explores the use of both economic and ecological approaches to the identification, valuation and protection of biological diversity and ecological integrity. Investigates the potential of coupled human and natural systems through construction and computer simulation of dynamic ecological-economic models.

ECON 402. Business Cycles and Forecasting. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ECON 203 with a minimum grade of B and ECON 211; or ECON 210 and ECON 211. An examination of repetitive variations in business activity. The measurement and analysis of economic fluctuations and how they affect the business environment. Stresses modern forecasting techniques.

ECON 403. Introduction to Mathematical Economics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ECON 203 with a minimum grade of B grade or ECON 210; ECON 211; and MGMT 212 or SCMA 212 or MATH 200. Enrollment is restricted to students who have completed at least 54 credit hours (junior standing). The application of mathematical techniques to economic theory and economic models.

ECON 419. History of Economic Thought. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ECON 203 with a minimum grade of B and ECON 211; or ECON 210 and ECON 211. A survey of the ideas of major economic contributors to modern economic thought. Theories of value, growth and distribution from the 18th through the 20th centuries will be presented.

ECON 421. Government and Business. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ECON 203 with a minimum grade of B or ECON 210. The application of economic analysis to the behavior of business, industry and government regulation. Topics include the causes and exercise of monopoly power, antitrust enforcement, public utilities and industry studies.

ECON 431. Labor Economics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ECON 300, 301 and 302; and STAT 210, STAT 212, MGMT 301 or PSYC 214. This course is restricted to students who have completed at least 54 credit hours (junior standing). Analysis of labor markets and institutions to gain an understanding of the process of wage and employment determination. Both historic and current topics are included.

ECON 441. Experimental Economics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ECON 300, ECON 301 and 302; and STAT 210, STAT 212, MGMT 301 or PSYC 214; and junior standing. Students will learn about the leading models of decision making and human behavior in markets. The course will focus on using experimental methods to test the models' hypotheses. Students will learn how to design experiments, collect experimental data, and how to examine the data and interpret the results.

ECON 442. Economic Growth. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ECON 203 with a minimum grade of B and ECON 211; or ECON 210 and ECON 211. Explores determinants of cross-country income differences using economic models, economic history and data analysis. Analyzes factors that influence productivity growth and diffusion of technology between countries.

ECON 489. Senior Seminar in Economics. 3 Hours.
3 lecture hours. 3 credits. Prerequisites: ECON 300, ECON 301 and 302; STAT 210, STAT 212, MGMT 301 or PSYC 214; and junior standing. Analysis of economic theory and problems. Students will study a few topics in depth, focusing on understanding the current research, critically analyzing controversial issues and using data to investigate competing claims.

ECON 491. Topics in Economics. 1-3 Hours.
Semester course; variable hours. Variable credit. Maximum of 3 credits per topics course; maximum total of 6 credits for all topics courses. Prerequisite: junior standing. An in-depth study of a selected economic topic, to be announced in advance.

ECON 492. Independent Study in Economics. 1-3 Hours.
Semester course; 1-3 credits. Maximum total of 3 credits. Prerequisites: junior or senior standing as an economics major and approval of adviser and department chair prior to course registration. Intensive study under supervision of a faculty member in an area not covered in depth or contained in the regular curriculum.

ECON 493. Internship in Economics. 1-3 Hours.
Semester course; the student is expected to work at the site 15-20 hours per week. 1-3 credits. Prerequisites: junior standing, a minimum of 3.0 GPA in economics courses, at least 15 economics credits and permission of the department chair. Intention to enroll must be indicated to the instructor prior to or during registration for semester of credit. The internship is designed to give students practical experience in an appropriate supervised environment in the public or private sector. Graded as pass/fail.

ECON 500. Concepts in Economics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Essential economic concepts including the price system, price determination in imperfectly competitive markets, employment theory, and monetary theory. This is a foundation course. Not open to students who have completed undergraduate foundation sequence: ECON 203 with a minimum grade of B and ECON 211, or ECON 210 and 211.

ECON 501. Introduction to Econometrics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ECON 500, 210 or 203, the latter with a minimum grade of B; and MGMT 301, STAT 210 or STAT 212. Sources and uses of economic data; includes the application of statistical methods and regression analysis to time series and cross-section data to test hypotheses of micro- and macroeconomics.

ECON 600. Fundamental Economic Analyses of Business Decisions. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Designed to provide the non-business major with knowledge of fundamental economic principles and their application to business decisions and organization. Topics include supply of demand, elasticity, price determination by a firm with market power, optimal levels of employment, incentives and compensation, and multidivisional organization.

ECON 604. Advanced Microeconomic Theory. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ECON 614. Theory of prices and markets; value and distribution. Partial and general equilibrium analysis.

ECON 607. Advanced Macroeconomic Theory. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ECON 614. National income analysis, monetary and fiscal theory and policy, and general equilibrium analysis.

ECON 609. Advanced International Economics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ECON 203 with a minimum B grade and ECON 211; or ECON 210 and ECON 211. An advanced-level examination of why trade occurs, balance of payments concept and adjustment, international equilibrium, forward exchange, markets, international investment, and international organizations.

ECON 610. Managerial Economics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ECON 203 with a minimum B grade and ECON 211; or ECON 210 and ECON 211. M.B.A. students must take in conjunction with MGMT 641 or by permission of assistant dean of master's programs. Analysis of business decisions, applying tools of economic theory. Decisions on demand, production, cost, prices, profits and investments.

ECON 612. Econometrics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ECON 501. Provides empirical content to the theoretical concepts of the economics by formulating and estimating models. Introduction to simultaneous equation problems in economics and the studies of production, demand, and consumption functions.

ECON 614. Mathematical Economics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ECON 203 with a minimum B grade and ECON 211; or ECON 210 and ECON 211. Economic analysis utilizing simple mathematical methods. Includes derivation and exposition of theories and the application of tools to widen the scope and increase the usefulness of economics.

ECON 616. Advanced Public Finance. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ECON 203 with a minimum B grade and ECON 211; or ECON 210 and ECON 211. Theory and application of public finance, including taxation, expenditures, and budgeting. Special attention to cost-benefit analysis and to intergovernmental relations in federal system.

ECON 617. Financial Markets. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ECON 501, MGMT 524, STAT 541, or MGMT 302; and ECON 500 or FIRE 520. Theories of markets for loanable funds are related to empirical findings and institutional structures. Yields of financial assets, kinds of debt instruments, financial institutions, public policy, financial models, and the role of money and credit in economic growth are considered.

ECON 620. The Economics of Industry. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ECON 301, ECON 303 or ECON 610. 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ECON 500; or ECON 203 with a minimum grade of B and ECON 210; or ECON 210 and 211. Study of specialized topic(s) in economics.

ECON 623. Anomalies in Financial Economics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ECON 617 and ECON 401. 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, over-reaction and under-reaction 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. Health Economics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ECON 203 with a minimum grade of B and ECON 211. Develops an 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 issues in the health care field. Crosslisted as: HADM 624.

ECON 631. Labor Market Theory and Analysis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ECON 203 with a minimum B grade and ECON 211. Theoretical and empirical analysis of labor markets from both an economics and a management or human resource perspective. Topics will include employment concerns, wage structure and compensation packages.

ECON 641. Econometric Time-series Analysis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ECON 501 and ECON 614. 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 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. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ECON 203 with a minimum B grade and ECON 211. The effect of externalities in terms of efficiency and equity considerations. 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 691. Topics in Economics. 1-3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: Approval of proposed work is required by graduate studies office in the School of Business. 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. 1-3 Hours.
Semester course; 3 lecture hours. 1, 2 or 3 credits. Prerequisite: Approval of proposed work is required by graduate studies office in the School of Business. 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. Thesis in Economics. 3 Hours.
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.

ECON 799. Thesis in Economics. 3 Hours.
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.

EDUCATION (EDUC)

EDUC 700. Externship. 1-6 Hours.
Semester course; 1-6 practicum hours. 1-6 credits. May be repeated for a maximum of 9 credits. Enrollment requires 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.

EDUC 797. Directed Research. 1-9 Hours.
Semester course; 1-9 variable hours. 1-9 credits. Enrollment restricted to students who have completed first-year Ph.D. courses in education or by permission of program director. The course provides doctoral students the opportunity to do hands-on research prior to the dissertation project that is relevant to their substantive area or individual learning needs. The topic and specific project will be initiated by the student and implemented in collaboration with a School of Education faculty member. A proposal for a directed research course must be submitted that specifies how the student will gain experience, knowledge and skills in one or more aspects of conducting a research project. Graded S/U/F.

EDUC 798. Thesis. 1-6 Hours.
Semester course; 1-6 variable hours. 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. Graded S/U/F.

EDUC 899. Dissertation Research. 1-9 Hours.
Semester course; 1-9 variable hours. 1-9 credits. May be repeated. A minimum of 6 semester hours required. Enrollment restricted to students who have successfully completed comprehensive examinations. Dissertation work under direction of dissertation committee. Graded as S/U/F.

EDUCATIONAL LEADERSHIP (EDLP)

EDLP 700. Effective Learning Networks. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Explores theory and research regarding characteristics of effective leaders, team members and organizations. Participants are administered personal inventories related to leadership skills; team-building and -participation skills; learning preferences; preferences for processing information and for decision-making. Results of inventories are analyzed, combined with learned theories and applied to practical situations.

EDLP 702. Understanding Self as Leader: Theory and Data Analysis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EDLP 700. Presentation of leadership and organizational theory. Study of statistical analyses appropriate for data sets provided in learning inventories and case studies. Critical analyses of research in the field related to leadership styles, personal inventories and organizations/communities as systems. Applications of theory, research and case-study analysis findings to organization/community settings.

EDLP 703. Understanding Self as Leader: Practical Applications. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: EDLP 700. Corequisite: EDLP 702. Applications of theory, research and case-study analysis findings to organization/community settings. Seminar discussions of applications to equity, accountability and learning issues.

EDLP 704. Frameworks for Decision-making: Legal Perspectives. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Critical analyses of legal research, theory and laws related to case studies provided. Critical analysis of legal and policy issues, as well as policy development/implementation theory. Applications of research, laws and policies related to the case studies provided.

EDLP 705. Frameworks for Decision-making: Ethical Perspectives. 3 Hours.
Semester course; 3 lecture hours. 3 credits. In-depth analyses of issues and problem-solving using research, ethics theory and frameworks. Application of research and theory to development of solutions in focused area of study.

EDLP 708. Leadership Presence. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Corequisite: EDLP 709. Selected topics for fostering effective leadership with particular attention placed on leadership presence, crisis response and public relations. The course will focus on facilitating leadership skills through better understanding of enhancing time management skills, fostering communication skills and leadership presence and planning for crisis.

EDLP 709. Equity and Leadership. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Corequisite: EDLP 708. Selected topics for fostering effective leadership with particular attention placed on equity and leadership. The course will focus on enhancing leadership skills through better understanding of equity issues and student psychosocial development.

EDLP 711. Evidence-informed Perspectives on Practice I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: permission of instructor. This course implements a collaborative approach to the theory-infused practice of program evaluation in education. Participants will hone their project-planning expertise and their data-gathering and data-analysis skills in the process of both contributing to ongoing evaluation research and preparing to conduct evaluations of programs of their own choosing in their own school divisions. The course culminates in the production of an interim report which is delivered to the "client" and which sets the stage for Evidence-informed Perspectives on Practice II.

EDLP 712. Planning for Sustainable Change I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Using a case-study approach, students will focus on theory and research regarding implementing change in organizations, with attention to organizational culture as a context for change. The course addresses laws, policies and research regarding improvement plan development, implementation and evaluation.

EDLP 713. Evidence-informed Perspectives on Practice II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EDLP 711. This course builds on the foundation laid in EDLP 711. Students are mentored as they proceed throughout the semester to develop and enhance their earlier program review plan and interim report. Students establish a literature foundation for the ongoing evaluation of the program they chose to evaluate; gather further data by means of interviews, focus groups, document review; and analyze data to develop conclusions and recommendations. The summative product of this course includes an executive summary, a full report and a binder of relevant data.

EDLP 714. Planning for Sustainable Change II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EDLP 712. Case study approach. Application of theory, laws, research to developing plans for implementing change, based upon case being studied. Study of methods for documenting, evaluating effectiveness of plan implementation and change implementation/sustainability.

EDLP 715. Principles for Professional Writing I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: permission of instructor. Study of scholarly writing styles and report formats appropriate to various audiences. Development of comprehensive written product suitable for distribution in student's setting. Focus is on conveying themes and drawing conclusions from scholarly research.

EDLP 716. Principles for Professional Writing II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EDLP 715. Study of scholarly writing styles and report formats appropriate to various audiences. Development of comprehensive written product suitable for distribution in student's setting. Focus is on conveying themes and drawing conclusions from scholarly research.

EDLP 717. Communicating Research Findings. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: permission of instructor. Study of data analysis methods relevant to capstone project. Styles and methods of writing related to conveying results of data analyses, including development of graphs, tables, charts and figures, and presentation materials.

EDLP 790. Capstone Development. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: permission of instructor. Supervised research. Client-based project. Designed to develop and refine the skills applicable to the preparation of an acceptable description of a capstone project. Development of background, review of research, project objectives and methods for gathering data, in consultation with capstone chair and client.

EDLP 798. Capstone Plan Implementation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EDLP 790. Supervised research. Client-based project. Conducting of research related to project developed in EDLP 790, with guidance from capstone project chair and client. Study of data management processes. Development of interim reports for capstone committee and client. Graded as S/U/F.

EDLP 799. Capstone Completion. 3 Hours.
Semester course; variable hours. 1-3 credits. Prerequisite: EDLP 798. Supervised research. Client-based project. Continuation of capstone implementation. Focus on developing conclusions and recommendations based upon data analyses. Presentation of capstone project to capstone committee and client. Graded as S/U/F.

EDLP 890. Dissertation Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: permission of director of doctoral studies. Designed to develop and refine the skills applicable to the preparation of an acceptable draft of a dissertation prospectus. Crosslisted as: EDUS 890.

EDLP 899. Dissertation Research. 1-9 Hours.
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. Graded as S/U/F. Crosslisted as: EDUS 899.

EDUCATIONAL STUDIES (EDUS)

EDUS 101. Teacher Cadet Program. 3 Hours.
Semester course; 3 hours. 3 credtis. Open only to students concurrently enrolled through a Teacher Cadet program at a participating Virginia high school. Designed to provide an introduction and foundation for the teaching profession, including awareness of personal attributes related to education, learning and cognitive styles, student growth and development, history and trends in public education, basic instructional approaches and the structure and governance of public education. The program includes an extended clinical component.

EDUS 200. Education in American Society. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An elective course for non-education majors, including those who may be exploring careers in education. An examination of the complex nature of our American educational system and various societal influences on that system. The course will include an exploration of some critical issues affecting the future of American education, on-site visits to educational institutions, and other field experiences in settings that will permit exploration of career options.

EDUS 300. Foundations of Education. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The historical, sociological and philosophical backgrounds of educational theories and practices. The aim of the course is to help the student develop a basic understanding of education in the modern world.

EDUS 301. Human Development and Learning. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of human development through the life span with special emphasis on child and adolescent psychology, the nature of learning, and basic concepts of learning theories.

EDUS 305. Educational Psychology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PSYC 101. The application of psychological principles to the teaching-learning process, with special emphasis on theories of learning and development. Crosslisted as: PSYC 305.

EDUS 400. Independent Study. 1-6 Hours.
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.

EDUS 476. Methods for Residence Hall Assistants. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: serve in VCU residence halls or permission of instructor. Course designed primarily to present resident assistants and others with student development concepts, peer assistance and helping skills, and group techniques. Residence halls will be used as primary learning laboratories.

EDUS 494. Topical Seminar in Education. 1-3 Hours.
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.

EDUS 500. Workshop in Education. 1-3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A methods course in parent-child communications and problem solving. Designed to enable parents and professionals to understand and relate more effectively with children.

EDUS 594. Topical Seminar. 1-3 Hours.
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. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines theory and practical applications of the research about the cognitive, social and physical development of children and adolescents. Emphasizes issues that affect students in school environments.

EDUS 606. Review of Research. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 9 credits. Application of research findings to a specific educational area of study. Emphasis is on the consumption and utilization of research findings rather than the production of research evidence.

EDUS 607. Advanced Educational Psychology for Elementary Teachers. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Application of the principles of psychology to the teaching-learning process in the elementary classroom. Discussion will focus on the comprehensive development of individual learning experiences and educational programs from the point of view of the educator and administrator. Crosslisted as: PSYC 607.

EDUS 608. Educational Statistics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: STAT 508 or equivalent. An intermediate-level statistics class focusing primarily on techniques of inferential analysis. The purpose of this course is to facilitate students' development of the skills required to come up with a research hypothesis and analyze data to confirm or deny said hypothesis. Students will conduct data analysis using the National Center for Education Statistics Educational Longitudinal Study of 2002. Students will specifically consider the development of theoretically grounded hypotheses and the use of a variety of statistical techniques to enable their testing. The class will focus in particular on multiple regression with two or more independent variables and the psychometric analysis of measurement scales intended to tap variables used in the models developed. Students will also consider curvilinear relationships, factor analysis and power analysis. Students who successfully complete the course should have the ability to analyze complex data sets and construct measures that enable the testing of hypotheses that advance theory, research and practice in the field of education.

EDUS 609. Learning and Motivation in Education. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines perspectives on learning and motivation in school settings.

EDUS 610. Social Foundations of Education. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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 615. Lifespan Development: A Gender Perspective. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Overview of human development theories and the impact of cultural gender messages on the developmental process. Crosslisted as: CLED 615.

EDUS 617. Advanced Educational Psychology for Secondary Teachers. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Application of the principles of psychology to the teaching-learning process in the secondary classroom. Discussion will focus on the comprehensive development of individual learning experiences and educational programs from the point of view of the educator and administrator. Crosslisted as: PSYC 657.

EDUS 620. Human Development in Education. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Doctoral seminar that examines issues in human development as they relate to the education of youth and young adults.

EDUS 621. Motivation in Education. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Doctoral seminar that examines issues in motivation as they relate to teaching and learning.

EDUS 631. American College and University. 3 Hours.
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. Crosslisted as: CLED 631.

EDUS 632. The Changing Face of Higher Education. 3 Hours.
Semester course; 3 lecture hours. 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. Crosslisted as: ADLT 632.

EDUS 633. Academic Leadership in Higher Education. 3 Hours.
Semester course; 3 lecture hours. 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. Crosslisted as: CLED 633.

EDUS 641. Independent Study. 1-6 Hours.
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.

EDUS 651. Topics in Education. 1-3 Hours.
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. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EDUS 660 or permission of instructor. A comprehensive review of the major evaluation theories and 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. 3 Hours.
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 study in-depth measurement and/or evaluation procedures in their specialization.

EDUS 672. Internship. 1-6 Hours.
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. 3 Hours.
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, drawn in part from practical issues encountered in clinical settings. Investigates how educational policies and practices reflect ethical values and how those values are grounded.

EDUS 701. Urban Education. 3 Hours.
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 702. Foundations of Educational Research and Doctoral Scholarship I. 3 Hours.
3 lecture hours. 3 credits. This interdisciplinary seminar is the first part of a two-semester sequence. Students will learn about the nature of scholarly inquiry and the worth of situating research within its wider social and political contexts. Course will deal with limitations of knowledge and knowing and aid students in understanding major themes in the field of epistemology. Emphasis will be given to the nature and structure of knowledge and evidence, justification of beliefs, beliefs about "truth," naturalized epistemology and the role of skepticism in inquiry and advanced study. EDUS 702 and 703 are continuous courses.

EDUS 703. Foundations of Educational Research and Doctoral Scholarship II. 3 Hours.
3 lecture hours. 3 credits. Prerequisite: EDUS 702. This interdisciplinary semester is the second part of a two-semester sequence. Students will deepen their understanding of scientific inquiry and apply an understanding of epistemology to a critical analysis of various philosophies of research and paradigms that exist (e.g.: positivism, constructivism, etc.). Emphasis will be placed on the relationships among research, politics, policy and ethics. Examples will be drawn from research on urban issues and deal with issues such as race, class and gender in education. EDUS 702 and 703 are continuous courses.

EDUS 706. Educational Theory and Praxis in Historical and Contemporary Contexts. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This seminar focuses on philosophies of education with particular attention paid to ways of thinking about seminal ideas and their relationships to education and social, institutional, economic and cultural change in the U.S. It considers how broader social phenomena affect the purposes and structures of educational institutions as well as how educational change affects wider society. Additionally, it highlights challenges for social change within and through public schools given institutional, social and political influences. Key topics include: schooling for democracy; progressivism, pragmatism and education; eco-education; behaviorism and social utopias; multiculturalism/pluralism; contemporary political educational discourse; and the roles of theory/philosophy in education. This course offers opportunity for students to engage with theories of social change that place education/schooling at the center. It provides space for students to develop a philosophical framework for their work as well as a means to deepen their understandings of educational research, policy and theory. Finally, this course requires students to begin to put their ideas into action in educational and other social contexts by means of a community engagement/organization component. The worth of engaging with and not just learning about the curriculum, culture and change is a core value of the program and in this course we will work hard to both study about and participate in the overlapping worlds of theory/academia and education-related social action.

EDUS 707. Socio-cultural Perspectives on Schooling, Society and Change. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This seminar focuses on the critical analysis of contemporary schooling in the U.S. and investigates how educational institutions work from a sociological-cultural perspective. The structure of schooling is analyzed through such topics as the social organization of schooling, stratification within and among schools, youth culture and student peer groups, curriculum and the stratification of knowledge, and equality of educational opportunity as mitigated by such factors as social class, race, ethnicity and gender. Discussions about current social theories and debates in education are combined with lessons drawn from social justice-based research on the politics of schooling and institutional transformation. In sum, the course provides a framework for informed participation in debates on controversial educational issues at the macro level, including school reform and educational policy, thereby equipping future curriculum and instruction leaders with the tools they need to affect change.

EDUS 710. Quantitative Research Design. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EDUS 660 or equivalent, and a graduate-level statistics course, or permission of instructor. An examination of quantitative 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 and nested designs, experimental validity and alignment of statistical procedures with designs.

EDUS 711. Qualitative Methods and Analysis. 3 Hours.
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, interactive data collection strategies, research reliability and validity. An interdisciplinary approach is used. Students conduct a small field study in their specialization.

EDUS 712. Mixed Methods Research. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: graduate-level statistics course, EDUS 660 and EDUS 711 or equivalents, or permission of instructor. Examines mixed methods research designs, including the major philosophical perspectives of mixed methodology, as well as the challenges and strategies for data collection and analysis procedures across designs.

EDUS 720. Seminar in Cognition and School Learning. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines topics in cognition that explain students' learning such as expertise, problem solving, cognitive strategies instruction and development of the knowledge base. Supportive instructional techniques will also be considered.

EDUS 721. Advanced Seminar in Social Processes in Education. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines the theoretical/conceptual and empirical bases of various social processes and their relationship to educational outcomes. The content covered is designed to provide students with a survey of literature and research on a number of topics that examine these relationships from individual, contextual/environmental and policy perspectives. Current developments with regard to research methodologies in these areas will also be considered.

EDUS 790. Educational Research Seminar. 3 Hours.
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 795. Professional Seminar in Educational Issues. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Limited to students in Ph.D. in Education program. Interactive seminar discusses contemporary educational issues based on research in the historical, philosophical, psychological, sociological, political and economic foundations of education. Includes active participation by students as well as guest lectures by scholars from various academic disciplines.

EDUS 797. Directed Research. 1-9 Hours.
Semester course; variable hours. 1-9 credits. Prerequisite: completion of first-year Ph.D. courses in education or permission of program director. The course provides doctoral students the opportunity to do hands-on research prior to the dissertation project that is relevant to their substantive area or individual learning needs. The topic and specific project will be initiated by the student and implemented in collaboration with a School of Education faculty member. A proposal for a directed research course must be submitted that specifies how the student will gain experience, knowledge and skills in one or more aspects of conducting a research project. Graded S/U/F.

EDUS 890. Dissertation Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: permission of director of doctoral studies. Designed to develop and refine the skills applicable to the preparation of an acceptable draft of a dissertation prospectus. Crosslisted as: EDLP 890.

ELECTRICAL AND COMPUTER ENGINEERING (EGRE)

EGRE 101. Introduction to Engineering. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Course open to first-year students majoring in electrical or computer engineering. Introduction to engineering through instruction on basic concepts of engineering. Topics will include an introduction to basic circuit components and circuit analysis, digital logic design and programming. General topics important to all engineers will also be covered, such as mathematics, improving written and oral communication skills, teamwork, ethics and life-long learning. The laboratory introduces fundamental testing, measurement, troubleshooting methodology and proper laboratory notebook maintenance. Engineering design and analysis is also emphasized through a team-based design that involves designing, building and programming a robot.

EGRE 206. Electric Circuits. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisite: MATH 200; and one of EGRE 101 or EGRB 102 or both EGMN 103 and EGMN 190, as applicable per department, all with minimum grades of C. Corequisite: MATH 201. An introduction to electrical circuit theory and its application to practical direct and alternating current circuits. Topics include Kirchhoff's Laws (review from departmental prerequisites, as applicable), fundamental principles of network theorems, transient and steady-state response of RC, RL and RLC circuits by classical methods, time-domain and frequency-domain relationships, phasor analysis and power. Laboratory work, practical applications and integral laboratory demonstrations emphasize and illustrate the fundamentals presented in this course.

EGRE 207. Electric Circuits II. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisite: EGRE 206, with a minimum grade of C. An introduction to higher level electric circuit theory, including the study of basic active components, such as diodes and operational amplifiers. Emphasis will be placed on design rather than analysis. The laboratory exercises will serve to train students in the art of designing a circuit to perform specific tasks and to conform to specific design parameters.

EGRE 224. Introduction to Microelectronics. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisites: EGRE 207 and MATH 301, both with a minimum grade of C. This course covers the analysis, modeling and design of electrical circuits which contain electronic devices. Students will learn to design analog circuits to specifications through laboratory problems, a design project and circuit simulation.

EGRE 245. Engineering Programming. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisite: MATH 151 with a minimum grade of C. Enrollment restricted to electrical and computer engineering majors. Students are expected to have fundamental computer skills. Introduction to the concepts and practice of structured programming using C. Problem-solving, top-down design of algorithms, basic C syntax, control structures, functions, arrays, files and strings.

EGRE 246. Advanced Engineering Programming. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGRE 245 with a minimum grade of C. Enrollment restricted to electrical and computer engineering majors. Advanced programming for engineering applications in C and C++. Topics include objects, classes and inheritance; linked lists; recursion; basic searching and sorting techniques; and program design for control and monitoring type applications.

EGRE 254. Digital Logic Design. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisites: EGRE 101 and EGRE 245 or equivalents, both with a minimum grade of C. An introduction to digital logic design with an emphasis on practical design techniques and circuit implementations. Topics include number representation in digital computers, Boolean algebra, theory of logic functions, mapping techniques and function minimization, design of combinational, clocked sequential and interactive digital circuits such as comparators, counters, pattern detectors, adders and subtractors. An introduction on designing digital circuits using schematic capture, logic simulation and hardware description languages is included. Students will use the above basic skills in the laboratory to design and fabricate digital logic circuits using discrete logic and field programmable gate arrays.

EGRE 303. Electronic Devices. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGRE 306 and MATH 301, both with a minimum grade of C. An introduction to solid state electronic devices covering the fundamentals of atomic structure, band theory, charge transport in solids and terminal electrical characteristics of semiconductor devices including p-n junction and Schottky diodes, bipolar junction and insulated gate field-effect transistors.

EGRE 306. Introduction to Microelectronics. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisites: EGRE 207 and MATH 301, both with a minimum grade of C. This course covers the analysis, modeling and design of electrical circuits which contain electronic devices. Students will learn to design analog circuits to specifications through laboratory problems, a design project and circuit simulation.

EGRE 307. Integrated Circuits. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisites: EGRE 306 and EGRE 337, both with a minimum grade of C. Corequisite: EGRE 336. Analysis, modeling, design and measurement of advanced MOSFET and bipolar analog integrated circuits. Topics include active filters, differential amplifiers, frequency response and feedback topologies. Operational amplifier circuit topologies are used as a means of studying input, gain, level shift and output stages. Circuit design techniques are explored for mixed signal analog-digital circuits. This course provides the opportunity for a group design project of an integrated circuit chip, using advanced software tools for simulation and physical layout.

EGRE 309. Electromagnetic Fields. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGRE 207, MATH 301, MATH 307 and PHYS 208, all with a minimum grade of C. Fundamentals of engineering electromagnetics, including electrostatics, magnetostatics, electrodynamics, analysis and understanding of the phenomena associated with electric and magnetic fields, wave dynamical solutions of Maxwell's equations, reflection and transmission of electromagnetic waves in dielectric materials, waveguides and transmission line structures, and radiation from antennas.

EGRE 310. Microwave and Photonic Engineering. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGRE 309 with a minimum grade of C. Wireless and optical communications applications of electromagnetic fields. Theory of microwave transmission line and waveguiding structures including impedance transformation and matching. Essential concepts from geometrical and physical optics and the interaction of photons with materials will be studied. Operating principles and design considerations of fiber optics, photodetectors and receivers are considered.

EGRE 334. Introduction to Microfabrication. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisites: CHEM 101, MATH 201 and PHYS 208, all with a minimum grade of C. This course gives an overview of microscale device fabrication and testing for a general audience. A wide variety of new terms, equipment and processes are presented. Fundamentals of photolithography, mask making, diffusion, oxidation, ion implantation, film deposition and etching are covered. Laboratory work consists of safety training, hands-on fabrication experience and testing. A laboratory chip test is fabricated from start to finish and then tested. The test chip includes basic integrated circuit elements as well as solar cells.

EGRE 335. Signals and Systems I. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisites: EGRE 206 and 245 and MATH 301, all with a minimum grade of C. Presents the concept of linear continuous-time and discrete-time signals and systems, their classification, and analysis and design using mathematical models. Topics to be covered: the concepts of linear systems and classification of these systems, continuous-time linear systems and differential and difference equations, convolution, frequency domain analysis of systems, Fourier series and Fourier transforms and their application, and continuous-time to discrete-time conversion.

EGRE 336. Introduction to Communication Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGRE 337 with a minimum grade of C. Introduction to the theory and application of analog and digital communications including signal analysis, baseband transmission, amplitude and angle modulation, digital modulation, baseband digital communication, and design considerations.

EGRE 337. Signals and Systems II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGRE 335 with a minimum grade of C. This class presents the Laplace and Z transforms and their application to electrical circuits and discrete-time systems, an introduction to probability, random variables and random processes with applications in electrical engineering.

EGRE 364. Microcomputer Systems. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisites: EGRE 246 and 254, both with a minimum grade of C. Basic computer organization, microprocessor instruction sets and architectures, assembly language programming and the function of computer memory and I/O subsystems will be discussed. The laboratory is designed to reinforce the lectures by providing the opportunity to study the workings of a simple computer system in detail using simulation models and real hardware. Students will write and execute assembly language programs and make use of commercial design automation tools.

EGRE 365. Digital Systems. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisites: EGRE 246 and 254, both with a minimum grade of C. Corequisite: EGRE 364. Focuses on the design of modern digital systems. Topics covered include: introduction to modeling, simulation, synthesis and FPGA design techniques using VHDL; microprocessor peripherals and interfacing; embedded system hardware and software design issues.

EGRE 397. Vertically Integrated Projects in Electrical and Computer Engineering. 1 Hour.
Semester course; 3 laboratory hours. 1 credit. May be repeated for a maximum of 2 credits. Requires permission of the project faculty adviser. Restricted to electrical engineering and computer engineering majors. This course provides undergraduate students the opportunity to participate in multiyear, multidisciplinary projects under the guidance of faculty and graduate students in their areas of expertise. As they address research and development issues, students learn and practice many different professional skills, make substantial technical contributions to the project, and experience many different roles on a large, multidisciplinary design/discovery team.

EGRE 402. Senior Design Studio I (Laboratory/Project Time). 2 Hours.
Semester course; 6 laboratory hours. 2 credits. Prerequisites: EGRE 207, 246, 254 and 335; and completion of three from: EGRE 306, 309, 337 and 364. All prerequisite courses must be completed with a minimum grade of C. Corequisite: any electrical engineering technical elective. Enrollment restricted to students with senior standing in electrical engineering and participation in a senior design (capstone) project. A minimum of six laboratory hours per week dedicated to the execution phase of the senior design (capstone) project, which should meet appropriate engineering standards and multiple realistic constraints. Tasks include team meetings, brainstorming, sponsor advising, designing, fabrications, assembling, reviewing, studying, researching, testing and validating projects.

EGRE 403. Senior Design Studio II (Laboratory/Project Time). 2 Hours.
Semester course; 6 laboratory hours. 2 credits. Prerequisite: EGRE 402 with a minimum grade of C. A minimum of six laboratory hours per week dedicated to the execution phase of the senior design (capstone) project, which should meet appropriate engineering standards and multiple realistic constraints. Tasks include team meetings, brainstorming, sponsor advising, designing, fabrications, assembling, reviewing, studying, researching, testing and validating projects.

EGRE 426. Computer Organization and Design. 3 Hours.
Semester course; 2 lecture and 3 laboratory hours. 3 credits. Prerequisite: EGRE 364 or CMSC 311 with a minimum grade of C. This course presents the foundation for computer design at the register transfer level. Starting from an instruction set architecture, students will learn the process used to design a data path and control unit to implement that instruction set. In addition, the topics of computer components and structures, data paths and control unit organizations, I/O and memory systems, interrupt systems, pipelining, and multiprocessing will be discussed. In addition to reinforcing the lecture material, the laboratory exercises will teach students the art of modeling and designing computer system components using a hardware description language.

EGRE 427. Advanced Digital Design. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisite: EGRE 365 and 426, both with a minimum grade of C. This course provides students with practical foundations for the design, implementation and testing of digital systems. It expands on the digital and computer system theory presented in prerequisite courses. Topics covered include: microcontrollers and embedded processors, application specific IC (ASIC) architectures and implementing digital systems with ACISs, logic families and high-speed interfacing, logic synthesis, design methodologies, hardware/software codesign, production testing and design for testability, and construction, testing and debugging of digital system prototypes. In the laboratory, the students will design, construct, test and debug a multidisciplinary, computer-based hardware/software system to meet appropriate engineering standards and multiple realistic constraints.

EGRE 428. Introduction to Integrated Systems Design. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: EGRE 364 and EGRE 365, both with a minimum grade of C. This course provides an introduction to senior capstone design for computer engineers. Topics include hardware/software project design methodologies, integrated hardware and software design tools, life cycle costs analysis and requirements and specification analysis. Students are also introduced to concepts and design tools for FPGA and system-on-a-chip devices. Lectures are intended to support tasks required to execute a successful senior capstone experience. These tasks include, but are not limited to, project configuration management, customer interaction skills, requirements elicitation, simulation, procurement, design, testing and validation.

EGRE 429. Advanced Digital Systems Design. 3 Hours.
Semester course; 2 lecture and 3 laboratory hours. 3 credits. Prerequisites: EGRE 365 and EGRE 428, both with a minimum grade of C. This course provides students with theoretical and practical foundations for advanced embedded systems design and cyber physical system applications. It extends the concepts introduced in EGRE 418. Special emphasis is placed on the design of advanced embedded computing platforms for cyber physical system applications. Topics covered include: introduction to cyber physical systems; cyber physical systems theory; FPGA and system-on-a-chip design environments; designing, developing and implementing cyber physical systems using FPGA and system-on-a-chip technology; real-time computing and operating systems; real-time sensor networks; engineering design standards; and verification and validation of complex designs. In the laboratory the students will use state-of-the-art system development tools to design, construct, test and verify a system-on-a-chip-based system to meet appropriate engineering standards and multiple realistic system constraints.

EGRE 435. Microscale and Nanoscale Fabrication. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisites: EGRE 306 and EGRE 334, both with a minimum grade of C. This course presents the design tools and techniques for designing a fabrication process as well as a device design and layout for advanced microscale and nanoscale devices. A number of different types of device technologies are covered, incorporating electronic, micromechanical and microfluidic devices and sensors. In the laboratory section of the course, students work in design teams to develop a complete fabrication process and design layout for a microscale device to meet appropriate engineering standards and multiple realistic constraints. Computer simulations and computer-aided design tools are used in the final design. The laboratory section of this course accomplishes the design phase of the senior design capstone project, which is presented at the end of semester and fabricated in the subsequent course, EGRE 436.

EGRE 436. Advanced Microscale and Nanoscale Fabrication. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisite: EGRE 435 with a minimum grade of C. This course presents a detailed analysis of the physics and modeling of the fundamental processes used in semiconductor processing. Emphasis is placed on the non-ideal effects that cause realistic processes to deviate from first order models, including second order effects such as interactions on the atomic level and the influence of crystal defects. Processes covered in detail include oxidation, diffusion, ion implementation, thin film deposition and plasma etching techniques. Student work in design teams in the laboratory section, which focuses on the fabrication and testing of the microscale device developed in EGRE 435. The laboratory section of the course accomplishes the fabrication and testing phase of the senior design capstone project.

EGRE 444. Communication Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGRE 336 with a minimum grade of C. Design and analysis of analog and digital communication systems, pulse modulation, information and digital transmission, digital modulation, information theory and coding will be treated. Emphasis is placed on the student gaining an appreciation for and an understanding of the role of optimization and trade-offs by considering bandwidth requirements, signal-to-noise ratio limitations, complexity and cost of analog and digital communication systems.

EGRE 454. Automatic Controls. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisite: EGRE 337, EGMN 305 or EGMN 315 with a minimum grade of C. For computer engineering or electrical engineering majors, the prerequisite is EGRE 337 with a minimum grade of C.This course covers the design and analysis of linear feedback systems. Emphasis is placed upon the student gaining mathematical modeling experience and performing sensitivity and stability analysis. The use of compensators to meet systems design specifications will be treated. Topics include: an overview and brief history of feedback control, dynamic models, dynamic response, basic properties of feedback, root-locus, frequency response and state space design methods. The laboratory will consist of modeling and control demonstrations and experiments of single-input/single-output and multivariable systems, analysis and simulation using MATLAB/Simulink and other control system analysis/design/implementation software.

EGRE 455. Control Systems Design. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGRE 454 with a minimum grade of C. This course covers the use of state space methods to model analog and digital linear and nonlinear systems. Emphasis is placed on the student gaining mathematical modeling experience, performing sensitivity and stability analysis and designing compensators to meet systems specifications. Topics treated will include a review of root locus and frequency design methods, linear algebraic equations, state variable equations, state space design and digital control systems (principles and case studies). The students will use complex dynamic systems for analysis and design.

EGRE 471. Power System Analysis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGRE 206 with a minimum grade of C. Provides a comprehensive overview of electrical power system operation and design. Students develop models and tools for investigating system behavior and have opportunities for using those tools in design processes. At the completion of the course students will be able to develop appropriate models for an interconnected power system, perform power flow analysis, economic dispatch, power system protection and controls. Students will also be able to write a basic power flow computer program.

EGRE 491. Special Topics. 1-5 Hours.
Semester course; variable hours. 1-5 credits. May be repeated with different topics for a total of 21 credits. Advanced study of a selected topic in electrical or computer engineering. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

EGRE 492. Independent Study in Electrical and Computer Engineering. 1-5 Hours.
Semester course; variable hours. 1-5 credits. May be repeated with different content for a total of 9 credits. Prerequisite: permission of the instructor. Students must submit a written proposal to be approved by the supervising instructor prior to registration. Investigation of specialized electrical or computer engineering problems through literature search, mathematical analysis, computer simulation and/or laboratory experimentation. Written and oral progress reports as well as a final report and presentation are required.

EGRE 497. Vertically Integrated Project in Electrical and Computer Engineering. 2 Hours.
Semester course; 6 laboratory hours. 2 credits. May be repeated for a maximum total of 6 credits. Prerequisites: EGRE 397 and permission of the project faculty adviser. Restricted to electrical engineering and computer engineering majors. This course allows undergraduate students to continue to participate in multiyear, multidisciplinary projects under the guidance of faculty and graduate students in their areas of expertise. As they address research and development issues, students learn and practice many different professional skills, make substantial technical contributions to the project, and experience many different roles on a large, multidisciplinary design/discovery team.

EGRE 521. Advanced Semiconductor Devices. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGRE 303, PHYS 420 and 440, or equivalents or permission of instructor. Studies the fundamentals of semiconductor heterojunctions, metal-semiconductor contacts, metal-oxide-semiconductor structures, defects, interface states, scaled MOS transistors and heterojunction bipolar transistors.

EGRE 525. Fundamentals of Photonics Engineering. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGRE 303, 309 and 310 or equivalents. An introduction to the interaction of electromagnetic lightwaves with solid-state materials. Based on the quantum mechanics of photon emission and absorption, the generation and detection of coherent light by semiconductor lasers and photodetectors are investigated. Optical waveguides also are studies for use in sensors employing interferometric and evanescent-field principles. Examples of integrated photonic sensors are presented for mechanical, chemical and biological systems.

EGRE 526. Computer Networks and Communications. 3 Hours.
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. Crosslisted as: CMSC 506.

EGRE 531. Multicore and Multithreaded Programming. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGRE 364 or CMSC 311 or permission of instructor. Introducing multicore architectures, multithreaded programming models, OpenMP, Pthreads, thread synchronization, performance evaluation and optimization, load balancing and software tools for multicore/multithread programming.

EGRE 532. GPU Computing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CMSC 502, EGRE 531 or permission of instructor. The primary objective of this course is to provide students with knowledge and hands-on experience in developing application software for graphics processing units. The course concentrates on parallel programming basics, GPU hardware architecture and software, GPU programming techniques, GPU performance analysis and optimization, and application development for GPUs.

EGRE 533. VLSI Design. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisites: EGRE 224 and EGRE 364. Analysis of NMOS and PMOS transistor design 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 design 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. 3 Hours.
Semester course; 2 lecture and 3 laboratory hours. 3 credits. Prerequisites: EGRE 337 or consent of instructor. The 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 540. Electromagnetics and Passive RF Components. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGRE 309 or equivalent or permission of instructor. Basics of electromagnetics and passive RF components such as filters, isolators, tuners, phase shifters, resonators and tees are discussed, along with a succinct description of media such as ferrites and tunable ferrites.

EGRE 553. Industrial Control Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: senior or graduate student standing in the School of Engineering, EGRE 246 and EGRE 254, or permission of the instructor. This course provides an introduction to the systems, techniques and languages used in the control of manufacturing and process industries. Major topics include programmable logic controller operation and programming, supervisory control and data acquisition systems, and human machine interfaces. Other topics include an introduction to feedback control systems, analog-to-digital and digital-to-analog conversion, sensors and transducers, and actuators and motors.

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

EGRE 572. Electric Machines. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGRE 206 and EGRE 309. Presents the principles of electric machines, including transformers, AC machinery fundamentals, modeling and simulation of AC machines, synchronous machines, induction machines, DC motors and generators, and special-purpose motors.

EGRE 573. Sustainable and Efficient Power Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGRE 309 or EGRE 471 or permission of instructor. The course covers distributed power generation system and renewable energy technologies. It introduces models and tools for investigating electric power generation and efficiency analysis, the wind and solar power, energy storage, renewable integration, and environmental impacts. At the completion of the course students will be able to apply appropriate models and complete a feasibility study of practical renewable energy systems.

EGRE 591. Special Topics in Electrical and Computer Engineering. 1-4 Hours.
Semester course; variable hours. 1-4 credits. Prerequisite: senior or graduate standing in the School of Engineering or permission of the instructor. 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.

EGRE 620. Electron Theory of Solids. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: PHYS 420 and 440 or permission of instructor. The study of electronic structures, band structure calculations, optical absorption and emission, lasing in semiconductors, electron-photon interactions, heterostructures and nanostructures. Quantum theory of electron-photon interaction, absorption and emission, semiconductor lasers, linear response transport, Landauer Buttiker formulas, mesoscopic devices and phenomena, resonant tunneling, single electronics, non-equilibrium Green's function formalism, second quantization, coupled mode theory, electrons in a magnetic field, and integer quantum Hall effect.

EGRE 621. Spintronics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGRE 620 or equivalent, or with permission of instructor. Basic concept of spin, spin interactions, spin transport, spin-based classical devices, single spintronics and spin-based quantum computing.

EGRE 622. MEMS Design and Fabrication. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGRE 303 and EGRE 334 or permission of instructor. The course provides the background required to conduct research in microelectromechanical systems. The course provides an overview as well as detailed coverage of material properties, specialized fabrication techniques and the fundamental principles of the major classes of MEMS devices. This will include mechanical sensors and actuators, surface acoustic wave devices, optical sensors, modulators and switches, bioMEMS, chemical and biochemical sensors, and microfluidic devices.

EGRE 623. Nanostructures and Nanodevices. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGRE 303, PHYS 420 and 440, equivalents or permission of instructor. Devoted to the fundamentals and technology of semiconductor nanostructures and relevant devices. Engineering and physics of new solid state devices, confined structures in one, two and three dimensions and their effect on more traditional solid state devices are covered.

EGRE 624. Nonlinear Optical Materials and Devices. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGRE 525 or equivalent or permission of instructor. This course describes the principles of nonlinear optics and discusses the operation of photonic devices and systems that utilize various second- and third-order nonlinear optical effects. The topics include electromagnetic wave propagation in anisotropic media, nonlinear optical susceptibility tensor, linear and quadratic electro-optic effects, second harmonic, sum- and difference-frequency generation, phase-matching, parametric amplification, optical switching, multi-photon absorption, and self-focusing and self-phase modulation.

EGRE 625. Clean Room Lab Practicum. 1 Hour.
Semester course; 3 laboratory hours. 1 credit. Prerequisite: EGRE 334 or permission of instructor. The course develops the detailed knowledge and skills required to design and fabricate advanced microscale and nanoscale devices for doctoral thesis work in a micro- and nano-fabrication facility cleanrooms. The course focuses on fabricating a nanostructured device and involves photolithography, wet and dry etching, oxidations, diffusions and thin film depositions. Students will complete the processing of the device and perform characterization experiments. Design skills will also be developed, including design and layout using software tools and fabrication of custom photomasks. Students will document all aspects of the laboratory work.

EGRE 626. Advanced Characterization of Electronic Materials and Devices. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGRE 303 or permission of instructor. This course discusses crystal symmetry in relation with physical properties of crystalline solids, with special emphasis on semiconductor materials forming the basis of modern electronic and optoelectronic devices, point and extended defects and their effects on electronic and optical properties of semiconductor materials and device performance, and defect formation during processing. The course also covers in depth structural, electrical and optical techniques used to reveal various structural defects: the theory and practice of X-ray, neutron and electron diffraction methods, transmission and scanning electron microscopy, scanning probe microscopy, Hall effect, deep-level transient spectroscopy, photo- and cathodoluminescence, and time-resolved spectroscopy, with particular focus on their applications to real semiconductor materials and device structures.

EGRE 627. Nanophotonics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGRE 525 or equivalent or permission of instructor. Advances in nanotechnology and fabrication have allowed scientists to control light like never before, bringing topics of science fiction such as cloaking, unlimited resolution imaging, nanometer-thick optics and breakthrough treatments for disease into the realm of reality. This course explores what is possible when students can confine light at the nanoscale and engineer materials at will, covering topics such as light guiding by metals (plasmonics), optical lattices (photonic crystals), arbitrary materials (meta-materials/surfaces), nanoscale lasers (spasers) and stopping light (static optics). Students are exposed to the newest advances in the field through discussion, projects and presentations.

EGRE 630. Neural Networks. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: permission of instructor. Introduces students to the fundamental theory, design and applications of neural networks. Topics covered will include network architectures, the learning process, types of learning, single layer perceptrons, multilayer perceptrons and neural network applications.

EGRE 631. Real-time and Embedded Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGRE 426 or equivalent or permission of instructor. 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 design challenges of embedded computing, real-time scheduling theory, worst-case execution time analysis, embedded architectures, embedded software design and performance optimizations. Hands-on labs and a research project on advanced topics in this field will be included in this course.

EGRE 632. Dependable Embedded Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGRE 364 or permission of instructor. This course explores the rich set of issues that must be considered when dealing with dependable embedded systems in smart energy delivery, transportation, interconnected health and medical devices and smart buildings, which have one or more of the following attributes: need for safety, continuous reliable operation, resilient to disruptions, secure against cyber-attacks, operate in real-time, maintainable and designed correctly. Among the topics covered are fault-tolerant computing, reliability and safety engineering, understanding the origins of failures and errors, design criteria, software reliability, formal verification of designs, cyber security, review of standards in safety critical systems and social/legal concerns.

EGRE 633. Advanced VLSI Systems Design. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGRE 533. Design techniques, implementation technologies and device design for high speed, large scale and low power integrated circuits. Topics presented include: submicron technologies, devices and architectures for low power VLSI, high speed clocking issues, BiCMOS devices and circuits, I/O circuit design, design for testing, analog VLSI, VLSI design methodologies, and physical design and VLSI algorithms. The course will include a design project for a complex VLSI device which will be performed using commercial design tools.

EGRE 634. Advanced Digital Theory. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGRE 254 or equivalent. Addresses topics and techniques in advanced switching theory that are relevant to the design of modern digital systems. Topics covered include: mathematical foundations, logic functions and their representations, optimization, verification, synthesis, synchronous and asynchronous finite state machines, modular designs, and fault detection.

EGRE 635. Advanced Computer Architecture. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGRE 426 or with permission of instructor. This course will focus on the design and analysis of high performance computer architectures. Topics investigated include pipeline design, superscalar computers, multiprocessors, memory systems, peripherals, interfacing techniques, networks, performance and software issues. Crosslisted as: CMSC 605.

EGRE 636. Introduction to Cyber-Physical Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGRE 335 and EGRE 365 or equivalents or permission of instructor. This course introduces students to the research, design and analysis of cyber-physical systems -- the tight integration of computing, control and communication. The main focus is on understanding existing and emerging models of CPSs, as well as physical processes in terms of differential equations and computational models for discrete time systems, such as extended finite-state machines and hybrid automata. State-charts are introduced and combined with the physical models for analysis of embedded systems. Linear temporal logic is introduced and applied to specify the desired system behavior. Tools for analytical study and verification of the satisfaction of linear temporal logic formulae are presented and discussed in numerous applications. Dependability attributes such as safety, reliability and cyber-security are discussed in the context of high integrity CPSs.

EGRE 640. Semiconductor Optoelectronics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGRE 309 or equivalent or permission of instructor. Discussions of optical processes in semiconductors and semiconductor heterostructures in terms of radiative and nonradiative processes, as well as absorption. Also covers in depth the theory and practice of light-emitting diodes, including those intended for solid-state lighting, lasers and detectors.

EGRE 644. Wireless Communications. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGRE 444 or permission of instructor. The main objective of this course is to introduce the fundamental principles of wireless communications. The focus will be on the physical layer and wireless transceiver design issues. Students are expected to gain a thorough understanding of wireless channel modeling, the concept of channel fading, the means to mitigate the effect of fading through diversity techniques. Some practical wireless communication techniques will also be introduced such as space-time coding, multiple input multiple output communications and orthogonal frequency-division multiplexing.

EGRE 651. Intelligent Linear Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGRE 337 or permission of instructor. This course covers selected topics on intelligent systems and fundamental principles of system analysis. Emphasis is placed on the student gaining mathematical modeling experience, performing computer simulations and designing systems architecture. Topics include intelligent agents, autonomous control, linear algebraic equations for state variable equations, complex dynamic systems, controllability and observability, linear discriminant functions in algorithm-independent optimization, multilayer neural networks, unsupervised learning and clustering, mobile robot localization and kinematics, and perception for planning and navigation.

EGRE 655. Dynamics and Multivariable Control II. 3 Hours.
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. Crosslisted as: MATH 655.

EGRE 656. Estimation and Optimal Filtering. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 310, EGRE 337 and EGRE 555/MATH 555. This course will expose students to the fundamental issues in parameter estimation and recursive state estimation for dynamic systems. Topics covered will include maximum likelihood estimation, maximum a posteriori estimation, least squares estimation, minimum mean square error estimation, Cramer-Rao lower bound, discrete-time Kalman filter for linear dynamic systems, extended Kalman filter for nonlinear problems and system models for the Kalman filter.

EGRE 671. Power System Operations and Controls. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGRE 471 or equivalent. This course covers the fundamental concepts of economic operation and controls of power systems, including real and reactive power balance, optimized generation dispatch, steady state and dynamic analysis, real-time monitoring and controls, and contingency analysis. Upon completion of this course, students will be able to develop equivalent circuits and compute programs for power flow analysis, define and analyze automatic generation control scheme on a power system, develop generation dispatching schemes, define and analyze state estimation of a power system using analysis programs, and perform contingency studies of the grid.

EGRE 691. Special Topics in Electrical and Computer Engineering. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Prerequisites: at least one graduate-level engineering course and permission of instructor. An advanced study of selected topic(s) in electrical and computer engineering. See the Schedule of Classes for specific topics to be offered each semester.

EGRE 692. Independent Study. 1-3 Hours.
Semester course; 1-3 lecture and 1-3 laboratory hours. 1-3 credits. Prerequisites: graduate standing and permission of instructor. The student must identify an electrical and computer engineering faculty member willing to supervise the course and submit a proposal for approval to the electrical and computer engineering graduate committee. Investigation of specialized electrical and computer engineering problems through literature search, mathematical analysis, computer simulations and/or experimentation. Written and oral reports, final report and examination are required.

EGRE 697. Directed Research in Electrical and Computer Engineering. 1-15 Hours.
Semester course; variable hours. 1-15 credits. Prerequisite: graduate standing or permission of instructor. Research directed toward completion of the requirements for the electrical and computer engineering track in the M.S. or Ph.D. in Engineering performed under the direction of an electrical and computer engineering faculty member and advisory committee. Graded as S/U/F.

EMERGENCY MEDICAL SCIENCES AND ADMINISTRATION (EMSA)

EMSA 200. Introduction to EMS Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of Emergency Medical Services systems in the U.S. Examines the 14 attributes of an EMS system to include the history of EMS, public and private organizations, delivery models, personnel, training and integration in the overall health care system.

EMSA 201. Emergency Medical Technician. 3 Hours.
Continuous courses; 4 lecture and 4 laboratory hours. 6-6 credits. Prerequisites: current CPR certification at the Health Care Provider level and permission of instructor; completion of EMSA 201 to enroll in EMSA 202. Students will learn to recognize the nature and seriousness of a patient's condition or extent of injuries, to assess requirements for emergency medical care, and to administer appropriate emergency medical care based on assessment findings of the patient's condition. Includes the lecture and laboratory elements needed to be eligible for certification as a Virginia and/or National Registry EMT-B as defined by the commonwealth of Virginia and the U.S. Department of Transportation's National Curriculum for EMTB.

EMSA 202. Emergency Medical Technician. 3 Hours.
Continuous courses; 4 lecture and 4 laboratory hours. 6-6 credits. Prerequisites: current CPR certification at the Health Care Provider level and permission of instructor; completion of EMSA 201 to enroll in EMSA 202. Students will learn to recognize the nature and seriousness of a patient's condition or extent of injuries, to assess requirements for emergency medical care, and to administer appropriate emergency medical care based on assessment findings of the patient's condition. Includes the lecture and laboratory elements needed to be eligible for certification as a Virginia and/or National Registry EMT-B as defined by the commonwealth of Virginia and the U.S. Department of Transportation's National Curriculum for EMTB.

EMSA 300. Foundations of Paramedic Practice. 4 Hours.
Semester course; 3 lecture and 2 laboratory hours. 4 credits. Open only to EMSA majors. Prerequisites: EMSA 200, 201-202. Foundation course covering medical ethics, medical legal issues, wellness and injury prevention, life span development, and communication with patients. Also reviews the anatomy and physiology of the airway and respiratory system, the assessment and establishment of airway including basic and advanced airway management.

EMSA 310. Clinical Practicum I. 2 Hours.
Semester course; 2 laboratory hours. 2 credits. (90-hour minimum.) Open to EMSA majors only. Corequisites: EMSA 310, 320, 400 and 405. First in a series of three application courses. Requires the student to apply the concepts being learned in the classroom to their patients under the supervision of a preceptor in hospital clinical areas. Covers professional behavior while acquiring and analyzing the patient's history, performing a comprehensive physical examination of different developmental and ethnic groups, performing appropriate medication administration and management of the patient's airway.

EMSA 320. Field Practicum I. 2 Hours.
Semester course; 2 laboratory hours. 2 credits. (90-hour minimum.) Open to EMSA majors only. Corequisites: EMSA 310, 320, 400 and 405. First in a series of three application courses. Requires the student to apply the concepts being learned in the classroom to their patients under the supervision of a preceptor in a mobile intensive care unit. Covers professional behavior while acquiring and analyzing the patient's history, performing a comprehensive physical examination of different developmental and ethnic groups, performing appropriate medication administration and management of the patient's airway. Develops the ability to team lead and manage a basic incident.

EMSA 340. Fundamentals of Pathophysiology. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Open to EMSA majors only. Foundation course for subsequent courses on specific disease processes. Covers cellular metabolism, disease processes, shock, Multi Organ Dysfunction Syndrome (MODS), the immune system and inflammatory response.

EMSA 360. Field Operations and Safety. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Open to EMSA majors only. The student will learn how to manage an incident and implement patient care in the pre-hospital environment. Students will integrate the principals of general incident management, management of mass casualty incidents and the safe rescue of patients from water, below grade, highway and hazardous situations.

EMSA 400. Pincipals of Pharmacology. 4 Hours.
Semester course; 3 lecture and 2 laboratory hours. 4 credits. Open to EMSA majors only. Presents the classification of pharmaceuticals, pharmacokinetics and pharmacodynamics of medications. Integrated discussion of agents used for the peripheral and central nervous systems, and respiratory, cardiovascular, gastrointestinal and endocrine systems are addressed. Integrates these agents with the pathophysiology of each body system to form a plan for management and administration. The application of drug dosage calculations, medication preparation, sterile technique and standard precautions for the preparation and administration of medications.

EMSA 401. Pediatric Advanced Life Support (PALS). 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: certification/licensure as a paramedic, R.N., M.D., D.O., dentist, physician's assistant, or enrolled as a paramedic, medical or nursing student. A comprehensive course that emphasizes early recognition of pre-arrest states and the prevention of cardiopulminary arrest according to American Heart Association guidelines. Covers relevant priorities and techniques that enable effective intervention in pediatric resuscitation by physicians, nurses, paramedics and other health care workers who are licensed to do advanced practice intervention, including airway management, vascular access and intravenous fluid and medication administration.

EMSA 402. Advanced Cardiac Life Support (ACLS). 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: certification/licensure as a paramedic, R.N., M.D., D.O., dentist, physician's assistant, or enrolled as a paramedic, medical or nursing student. A comprehensive course that emphasizes early recognition of pre-arrest states and the prevention of cardiopulminary arrest according to American Heart Association guidelines. Covers relevant priorities and techniques that enable effective intervention in adult cardiac resuscitation by physicians, nurses, paramedics and other health care workers who are licensed to do advanced practice intervention, including airway management, vascular access and intravenous fluid and medication administration.

EMSA 405. Advanced Patient Assessment. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Open to EMSA majors only. Covers the acquisition and analysis of patients' histories and advanced physical assessments. Encompasses normal and abnormal variations of different developmental and ethnic groups to perform a comprehensive history and physical to form a clinical diagnosis. Incorporates appropriate documentation and communication through written, verbal and direct patient contact.

EMSA 411. Clinical Practicum II. 2 Hours.
Semester course; 2 laboratory hours. 2 credits. (90-hour minimum.) Open to EMSA majors only. Corequisites: EMSA 340, 360, 441 and 443. Requires the student to apply the concepts being learned in the classroom to their patients under the supervision of a preceptor in hospital clinical areas. Covers professional behavior while acquiring and analyzing the patient's history, performing a comprehensive physical examination of different developmental and ethnic groups, performing appropriate medication administration and management of the patient's condition.

EMSA 412. Clinical Practicum III. 2 Hours.
Semester course; 2 laboratory hours. 2 credits. (90-hour minimum.) Open to EMSA majors only. Corequisites: EMSA 430, 440, 442 and 450. Requires the student to apply the concepts being learned in the classroom to their patients under the supervision of a preceptor in hospital clinical areas. Covers professional behavior while acquiring and analyzing the patient's history, performing a comprehensive physical examination of different developmental and ethnic groups, performing appropriate medication administration and management of the patient's condition.

EMSA 421. Field Practicum II. 2 Hours.
Semester course; 2 laboratory hours. 2 credits. (90-hour minimum.) Open to EMSA majors only. Corequisites: EMSA 340, 360, 441 and 443. Focuses on the patient presenting with cardiopulminary, obstetrical and gynecological pathologies, and pediatric patients, under the supervision of a preceptor in a mobile intensive care unit. Requires the synthesis of the assessment of the pathology to form a clinical diagnosis and treatment plan for each patient. Demonstrates the ability to assess, perform and coordinate advanced patient care under supervision.

EMSA 422. Field Practicum III. 2 Hours.
Semester course; 2 laboratory hours. 2 credits. (90-hour minimum.) Open to EMSA majors only. Corequisites: EMSA 430, 440, 442 and 450. Focuses on the patient presenting with medical complaints or traumatic injury patients under the suoervision of a preceptor in a mobile intensive care unit. Requires the synthesis of the assessment of the pathology to form a clinical diagnosis and treatment for each patient. Demonstrates the ability to assess, perform and coordinate advanced patient care under supervision.

EMSA 430. Trauma. 4 Hours.
Semester course; 3 lecture and 2 laboratory hours. 4 credits. Open to EMSA majors only. A comprehensive course integrating the anatomy, pathophysiology, epidemiology, mortality and morbidity of trauma. Covers the structure of trauma care systems, kinematics and epidemiology of trauma. Integrates the assessment, clinical diagnosis, development and application of a management plan for patients with hemorrhage, shock, burns, head, thoracic, abdominal, musculoskeletal and spinal injuries.

EMSA 440. Medical Emergencies. 4 Hours.
Semester course; 4 lecture hours. 4 credits. Open to EMSA majors only. Integrates the assessment, clinical diagnosis, development and application of a management plan for patients with needs in the following systems: endocrine, gastrointestinal, urological, neurological and hematological. Will also encompass patients presenting with toxicological, environmental and behavioral/psychiatric emergencies.

EMSA 441. Basic Electrocardiography. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Permission of instructor required. Reviews the relevant anatomy, physiology and electrophysiology of the cardiac system. The acquisition, interpretation and diagnosis of cardiac dysrhythmias using three-lead electrocardiograms will be covered.

EMSA 442. Advanced Electrocardiography. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisites: EMSA 441 or equivalent and permission of instructor. Reviews the relevant anatomy, physiology and electrophysiology of the cardiac system. The acquisition, interpretation and diagnosis of cardiac dysrhythmias using 12-lead electrocardiograms will be covered.

EMSA 443. Cardiopulmonary Medicine. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Open to EMSA majors only. A comprehensive course integrating the anatomy, pathophysiology, epidemiology, mortality and morbidity of cardiopulmonary pathologies into the assessment, clinical diagnosis, development and application of a management plan.

EMSA 445. Assessment-based Management. 4 Hours.
Semester course; 4 lecture hours. 4 credits. Open to EMSA majors only. Students will synthesize and integrate the pathophysiological principles with assessment results to formulate a clinical impression, then develop and implement an appropriate treatment plan on a programmed patient or manikin. Patient complaints will be inclusive of the materials presented in previous courses for pediatric, adult and geriatric patient populations.

EMSA 450. Obstetrics, Gynecology and Pediatrics. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Open to EMSA majors only. A comprehensive course integrating the anatomy, pathophysiology, epidemiology, mortality and morbidity of women and children into the assessment, clinical diagnosis, development and application of a management plan for women with gynecological emergencies, normal pregnancies and deliveries, and abnormal pregnancies and deliveries. Will also integrate the assessment, diagnosis and management of the neonatal and pediatric patient for medical and traumatic injuries and illness.

EMSA 460. EMS Operations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Topics presented include medical incident command, national incident management systems, post-9/11 issues and needs, interoperation with other agencies, interoperability of communications between agencies, deployment methods, OSHA regulations at incident scenes and field supervision.

EMSA 461. EMS Supervision and Human Resources. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The principles of personnel management and processes for effective EMS organizations are explored. Employment regulations, job analysis, performance assessment, recruitment and retention, training and development, employee and labor relations. Also presented are the factors and processes relating to paid and volunteer personnel, medical directors, shift schedules and general personnel issues.

EMSA 462. Management of EMS Organizations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines theory, processes and techniques needed to manage the EMS agency. Will address regulatory, management, finance, reimbursement, legislation, regulation and other contemporary issues affecting EMS organizations.

EMSA 463. Legal Issues in Health Care. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines basic principles and practices of law affecting EMS operations of ground and air transport systems. Topics will include the legal aspects of patient care and treatment, medical services, and hospital-patient related functions and health care and public safety employment law.

EMSA 464. Research and Quality Improvement. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A review of published research in EMS. Selected studies will be reviewed with respect to their methodology, statistics, measurement and design. Basic research principles, scientific theory and the ability to critically interpret peer-reviewed literature will be emphasized.

EMSA 465. EMS Education. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The principles of adult education and training will be presented. Topics will include domains of learning, principles of adult learning, construction of lesson plans and use of current technology for presentation of content. Dealing with barriers to effective education and special considerations for non-traditional teaching and learning settings will be presented. Students will prepare and function as assistant instructors in other EMS education programs.

EMSA 466. Injury Prevention and Control. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introduction to public health principles and an overview of injury prevention principles for EMS personnel and the community. Review of epidemiological principles and patterns of injuries related to occupation, transportation, interpersonal violence and related incidents. Emphasis will be placed on prevention of injuries. The success of fire prevention will be explored as an example. The role of public health and EMS in the post-9/11 world will be examined.

EMSA 470. Summative Field Internship. 1 Hour.
Semester course; 1 laboratory hour. 1 credit. (45-hour minimum.) May be repeated. Open to EMSA majors only. This is an evaluation of the student's ability to assess, perform and coordinate advanced patient care without the assistance of the preceptor.

EMSA 471. Summative Senior Seminar. 3 Hours.
Semester course; 3 credits. Open to EMSA majors only. The synthesis, integration and evaluation of the student's entire paramedic curriculum experience. Provides students with the opportunity to review and present their ability to assess, perform and coordinate advanced patient care. Prepares the student for transition into the profession.

EMSA 472. Professional Issues in EMS. 3 Hours.
Semester course; 3 credits. Open to EMSA majors only. Provides an overview of the current and potential issues facing EMS. Discussions and assignments are designed to enable the student to investigate and report on issues affecting delivery of health care, patient and provider safety, cost of care, research, legislation and issues affecting staffing and personnel.

EMSA 474. Critical Care Transportation Provider I. 3 Hours.
Semester course; 3 credits. Designed for the experienced paramedic or registered nurse. Objective is to offer formal training in the concepts and essential skills required for the treatment of critical care patients by ground or aeromedical mode. Topics covered include: flight physiology, aeromedical considerations, medical legal aspects, X-ray interpretation, lab data interpretation, hemodynamic monitoring, advanced airway management and mechanical ventilation, and a review of pathologies, assessment and management of medial and traumatically injured patients. Students must be paramedics, R.N.s or advanced providers and should have ALS certification for more than two years with current certification in ACLS, trauma life support, PALS and BLS health care provider.

EMSA 475. Critical Care Transportation Provider II. 3 Hours.
Semester course; 3 credits. A continuation of the concepts and ideas covered in EMSA 474.

EMSA 476. Critical Care Transport Provider Practicum. 1-3 Hours.
Semester course; variable hours. 1-3 credits. Prerequisite: completion of EMSA 474. May be taken concurrently with EMSA 475. Focuses on the patient with complicated multisystem health problems in the critical care environment. Provides an opportunity for observation and integration of classroom concepts in a critical care area.

EMSA 491. Special Topics. 4 Hours.
Semester course; variable hours. 1-4 credits. A study of selected topics in EMSA. See the Schedule of Classes for specific topics to be offered each semester.

EMSA 492. Independent Study. 1-4 Hours.
Semester course; variable hours. 1-4 credits. An independent study of selected topics in EMSA.

ENDODONTICS (ENDO)

ENDO 522. Introduction: Specialty of Endodontics. 2 Hours.
Semester course; 96 laboratory hours. 2 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. 1 Hour.
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. 1 Hour.
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. 3.5 Hours.
Semester course; 58 lecture hours. 3.5 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 622. Principles of Endodontics. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Covers the basic principles of endodontics in preparation for clinical endodontics.

ENDO 623. Principles of Endodontics Lab. 1.5 Hour.
Semester course; 4 laboratory hours. 1.5 credits. This lab course teaches the basic technical skills of endodontics in preparation for clinical endodontics.

ENDO 650. Endodontic Topic Literature Review. 3.5 Hours.
Semester course; 58 seminar hours. 3.5 credits. May be repeated for credit. 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. 1.5 Hour.
Semester course; 28 seminar hours. 1.5 credits. May be repeated for credit. 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. 1 Hour.
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. 1 Hour.
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 680. Clinical Endodontics. 1-5 Hours.
Semester course; 153 clinical sessions. Variable for 1-5 credits. Must be taking both fall and spring of the first and second years of the program for 5 credits each semester. May be taken in additional semesters as needed to complete clinical training; credit will vary based on circumstances. 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.

ENDO 700. Senior Selective in Advanced Clinical Endodontics. 1 Hour.
Semester course; 4 clinical hours per week. 1 credit. Prerequisites: successful completion of ENDO 622 (sections .01 and .02), ENDO 731, ENDO 739 and permission of the course director. This clinical course is designed to develop advanced skills in treating endodontic cases beyond the scope of those expected in basic clinical competency of a dental student.

ENDO 731. Endodontic Therapy. 1 Hour.
Semester course; 1 lecture contact hour. 1 credit. An application course designed for the student to gain experience and demonstrate proficiency in the application of clinical endodontic knowledge to the diagnosis and management of complex clinical endodontic problems. Emphasis is placed on differential diagnosis and management of clinical endodontic problems. This course builds on the principles of diagnosis and treatment of disease of the pulp and periradicular tissues and injuries of the dental pulp. This course continues to place emphasis on the prevention of disease and maintenance of the normal pulpodentin complex.

ENDO 739. Clinical Endodontics III. 1.5 Hour.
Yearlong clinical course. 1.5 credits. Designed to develop clinical skills and provide experience in the diagnosis, treatment planning, treatment, prognosis, follow-up care and clinical patient management in cases involving the pulp and periradicular tissues. Emphasis is placed on the management of common clinical problems that may be encountered in the general practice of dentistry. This course emphasizes and elaborates on the rationale and treatment techniques presented in the D-2 didactic and laboratory course.

ENDO 749. Clinical Endodontics IV. 1.5 Hour.
Yearlong course; 1 clinic session per week.1.5 credits. This course is designed to enhance the student's clinical experience in the field of endodontics, to include patient management, treatment planning, endodontic treatment modalities, consultation with other health care professionals and referral to appropriate dental specialists. Emphasis is placed on the management of common clinical endodontic problems that may be encountered in the general practice of dentistry. The course will run the spring and fall semester of the dental student's fourth year. Guidance from faculty will encourage the student to synthesize and integrate techniques taught in previous endodontic courses and labs into a logical and systematic approach to the delivery of quality endodontic care to the patients. Students receive CO grading in the fall and a pass or fail grade and earned credit in the spring.

ENGINEERING (ENGR)

ENGR 101. Introduction to Engineering. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisites: admission to the School of Engineering or permission of instructor. Introduces basic circuits including resistors, diodes, transistors, digital gates and motors. Simple electromechanical systems are considered including motors, gears and wheels. The laboratory introduces fundamental circuit testing and measurement, and proper laboratory notebook writing; students are required to analyze, build and test a digitally controlled robot.

ENGR 111. Innovation Shop Training I. 0.5 Hours.
Semester course; 1 laboratory hour. 0.5 credits. Enrollment restricted to students in the School of Engineering. The course provides training on innovation shop safety, includes a tour of the shop, measuring and layout tools and techniques, use of general manual and powered hand tools. Students will be instructed on the use of a bench-top drill press, deburring and finishing tools, 3D printing, laser engraving and thermoforming equipment. Students need to achieve a minimum score of 76% in the class to attain Level I (Blue) certification. Only certified students have permission to use tools and equipment covered in this training. Graded as Pass/Fail.

ENGR 121. Engineering Fundamentals. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: permission of instructor. Open only to non-engineering majors in Certificate in Product Innovation program. Introduces engineering fundamentals to students from non-engineering disciplines. Particular focus is the engineering problem-solving process as applied to open-ended problems. Students will be introduced to the different types of engineering, examine engineering issues and apply the engineering problem-solving process.

ENGR 211. Innovation Shop Training II. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Prerequisite: ENGR 111. Enrollment restricted to students in the School of Engineering. The course provides training on machine/innovation shop safety, blueprint reading, measuring and layout tools and techniques, and use of general and powered hand tools. Students will be instructed on sawing, sanding, drilling and tapping operations, 3D printing and laser engraving/cutting equipment. Hands-on graded assignment is the part of the course.

ENGR 291. Special Topics in Engineering. 1-5 Hours.
Semester course; variable hours. 1-5 credits. Prerequisite: to be determined by the instructor. Specialized topics in engineering designed to provide a topic not covered by an existing course or program. General engineering or multidisciplinary. May be repeated with different content. Graded as pass/fail or normal letter grading at the option of the instructor. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

ENGR 296. Part-time Internship Experience. 0 Hours.
Semester course; 0 credit. Students may attempt this course a total of six times. Enrollment restricted to School of Engineering majors. The student works part time in an approved internship and must work a minimum of 90 hours, but less than 300 hours during the semester. The student works to meet learning objectives while gaining practical experience relevant to their major. The student completes assignments to document, assess and reflect on their learning experience. The supervisor and student both complete evaluations of the learning experience. Graded pass/fail.

ENGR 303. Junior Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: permission of instructor. This course provides students an opportunity to explore business and leadership topics. Topics include the fundamentals of product design and new product development, manufacturing and quality systems, finances and financial reports, ethics in the workplace, intellectual property, teamwork, leadership and communications. Students will be assigned selected readings, written compositions and oral presentations. This course prepares the student to participate in the Engineering Laboratory/Manufacturing Internship.

ENGR 311. Innovation Shop Training III. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Prerequisite: ENGR 211. Enrollment is restricted to students with Level II (Red) certification. The Level III (Green) course provides basic training on set-up and operation of manual milling machines and the lathe. The course covers cutting tool, speed and feed calculation. Students must develop a technological process and machine metal parts per assigned drawings on vertical mill and lathe. They will also use other techniques and equipment that were covered in previous levels. Students need to achieve a minimum score of 76 % in the class to attain Level III (Green) certification. Only certified students have permission to use tools and equipment covered in this training.

ENGR 395. Professional Development. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Restricted to School of Engineering majors. Professional development course to help prepare students to find a job and succeed in a professional environment, and specifically to work as an intern or in a cooperative education position. Topics covered include career paths; job searches; resume and cover letter writing; preparing for the interview; personal assessment of interests, values and strengths; networking; professional and ethical behavior on the job; overview of legal issues related to hiring, such as nondisclosure agreements and noncompete clauses; overview of personal finance management at the first job; workplace safety; and expectations and requirements for internships and cooperative education positions.

ENGR 396. Internship Experience. 0 Hours.
Semester course; 0 credit. Students may attempt this course a total of three times. Enrollment restricted to School of Engineering majors. The student works in an approved internship and must work a minimum of 300 hours during the semester. The student works to meet learning objectives while gaining practical experience relevant to their major. The student completes assignments to document, assess and reflect on their learning experience. The supervisor and student both complete evaluations of the learning experience. Graded pass/fail.

ENGR 398. Cooperative Education Experience. 0 Hours.
Semester course; 0 credits. Students may attempt this course a total of four times. Prerequisite: ENGR 395. Restricted to School of Engineering majors in good academic standing. The student works full-time in an approved cooperative education position. The student works to meet specific learning objectives while gaining practical experience relevant to their major. The student completes assignments to document, assess and reflect on their learning experience. The supervisor/mentor and student both complete midterm and final evaluations of the learning experience. Graded pass/fail.

ENGR 399. Cooperative Education Experience II. 3 Hours.
Semester course; 3 credits. Prerequisite: ENGR 398. Restricted to School of Engineering majors in good academic standing. A student that has completed at least one work term in a full-time approved cooperative education position completes an additional full-time work term. The student works to meet specific learning objectives while gaining practical experience relevant to their major. The student completes assignments to document, assess and reflect on their learning experience. The supervisor/mentor and student both complete midterm and final evaluations of the learning experience.

ENGR 402. Senior Design Studio (Seminar). 1 Hour.
Continuous courses; 1 lecture hour. 1-1 credit. Prerequisites: senior standing and participation in a senior design (capstone) project; completion of ENGR 402 to enroll in ENGR 403. This weekly seminar presents and discusses topics relevant to senior-level engineering students in support of the capstone project and upcoming graduation. A single course coordinator manages and administers the course and schedules the various faculty lectures and guest speakers. Topics include, but are not limited to, the following: proposal writing, project planning and management, scheduling resources and budgeting for technical projects, patents and intellectual property, quality systems (six sigma, ISO standards, statistical process control), entrepreneurship, creativity and innovation and professional registration.

ENGR 403. Senior Design Studio (Seminar). 1 Hour.
Continuous courses; 1 lecture hour. 1-1 credit. Prerequisites: senior standing and participation in a senior design (capstone) project; completion of ENGR 402 to enroll in ENGR 403. This weekly seminar presents and discusses topics relevant to senior-level engineering students in support of the capstone project and upcoming graduation. A single course coordinator manages and administers the course and schedules the various faculty lectures and guest speakers. Topics include, but are not limited to, the following: proposal writing, project planning and management, scheduling resources and budgeting for technical projects, patents and intellectual property, quality systems (six sigma, ISO standards, statistical process control), entrepreneurship, creativity and innovation and professional registration.

ENGR 410. Review of Internship. 1 Hour.
Semester course; 1 credit. Prerequisites: chemical, electrical and computer, or mechanical engineering major and experience to satisfy the engineering internship requirements. Students complete oral presentations and written reports summarizing the internship experience.

ENGR 411. Fundamentals of Engineering Exam Preparation. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: senior or graduate standing, or permission of instructor. This course prepares students for taking the fundamentals of Engineering Exam. Passing the FE Exam is the first step to getting a Professional Engineering license. This course is not intended to teach the various subject matters, but to review the subject areas and help students prepare as well as possible for the examination.

ENGR 490. Engineering Seminar. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May be repeated with different content. Prerequisite: permission of the instructor. A series of specialized topics in engineering that are of general interest but not covered by an existing course or program. Lectures will be presented in seminar format by speakers from business, industry, government and academia. Subjects will be multidisciplinary in nature. Graded as pass/fail or normal letter grading at the option of the instructor.

ENGR 491. Special Topics in Engineering. 1-5 Hours.
Semester course; variable hours. 1-5 credits. Prerequisite: determined by the instructor. Specialized topics in engineering designed to provide a topic not covered by an existing course or program. General engineering or multidisciplinary. May be repeated with different content. Graded as pass/fail or normal letter grading at the option of the instructor. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

ENGR 492. Independent Study in Engineering. 1-5 Hours.
Semester course; variable hours. 1-5 credits. May be repeated with different content. Prerequisite: permission of the instructor. Students must submit a written proposal to be approved by the supervising instructor prior to registration. Investigation of specialized engineering problems that are multidisciplinary or of general interest through literature search, mathematical analysis, computer simulation and/or laboratory experimentation. Written and oral progress reports as well as a final report and presentation are required. Graded as pass/fail or normal letter grading at the option of the instructor.

ENGR 496. Internship Review. 0 Hours.
Semester course; 0 credits. Prerequisite: ENGR 296 or ENGR 396. Restricted to School of Engineering majors. This course is to be taken following the completion of a minimum of 300 hours of approved internship experience relevant to the student's major and documents that a student has fulfilled all internship requirements, including a final evaluation by the employer, a final self-evaluation, a final report describing the experience and a final oral presentation about the experience. Graded pass/fail.

ENGR 497. Vertically Integrated Projects. 1,2 Hour.
Semester course; 3 or 6 laboratory hours. 1 or 2 credits. May be repeated for a maximum total of 8 credits Prerequisites: permission of the project faculty adviser. This course provides undergraduate students the opportunity to participate in multiyear, multidisciplinary projects under the guidance of faculty and graduate students in their areas of expertise. As they address research and development issues, students learn and practice many different professional skills, make substantial technical contributions to the project, and experience many different roles on a large, multidisciplinary design/discovery team. Students must earn a minimum of 4 credits in ENGR 497 with a minimum grade of C in order for these credits to be eligible to count toward a technical or departmental elective. More restrictive requirements may be imposed by individual departments.

ENGR 498. Review of Cooperative Education Experience. 0 Hours.
Semester course; 0 credits. Prerequisite: ENGR 398. Restricted to School of Engineering majors. This course is completed following the final work term of a cooperative education experience and is required to obtain transcript notation to document that a student has fulfilled all the requirements of the school's cooperative education program. The requirements include a final evaluation by the employer, a final self-evaluation, a final report describing the experience and a final oral presentation about the experience.

ENGR 591. Special Topics in Engineering. 1-4 Hours.
Semester course; 1-4 credits. Prerequisite: senior or graduate standing in the School of Engineering, or permission of the instructor. 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. 1 Hour.
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. 1-4 Hours.
Semester course; 1-4 lecture hours. 1-4 credits. 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. 1-3 Hours.
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. 1-15 Hours.
Semester course; variable hours. 1-15 credits. Research directed toward completion of the requirements for M.S. and Ph.D. in Engineering degrees under the direction of engineering faculty and an advisory committee. Graded S/U/F.

ENGLISH (ENGL)

ENGL 201. Western World Literature I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 112 or both ENGL 295 and HONR 200. An introduction to the literature of Western cultures from the ancient world through the Renaissance, emphasizing connections among representative works.

ENGL 202. Western World Literature II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 112 or both ENGL 295 and HONR 200. An introduction to the literature of Western cultures from the end of the Renaissance to the present, emphasizing connections among representative works.

ENGL 203. British Literature I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 112 or both ENGL 295 and HONR 200. An introduction to the literature of the British Isles from the Middle Ages through the 18th century, emphasizing connections among representative works.

ENGL 204. British Literature II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 112 or both ENGL 295 and HONR 200. An introduction to the literature of the British Isles from the late 18th century to the present, emphasizing connections among representative works.

ENGL 205. American Literature I. 3 Hours.
Semester courses; 3 lecture hours. 3 credits. Prerequisite: UNIV 112 or both ENGL 295 and HONR 200. An introduction to the literature of the United States from its origins through the 1860s, emphasizing connections among representative works.

ENGL 206. American Literature II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 112 or both ENGL 295 and HONR 200. An introduction to the literature of the United States from the 1860s to the present, emphasizing connections among the representative works.

ENGL 211. Contemporary World Literature. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 112 or both ENGL 295 and HONR 200. A study of selected literature published in the past 25 years and chosen from a number of different nations and cultures. Crosslisted as: INTL 211.

ENGL 215. Reading Literature. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An inquiry into literary and cultural texts, emphasizing critical thinking and close reading. Individual sections may survey a portion of literary history or focus on a theme or unifying question.

ENGL 236. Women in Literature. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 112 or both ENGL 295 and HONR 200. An introduction to literature by and/or about women. Crosslisted as: GSWS 236.

ENGL 250. Reading Film. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Develops students' visual literacy by exploring and analyzing the various elements of film (cinematography, lighting, editing, art direction, acting and sound, among others). Examples will be drawn from both U.S. and world cinema and from all eras of filmmaking.

ENGL 291. Topics in Literature. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Maximum 6 credits in all topics courses at the 200 level. Prerequisite: UNIV 112 or both ENGL 295 and HONR 200. An introduction to literature through the in-depth study of a selected topic or genre. See the Schedule of Classes for specific topics to be offered.

ENGL 295. The Reading and Writing of Fiction and Poetry. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introduction to the basic elements of writing poetry and fiction, using published examples of contemporary fiction and verse as guides in the study of literary form and the production of original creative writing. Students will be offered a practitioner's perspective on genre conventions and the process of revision.

ENGL 301. Introduction to the English Major. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: UNIV 200 or HONR 200, and ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. Study of literature focused on skills helpful in the English major, introducing students to the ways in which language is used in literary texts and to the practice of writing responses to those texts. Texts will represent at least two genres (drama, poetry, prose). This course should be taken at the beginning of the student's major, preferably before completing more than six hours of other upper-level English courses. Majors are required to take ENGL 301; they must achieve a minimum grade of C to complete the requirement.

ENGL 302. Legal Writing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: UNIV 200 or HONR 200, and ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. Intensive practice in writing on subjects related to law or legal problems. Emphasis on organization, development, logical flow and clarity of style. May not be used to satisfy the literature requirement of the College of Humanities and Sciences. Crosslisted as: CRJS 302.

ENGL 303. Writing for Stage and/or Screen. 3 Hours.
Semester course; 3 workshop hours. 3 credits. Prerequisites: UNIV 200 or HONR 200, and ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. A workshop in playwriting or screenwriting primarily for students who have not yet completed a full-length dramatic work. Students will present a portfolio of work at the end of each course.

ENGL 304. Advanced Writing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: UNIV 200 or HONR 200, and ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. An advanced study of informative and persuasive prose techniques, with attention to the relationships among content, form and style. May not be used to satisfy the literature requirement of the College of Humanities and Sciences.

ENGL 305. Writing Poetry. 3 Hours.
Semester course; 3 workshop hours. 3 credits. Prerequisites: UNIV 200 or HONR 200, and ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. An introduction to the craft of writing poetry. Students will explore the elements of poetic technique and produce a volume of quality work.

ENGL 307. Writing Fiction. 3 Hours.
Semester course; 3 workshop hours. 3 credits. Prerequisites: UNIV 200 or HONR 200, and ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. A fiction workshop primarily for students who have not produced a portfolio of finished creative work. Students will present a collection of their work at the end of each course.

ENGL 309. Writing Creative Nonfiction. 3 Hours.
Semester course; 3 workshop hours. 3 credits. Prerequisites: UNIV 200 or HONR 200, and ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. A creative nonfiction workshop primarily for students who have not produced a portfolio of finished creative work. Students will present a collection of their work at the end of each course.

ENGL 310. Business and Technical Report Writing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: UNIV 200 or HONR 200, and ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. Development of critical writing skills used in business, science, technology and government, including instructions, descriptions, process explanations, reports, manuals and proposals. The course will include such topics as communication theory, technical style, illustrations, formats for proposals, reports and manuals.

ENGL 311. Introduction to Literary Theory. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. Introduces students to the variety of critical methods that are sometimes employed — often subconsciously or habitually — in writing about literature. Requires students to think abstractly and theoretically about the nature of the literary text, but it also gives students valuable practice in mastering different critical methods through close engagements with short stories, poems and plays.

ENGL 320. Early Literary Traditions. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. A study of early and medieval literature such as epic, romance, saga or lyric poetry written in England or influencing English literature prior to 1500.

ENGL 321. English Drama From 900 to 1642. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. A study of the origin of the English drama and its development until the closing of the theaters in 1642, exclusive of Shakespeare.

ENGL 322. Medieval Literature: Old English to Middle English. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. A study of texts in Old and Middle English, and the literary and cultural traditions that influence the rise of English literature over 500 years from the early to the High Middle Ages, or from Bede and Beowulf to Chaucer.

ENGL 324. Late Medieval Literature. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. An introduction to the literature of the 15th and 16th centuries. Works surveyed will likely include those of Langland, Julian of Norwich, Kempe, Malory, Henryson, Skelton, More, Tyndale, Foxe, Surrey, Spenser and Sidney.

ENGL 325. Early Modern Literature. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. An introduction to the literature of the 16th and 17th centuries, which may include Sidney, Spenser, Donne, Jonson, Lanyer, Wroth, Phillips, Cavendish, Bradstreet, Hutchinson, Milton and Bunyan.

ENGL 326. Shakespeare in Context. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. Examines selected works of Shakespeare in historical, political, sociocultural, literary and/or other contexts.

ENGL 330. Restoration and 18th-century Drama. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. A study of English drama from 1660-1777, usually including the comedy of manners, sentimental comedy, ballad opera, farce and heroic and bourgeois tragedy.

ENGL 331. Restoration and 18th-century British Literature. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. A survey of representative poetry, drama and prose from the Restoration and 18th century, usually including Behn, Dryden, Pope, Swift, Johnson and Gay.

ENGL 332. 18th-century British Novels and Narratives. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. A study of the British narratives in the long 18th century, usually including Defoe, Richardson, Fielding, Burney, Sterne, Austen, Radcliffe and Walpole.

ENGL 335. British Literature of the Romantic Era. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. Exploration of the literature and the cultural phenomenon of Romanticism in Britain during the years 1783-1832, with reading from poets such as Blake, Wordsworth, Byron and Shelley, and from a variety of other writers.

ENGL 336. 19th-century British Novels and Narratives. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. A study of British narratives of the 19th century, usually including Austen, Dickens, Thackeray, the Brontes, George Eliot and Hardy.

ENGL 337. Victorian Poetry. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. A survey of the poetry of Victorian Britain, usually including Tennyson, the Brownings, Arnold and the pre-Raphaelites.

ENGL 340. Early 20th-century British Literature. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. Representative British and Irish poetry, fiction and drama of the early 20th century, including such writers as Yeats, Joyce, Shaw, Lawrence, Conrad, Auden, Forster and Woolf.

ENGL 341. British Literature and Culture After 1945. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. A British studies course that surveys writing in Britain and Ireland since the mid-20th century, with emphasis on social, economic and ideological contexts. Includes such authors as William Golding, Doris Lessing, Seamus Heaney, Harold Pinter, Philip Larkin, Iris Murdoch, Kazuo Ishiguro, Salman Rushdie and Carol Ann Duffy.

ENGL 342. The Modern Novel. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. An examination of the novel, chiefly British and European, in the 20th century.

ENGL 343. Modern Poetry. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. A study of British and American poetry in the first half of the 20th century.

ENGL 344. Modern Drama. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. A study of the development of Continental, English and American drama since Ibsen.

ENGL 345. Contemporary Poetry. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. A study of British and American poetry from approximately 1945 to the present for the purpose of determining the aesthetic and thematic concerns of contemporary poets.

ENGL 347. Contemporary Literature. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. A study of internationally prominent texts in various genres produced during the past 30 years. Familiarizes students with distinctive properties of literary expression that have emerged in this period, such as the political, historical, economic and social influences that have shaped literary production.

ENGL 352. Feminist Literary Theory. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. The study of contemporary feminist thought and feminist approaches to analyzing literature and culture. This course examines the history and development of feminist theory as a methodology in the humanities, explores several of the major theoretical trends of the past 30 years and examines applications of feminist theory to specific works of literature. Crosslisted as: GSWS 352.

ENGL 353. Women Writers. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated once when a different group of writers is studied. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. A study of selected literature written by women and about women writers. Crosslisted as: GSWS 353.

ENGL 354. Queer Literature. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. A study of queer literature. Considers issues of history, theory, aesthetics, politics, authorship and interpretive communities and examines the intersection of social identities with particular attention to race/ethnicity, sex, sexual orientation, gender expression, class and/or nationality. Crosslisted as: GSWS 354.

ENGL 355. African-American Women Writers. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. Surveys the African-American women's literary tradition from slavery to the present. Explores the variety of ways African-American women writers gained self-expression in the midst of gender and race oppression. Also explores the rise of black feminist discourse in the U.S. as a project of reclaiming and giving voice to writers who had previously been silenced or suppressed.

ENGL 361. The Bible as Literature. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Literary aspects of the Bible will be considered. Also, attention will be given to the history of the English Bible. Crosslisted as: RELS 361.

ENGL 363. African Literature. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. A survey of the literature of Africa with particular emphases on fiction and on West Africa. Some attention also will be given to orature. Crosslisted as: AFAM 363/ INTL 366.

ENGL 364. Mythology and Folklore. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. A study of one or more forms of folklore, such as folktales, fairy tales, legends, myths, proverbs, riddles, ballads and/or games, with some attention to literary, social or historical significance and contexts. This course may also include approaches to collecting material or to examining later literary forms and texts inspired by folklore. Crosslisted as: ANTH 364.

ENGL 365. Caribbean Literature. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. A survey of West Indian writings. Attention will be given to African, European and Amerindian influences, as well as to the emergence of a West Indian literary tradition. Crosslisted as: AFAM 365/INTL 367.

ENGL 366. Writing and Social Change: ____. 3 Hours.
Semester course; 3 lecture/workshop hours. 3 credits. May be repeated once for credit with a different topic. Prerequisite: three credits in a 200-level literature course (or equivalent). A focused study of the literatures of underserved communities such as those of prisoners, recovering addicts, inner-city teens or immigrants. Students will collaborate with one such community on an original writing project.

ENGL 367. Writing Process and Practice. 3 Hours.
Semester course; 3 lecture/workshop hours. 3 credits. Prerequisites: UNIV 200 or HONR 200, and ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. Joins writing theory to writing practice. Students will explore their own writing practice and expand their knowledge of rhetorical processes and the teaching/learning of writing. Covers readings and investigations into theories about writing and the writing process, as well as the principles of working one-on-one with student writers. In the latter part of the semester students will devote two hours per week to peer consulting in the Writing Center.

ENGL 368. Nature Writing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. A study of the literary genre of nature writing in English. Crosslisted as: ENVS 368.

ENGL 369. Illness Narratives. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An overview of the history, interpretations and practices of reading and writing illness narratives — through case studies and theoretical perspectives, in fictionalized and nonfiction accounts, from the viewpoint of various actors (doctors, patients, patient families and their caregivers). Students will further examine the role of narrative knowledge in health care. Crosslisted as: SCTS 301.

ENGL 371. American Literary Beginnings. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. A study of the most important writings from the founding of the first colonies to the establishment of the federal government with attention to such authors as Bradford, Byrd, Bradstreet, Equiano, Cabeza de Vaca and Franklin.

ENGL 372. U.S. Literature: 1820-1865. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. A study of the writings of American authors in the middle decades of the 19th century, with attention to such authors as Poe, Emerson, Thoreau, Stowe, Hawthorne, Melville, Douglass and Whitman.

ENGL 373. U.S. Literature: 1865-1913. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. A study of writings from the end of the Civil War to World War I, with attention to such authors as Dickinson, Clemens, Howell, James, Wharton, Crane, Norris, Dreiser, Chopin and Chesnutt.

ENGL 374. U.S. Literature: Modernism. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. A study of the most important writings between World War I and World War II, with attention to such authors as Anderson, Frost, Eliot, Stein, Glasgow, Fitzgerald, Wright, Cather, Hemingway, O'Neill, Hurston, Toomer and Faulkner.

ENGL 375. U.S. Literature After 1945. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. A study of American writings since the end of World War II, with attention to such authors as Albee, Baldwin, Carver, Coover, Ellison, Erdrich, Ginsberg, Lowell, Morrison, Plath, Pynchon, Salinger and Walker.

ENGL 377. 19th-century U.S. Novels and Narratives. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. A study of selected novels with some attention to other forms of narrative that reflect the experiences of diverse groups in the United States.

ENGL 378. 20th-century U.S. Novels and Narratives. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. A study of selected novels with some attention to other forms of narrative that reflect the experiences of diverse groups of the United States.

ENGL 379. African-American Literature: Beginnings Through the Harlem Renaissance. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. An examination of the culture and literature of African Americans from their roots in Africa and the African Diaspora to the Harlem Renaissance. Authors may include Wheatley, Douglass, DuBois, Hurston, Hughes and Cullen. Crosslisted as: AFAM 379.

ENGL 380. Southern Literature. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. A study of the literature of the South with attention to writers such as Byrd, Poe, Chopin, Faulkner, Welty, Wolfe, O'Connor, Walker and Percy.

ENGL 381. Multiethnic Literature. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. A study of the literature and culture of multiethnic writers in the United States. May include Native American, Latino/a, African-American, Asian-American and/or Jewish-American authors.

ENGL 382. African-American Literature: Realism to the Present. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. An examination of the culture and literature of African-Americans from the Harlem Renaissance to the present day. Authors may include Wright, Ellison, Hayden, Brooks, Walker, and Morrison.

ENGL 385. Fiction into Film. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. A study of the translation of literature into film. Topical approaches vary from semester to semester. Consideration is given to the literature in its original form and to the methods of translating it into film.

ENGL 386. Children's Literature I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. Designed to give students an appreciation of children's literature; includes biography, fable, myth, traditional and modern fanciful tales and poetry, as well as a survey of the history of children's literature. Crosslisted as: TEDU 386.

ENGL 387. Literature for Adolescents. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. Designed to acquaint the prospective middle and secondary school English teacher with the nature, scope and uses of adolescent literature. The student is acquainted with reading materials for meeting the varied needs and interests of adolescents. Crosslisted as: TEDU 387.

ENGL 388. Writing in the Workplace. 3 Hours.
Semester course; 3 lecture/workshop hours. 3 credits. Prerequisites: UNIV 200 or HONR 200 and ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. Advance study and practice of writing in fields such as technology, science, administration and government, including visual rhetoric in both print and electronic forms.

ENGL 389. The Teaching of Writing Skills. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Studies the theory and methods for teaching writing to students in middle and secondary schools. Teaches strategies for prewriting, composing, peer revision, evaluation and topic construction. Includes extensive journal and essay writing. Crosslisted as: TEDU 389.

ENGL 390. Introduction to Linguistics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. An introduction to methods of language analysis, emphasizing the study of sounds and sound patterns, and units of meaning and their arrangements. Crosslisted as: LING 390/ANTH 390.

ENGL 391. Topics in Literature. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Maximum of 12 credits in all topics courses at the upper level. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. An in-depth study of a literary genre, an aesthetic or cultural theme in literature, or of a major writer in English or American literature. See the Schedule of Classes for specific topics to be offered each semester.

ENGL 392. Language, Culture and Cognition. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ANTH 220 or 230. Introduces theoretical and methodological foundations for the study of language from sociocultural perspectives. The perspectives include linguistic, philosophical, psychological, sociological and anthropological contributions to the understanding of verbal and nonverbal communication as a social activity embedded in cultural contexts. No prior training in linguistics is presupposed. Crosslisted as: ANTH 328/FRLG 328/LING 392.

ENGL 401. Shakespeare. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated once for credit. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. Advanced study of Shakespeare's works. May focus on a specific genre (tragedies, comedies, romances, histories, lyrics, narrative poems) or period of Shakespeare's career.

ENGL 402. Chaucer. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. A study of "The Canterbury Tales," with some attention to the early works.

ENGL 403. Milton. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. A study of shorter poems, selected prose, "Paradise Lost" and "Samson Agonistes.

ENGL 407. Medieval Epic and Romance. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: three credits in a 200-level literature course (or equivalent). A study of the vernacular epic and romance in England and on the continent prior to 1500.

ENGL 410. Medieval Studies: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with a different topic for a maximum of six credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. Studies in the English language and literature of the Middle Ages in its cultural context.

ENGL 411. Early Modern Studies: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with a different topic for a maximum of six credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. Studies in the language, literature and culture of early modern Britain, ca. 1500 to 1700.

ENGL 412. 18th-century Studies: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with different topics for maximum of six credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. Studies in the literature, language and culture of the 18th century in Britain and/or the United States.

ENGL 413. 19th-century Studies: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with a different topic for a maximum of six credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. Studies in the literature, language and culture of the 19th century in Britain and/or the United States.

ENGL 414. 20th-century Studies: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with a different topic for a maximum of six credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. Studies in the literature, language and culture of the 20th century in Britain, the United States and/or elsewhere in the Anglophone world.

ENGL 433. Advanced Dramatic Writing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated once for credit. Prerequisite: ENGL 303. A practical approach to the creation of original scripts for theatre or film. Crosslisted as: THEA 426.

ENGL 435. Advanced Poetry Writing. 3 Hours.
Semester course; 3 workshop hours. 3 credits. May be repeated once for credit. Prerequisite: ENGL 305. Study of the craft of writing, with instruction and guidance toward constructive self-criticism. Workshop members will be expected to produce a substantial volume of quality work and to become proficient in critical analysis in order to evaluate and articulate the strength of their own poetry. May not be used to satisfy the literature requirement of the College of Humanities and Sciences.

ENGL 437. Advanced Fiction Writing. 3 Hours.
Semester course; 3 workshop hours. 3 credits. May be repeated once for credit. Prerequisite: ENGL 307. Study the craft of fiction writing, with instruction and guidance toward constructive self-criticism. Workshop members will be expected to produce a substantial volume of short stories or portion of a novel and to become proficient in the critical analysis of fiction in order to evaluate and articulate the strength of their own work. May not be used to satisfy the literature requirement of the College of Humanities and Sciences.

ENGL 439. Advanced Creative Nonfiction Writing. 3 Hours.
Semester course; 3 workshop hours. 3 credits. May be repeated once for credit. Prerequisite: ENGL 309. Advanced study of the craft of creative nonfiction writing, with instruction and guidance toward constructive self-criticism. Workshop members will be expected to produce a substantial volume of writing or a portion of a book-length work of nonfiction, and to become proficient in the critical analysis of literary nonfiction in order to evaluate and articulate the strength of their own work.

ENGL 445. Form and Theory of Poetry. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. A study of the poetics, including prosody, with attention to the nature and functioning of language in poetry (especially metaphor), the development of poetic genres and the process by which poems are created and come to have meaning.

ENGL 447. Form and Theory of Fiction. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. A study of narration in verbal and other media, with attention to the nature, organization and functioning of language in narrative, the development of narrative genres, and the process by which narratives are created and come to have meaning.

ENGL 449. Form and Theory of Creative Nonfiction. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. An examination of one or more types of creative nonfiction. These may include magazine articles, research-based reportage, New Journalism, memoir, biography, autobiography, the meditative essay, the personal essay and others. May also include creative writing in the genre.

ENGL 450. Modern Grammar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. Study of modern English grammar and usage with some attention to linguistic theory. Recommended for teachers at all levels. May not be used to satisfy the literature requirement of the College of Humanities and Sciences. For English majors, these courses (limit of six credits) may be counted as part of graduate or undergraduate degree, but not both. Crosslisted as: LING 450.

ENGL 451. History of the English Language. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. The historical development of the English language; etymology, morphology, orthography and semantics. May not be used to satisfy the literature requirement of the College of Humanities and Sciences. For English majors, these courses (limit of six credits) may be counted as part of graduate or undergraduate degree, but not both. Crosslisted as: LING 451.

ENGL 452. Language and Gender. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211,215, 236, 291 or 295. A study of relationships between gender and language by focusing on such issues as differences between the ways women and men use language, relationships between language and power and ways in which language reflects and reinforces cultural attitudes toward gender. May not be used to satisfy the literature requirement of the College of Humanities and Sciences. Crosslisted as: LING 452/GSWS 452.

ENGL 453. Modern Rhetoric. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: UNIV 200 or HONR 200, and ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. A study of a broad range of modern rhetorical theories, emphasizing their possible relationships with linguistics, literary criticism, civic engagement and the process of writing. Crosslisted as: LING 453.

ENGL 454. Cross-cultural Communication. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. A study of the dynamics of cross-cultural communication that applies linguistic tools to understanding cultural issues and solving communication problems. Crosslisted as: INTL 454/ANTH 450.

ENGL 480. Authors: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with a different topic for a maximum of six credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. An advanced study of a specific author's texts and contexts. Taught in a seminar format with an emphasis on research.

ENGL 481. Genres: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with a different topic for a maximum of six credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. An advanced study of a single genre, either over time or at a particular historical moment. Taught in a seminar format with an emphasis on research.

ENGL 482. Literary Topics: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with a different topic for a maximum of six credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. An in-depth study of an aesthetic or cultural theme in literature. Taught in a seminar format with an emphasis on research.

ENGL 483. Literary Texts and Contexts: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with a different topic for a maximum of six credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. An advanced study of a select group of literary texts with emphasis on the culture and historical moment in which they were produced. Taught in a seminar format with an emphasis on research.

ENGL 484. Literary Movements: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with a different topic for a maximum of six credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. An advanced study of a group of writers whose work shares a common subject matter, writing style or philosophy. These may be defined by members of the movement (e.g., the Beats) or by critics in retrospect (e.g., the Metaphysical Poets). Taught in a seminar format with an emphasis on research.

ENGL 485. Literary Theory and Criticism: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with a different topic for a maximum of six credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. An advanced study of a single theoretical and critical methodology, or a small cluster of them, as well as of their application to a variety of literary texts. Taught in a seminar format.

ENGL 491. Topics in Writing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Maximum of 12 credits in all topics courses at the upper level. Prerequisites: UNIV 200 or HONR 200, and ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. Intensive study and practice of writing in a specific genre or application. See the Schedule of Classes for specific topics to be offered each semester.

ENGL 492. Independent Study. 1-3 Hours.
Semester course; variable hours. Variable credit. Maximum of 3 credits per semester. Student may take no more than 9 hours total. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291,or 295. This course is designed for students who wish to do extensive reading and writing in a subject not duplicated by any English course in this bulletin.

ENGL 493. English Internship. 1-3 Hours.
Semester course; 1-3 credits. May be repeated for a maximum total of 6 credits. Prerequisite: three credits in a 200-level literature course (or equivalent). Open to students with demonstrated writing ability; completion of ENGL 302, 304 or 327 is recommended. Permission and determination of credit must be established prior to registration. Students will apply research, writing and/or editing skills in an approved job in areas such as business, government, law or financial services.

ENGL 499. Senior Seminar in English. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 301 with a minimum grade of C. Restricted to seniors in English with at least 85 credit hours taken toward the degree. A study of a specific topic, author, movement or genre in a seminar format. Students will produce an extended, documented essay as a seminar paper. See the Schedule of Classes for specific topics to be offered each semester.

ENGL 500. Practicum in College English. 1-6 Hours.
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. 1 Hour.
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. Children's Literature II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of classic and current children's books from a variety of literary genres. 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 351/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. Crosslisted as: TEDU 528.

ENGL 532. Applied English Linguistics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated for credit. Prerequisite: ENGL 390. 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. Crosslisted as: ENED 532.

ENGL 550. Studies in Linguistics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated for credit. Prerequisite: ENGL 390. A general introduction to one area of linguistic study, such as pronunciation, grammar, stylistics, dialects, usage standards, lexicography, onomastics or semantics.

ENGL 552. Teaching English as a Second Language. 3 Hours.
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. Crosslisted as: TEDU 552/LING 552.

ENGL 560. Studies in British Literature and Culture. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Covers important topics in British literary and cultural studies including major literary periods, genres, major authors or literary movements. May be repeated for credit with permission of the instructor.

ENGL 570. Special Topics in American Literature and Culture. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Covers important topics in American literary and cultural studies including major literary periods, genres, authors and literary movements. May be repeated for credit with permission of instructor.

ENGL 601. Young Adult Literature. 3 Hours.
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. Crosslisted as: ENED 601.

ENGL 605. Introduction to Scholarship in English Studies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Introduces the practice of research and scholarly discourse in English studies. Emphasizes scholarly resources (printed and electronic) and textual studies.

ENGL 606. Literary Criticism. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A comparative study of critical approaches to literary texts (reader-oriented, new critical and formalist, psychoanalytic, archetypal, feminist and gender-oriented, structuralist, poststructuralist, new historicist and postcolonial). These approaches will be evaluated in terms of their capacity to address major components of the literary process (author, text, reader, history, culture); they will also be tested on selected literary texts. Some attention is given to the historical development of criticism, but the primary focus is on its theoretical claims, methodologies and aims.

ENGL 611. Authors. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated for credit. A study of the relationships among authorship (in material or discursive form), texts and cultural contexts.

ENGL 614. Cultural Discourses. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated for credit. A study of contemporary literary and nonliterary texts produced within a designated period of time.

ENGL 620. Intertextuality. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated for credit. A study of texts, potentially of disparate genres and contexts, focused on similar theme, concern or issue. Will examine both foundational, originating texts and subsequent reactions.

ENGL 624. Texts and Contexts. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated for credit. A study of the ways in which texts shape, reflect and inform their cultural contexts.

ENGL 627. Genres. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated for credit. A sustained and detailed examination of one or more genres.

ENGL 629. Form and Theory of Poetry. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated once for credit. Will address a number of key issues concerning the structure of verse and the function of poetic discourse and will provide readers and writers of poetry an opportunity to study and practice a broad range of poetic forms and techniques, as well as to explore various genre conventions and their thematic and rhetorical significance. Students may study poems from various periods, with some focus on the contemporary, and apply to them the insights offered by major theorists of poetry and poetics. They also may write imitations, parodies and responses examining and demonstrating poetic approaches.

ENGL 630. Form and Theory of Fiction. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated once for credit. Will address a number of key issues concerning the structure, conventions and function of narrative discourse and will seek to give readers and writers of fiction an opportunity to study a broad range of narrative forms, as well as to explore genre conventions and their thematic and rhetorical significance. Students will read stories and novels from various historical periods, with some focus on the contemporary, and apply to them the insights offered by major theorists of narrative. They also may write imitations, parodies and responses examining and demonstrating the aesthetics of fiction.

ENGL 631. Form and Theory of Creative Nonfiction. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated once for credit. Will address a number of key issues concerning the structure, conventions and function of varied types of creative nonfiction and will seek to give readers and writers an opportunity to study a broad range of forms in the genre, which may include magazine articles, research-based reportage, New Journalism, memoir, biography, autobiography, the meditative essay, the personal essay, the lyric essay and others, as well as to explore genre conventions and their thematic and rhetorical significance. Students will read across this range of forms, with some focus on contemporary writing, and apply to them insights offered by major theorists of the genre. They also may write imitations, parodies and responses examining and demonstrating the aesthetics of creative nonfiction writing.

ENGL 632. Community Writing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course teaches students how to use research in rhetoric and composition to design and deliver a community writing project that is mutually empowering, knowledge generating and publicly oriented -- designed to inspire social change.

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

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

ENGL 638. Responding to Writing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course studies theories and practices for responding to expository and persuasive nonfiction texts, both students' and professionals', academic and creative.

ENGL 652. Studies in Writing and Rhetoric: ____. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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 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. 3 Hours.
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 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. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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.
1-3 hours. Variable credit. Maximum of 6 credits. Prerequisite: permission from department chair. For students in English/English education to pursue, in depth, a particular problem or topic about which an interest or talent has been demonstrated.

ENGL 694. Internship in Writing. 3 Hours.
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 695. Directed Study/Major Project and Presentation. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May not be repeated for credit. Students who choose not to write a thesis will complete a substantial project with a graduate faculty adviser and share the results of his or her research in a public presentation. This project may be an expansion or reworking of a seminar paper or group of seminar papers and must contain a statement of the theoretical, critical or methodological issues important to the project. An abstract of the research will be submitted three to four weeks before the presentation date scheduled for that semester and must be approved by the M.A. committee. The presentation will take place before the adviser, M.A. committee members, and interested faculty and students on the date designated by the M.A. director. Graded PR. Note: Students who present a paper at a national conference or publish in a reputable journal may be exempted from the presentation upon the approval of the M.A. committee.

ENGL 798. Thesis. 1-3 Hours.
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.

ENGL 799. Thesis. 1-3 Hours.
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.

ENGLISH/ENGLISH EDUCATION (ENED)

ENED 532. Applied English Linguistics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated for credit. Prerequisite: ENGL 390. 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. Crosslisted as: ENGL 532.

ENED 601. Young Adult Literature. 3 Hours.
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. Crosslisted as: ENGL 601.

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

ENVIRONMENTAL STUDIES (ENVS)

ENVS 103. Environmental Science. 4 Hours.
Hybrid semester course taught mostly online; 3 lecture and 2 laboratory hours. 4 credits. Online presentations, assignments, debates and exams require students to understand situations and ideas that involve scientific, social and economic concepts associated with Earth's environment. Laboratory exercises reinforce major course concepts. Integrates aspects of biology, chemistry, geology, physics and sociology. Topics include ecology, evolution, natural resources, air and water resources, energy and recycling, population biology, and sustainable global societies. Not applicable as a prerequisite for any biology course at the 200 level or above, nor for credit toward the B.S. in Biology. Crosslisted as: BIOL 103.

ENVS 105. Physical Geology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A descriptive approach to physical geology dealing with the history and structure of the earth, catastrophic events and geology as it relates to the contemporary environment. An optional laboratory, ENVZ 105, may be taken with this course.

ENVS 201. Earth System Science. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. An introduction to the processes of and linkages among the major systems that drive planet Earth. The biosphere, geosphere, hydrosphere, atmosphere and sociosphere are presented as dynamic and interdependent systems. Labs/discussion sections will include both computer modeling of integrated systems and lab activities/field trip(s) at the Rice Center for Environmental Life Sciences.

ENVS 300. Sustainable Societies: James River Basin. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course explores the 25 most critical social, economic and environmental issues in the region in a global context. It examines how people are tackling the issues of sustainably and turning them into opportunities.

ENVS 301. Introduction to Meteorology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introductory course designed to provide the student with an overview of the structures and processes that cause weather. These include atmospheric circulations and the weather patterns that we observe. Emphasis will be placed upon the tracking and display of weather phenomena, as well as their forecast movement and impact.

ENVS 310. Introduction to Oceanography. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introductory course designed to provide the student with an overview of the structures and processes of the world's oceans. These include the systems that impact the oceans: the hydrosphere, the atmosphere, the geosphere, the biosphere and the sociosphere. Emphasis will be placed upon hands-on techniques for understanding these systems, including online simulations and in-class activities.

ENVS 311. Politics of the Environment. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An exploration of the current controversy about environmental politics and the issues and crises it centers on. Special attention will be given to the constitutional, political and geographical factors in the development of environmental policy and the organized effort to deal with governmental actions and inaction and its impact on policy outcomes. Crosslisted as: POLI 311.

ENVS 314. Man and Environment. 3 Hours.
Semester course. 3 lecture hours. 3 credits. A comparative study of the ecology and natural history of human populations, including the environments as determining factors in the evolution of human institutions and technology, resources management, and population crises; cultural traditions as mechanisms of population control; basic theory of population biology. Crosslisted as: INTL 314.

ENVS 315. Energy and the Environment. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to non-physics majors with junior or senior standing; not applicable to the physics major. A study of society's demands for energy, how it is currently being met, the environmental consequences thereof and some discussion of alternatives. Crosslisted as: PHYS 315.

ENVS 330. Environmental Pollution. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: eight credits in biology. The study of pollution in the environment with emphasis on the procedures for detection and abatement. Crosslisted as: BIOL 332.

ENVS 332. Environmental Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: GEOG 204 or URSP 204. An interdisciplinary review of domestic and international environmental problems and their underlying causes, current management frameworks, alternative management approaches and strategies, and barriers to their implementation. Other topics include: environmental history and economics, population growth, natural resources use, biodiversity, pollution. Crosslisted as: URSP 332.

ENVS 335. Environmental Geology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENVS 105 or URSP 204. The relationship between humankind and the physical environment, Earth materials and processes, geological hazards, water, mineral and energy resources, land use and environmental health and law.

ENVS 368. Nature Writing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. A study of the literary genre of nature writing in English. Crosslisted as: ENGL 368.

ENVS 401. Meteorology and Climatology. 3 Hours.
Semester course; 3 lecture hours. Prerequisite: PHYS 201 or PHYS 207. A basic, semiquantitative course in the elements of weather and climate, their driving forces and their spatial and temporal distribution and variability. Atmospheric motions and circulation, weather forecasting, human impact on weather and climate.

ENVS 411. Oceanography. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 151, BIOL 152 and CHEM 102. A basic course in the physical, chemical and geological properties of oceans and ocean basins. Origin and character of ocean basins, properties of oceanic waters, oceanic circulation, land-sea interactions, marine environments and ecology.

ENVS 490. Research Seminar in Environmental Studies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: senior standing and at least 12 hours of approved environmental studies course work. An interdisciplinary examination of problems and issues central to environmental studies. Environmental research of VCU faculty will be reviewed, and selected local environmental problems will be studied. Each student will complete a research project focusing on a specific environmental question.

ENVS 491. Topics in Environmental Studies. 1-3 Hours.
Semester course; variable hours. 1-3 credits per semester. May be repeated with different topics for a maximum of 6 credits. Prerequisites vary by topic. 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 492. Independent Study. 1-3 Hours.
Semester course; variable hours. Variable credit. Maximum of 3 credits per semester; maximum total of 6 credits for all topics courses. Prerequisite: junior or senior standing, and permission of instructor.

ENVS 493. Environmental Studies Internship. 1-3 Hours.
Semester course; variable hours. 1-3 credits per semester. Maximum total of 6 credits. Prerequisite: junior or senior standing, and permission of instructor. Graded as pass/fail.

ENVS 515. Mangrove Avian Field Ecology. 4 Hours.
Semester course; 2 weeks study abroad in Panama (or other tropical location with mangrove forests); 3 lecture and 3 laboratory hours. 4 credits. Prerequisites: BIOL 317. This course provides students with an immersive study of tropical ecology with a focus on bird ecology and conservation of mangrove ecosystems through a unique blend of rigorous science and community engagement. While studying abroad during the winter intersession, students learn about mangrove ecosystems by collecting data on birds and habitat and by reading and discussing scientific papers. Students also engage with local conservation organizations leading efforts to protect wetland habitats. Throughout the spring semester, students read and discuss related research and conduct data analysis. Students also participate in education outreach with local schools. Progress and research findings are presented in a symposium open to the public. Students are challenged by this course as they are asked to collect, analyze, interpret and make sense of the data in light of what others have found.

ENVS 521. Introduction to Geographic Information Systems. 3 Hours.
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. Crosslisted as: URSP 521/GEOG 521.

ENVS 541. Principles of Waste Management. 3 Hours.
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.

ENVS 550. Ecological Risk Assessment. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: course work in ecology, 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 U.S. 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. Historical and Cultural Landscapes. 3 Hours.
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. Crosslisted as: ANTH 556.

ENVS 590. Research Seminar in Environmental Studies. 1 Hour.
An interdisciplinary examination of problems and issues related to environmental studies.

ENVS 591. Topics in Environmental Studies. 1-3 Hours.
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. 3 Hours.
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. 1-3 Hours.
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. 3 Hours.
Prerequisite: STAT 543 or permission of instructor. 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. Environmental Policy and Administration. 3 Hours.
Semester course; 3 lecture hours. 3 credits. 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. Crosslisted as: PADM 628.

ENVS 640. River Policy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines public policy related to rivers and watersheds. Uses the James River for exploring and illustrating generic river policy issues. Crosslisted as: GVPA 640.

ENVS 650. Pesticides, Health and the Environment. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: Course work in toxicology, chemistry or permission of instructor. This course is a balanced overview of 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. Environmental Remote Sensing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENVS 602, or permission of the instructor. 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. Crosslisted as: URSP 654/BIOL 654.

ENVS 655. Hydrogeology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ENVS 355 or equivalent, or permission of instructor. Focuses on the fundamental concepts 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 environmental hydrogeologic characteristics of a site and to use that knowledge to provide an informed opinion on protection and remediation.

ENVS 660. Virginia Environmental Law. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: Course work in: ecology, toxicology or animal physiology; or permission of instructor. Courses 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. 1-3 Hours.
Provides an in-depth study of a selected environmental topic.

ENVS 692. Independent Study. 1-3 Hours.
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. 1-3 Hours.
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. 1-3 Hours.
Planning, preparation, completion, and presentation of research in environmental studies.

ENVS 698. Thesis. 1-3 Hours.
Planning, preparation, completion, and presentation of research in environmental studies.

ENVIRONMENTAL STUDIES LAB (ENVZ)

ENVZ 105. Physical Geology Laboratory. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Pre- or corequisite: ENVS 105, an optional laboratory course consisting of experiments and activities related to ENVS 105.

ENVZ 335. Environmental Geology Laboratory. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Corequisite: ENVS 335. Required for environmental science majors enrolled in ENVS 335; optional for other majors. Attendance on one Saturday morning field trip required. Laboratory exercises coordinated with ENVS 335 lectures.

ENVZ 401. Meteorology and Climatology Laboratory. 1 Hour.
Semester course; 3 laboratory hours. 1 credit. Pre- or corequisite: ENVS 401. A series of laboratory and field experiments designed to quantify the elements of weather and climate and to interpret their local temporal and spatial variations.

EUROPEAN CULTURES (EUCU)

EUCU 307. Aspects of German Culture. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A broad interdisciplinary approach to an understanding of German culture, language and literature. Lectures in English by guest speakers and/or use of films as required. This course will not satisfy foreign language requirements. No knowledge of German is required. All work is done in English.

EUCU 311. Classical Mythology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The basic myths of the Greek and Roman heritage. Their impact in culture then and now; from the origins of Greek myth to the superstitions of the late Roman and early Christian world.

FAMILY MEDICINE AND POPULATION HEALTH (EPID)

EPID 543. Statistical Methods I. 3 Hours.
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.

EPID 547. Applied Data Analysis Lab I. 1.5 Hour.
Semester course; 1.5 laboratory hours. 1.5 credits. Corequisite: BIOS 547. Lab sessions will focus on hands-on data analysis and presentation techniques using SAS statistical software. The labs will also provide exercises to help students more fully understand the statistical principles presented in the corequisite lecture course (BIOS 547).

EPID 548. Applied Data Analysis Lab II. 1.5 Hour.
Semester course; 1.5 laboratory hours. 1.5 credits. Prerequisite: BIOS 547, EPID 547 with minimum grade of B. Must enroll concurrently in BIOS 548 to take this course. Lab sessions will focus on hands-on data analysis and presentation techniques using SAS statistical software. The labs will also provide exercises to help students more fully understand the statistical principles presented in the corequisite lecture course (BIOS 548).

EPID 571. Principles of Epidemiology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Corequisites: BIOS 547 and EPID 547. Offers the theoretical foundations, concepts and principles of epidemiological research methods utilized to examine the distribution and determinants of diseases or other health problems. Entails understanding of measures of disease frequency and association, descriptive and analytic studies, community surveys, sampling, bias, confounding surveillance, outbreak investigation, screening and research proposal writing. Also provides basic foundations for data analysis and its translation into health care planning, management and policy formulation.

EPID 580. Public Health Ethics. 1 Hour.
Online course; 1 lecture hour. 1 credit. The class examines, from an ethical perspective, federal and state public health practices, privacy and confidentiality issues; mental health practices; abortion, contraception and sterilization; patients' rights; medical care; human experimentation; terminal illness; AIDS and other infectious diseases; environmental justice; health planning and reimbursement; and medical malpractice. The national health care reform legislation will be discussed.

EPID 593. MPH Practicum I. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Enrollment restricted to M.P.H. program students. First in a two-semester course series of practical knowledge and experience for first-year Master of Public Health students. The course will offer didactic training in basic public health operations, work of local public health organizations and research teams, human research subjects protection, selected career skills and leadership principles in preparation for a future assignment in a professional public health setting. By the end of the semester, the student will have selected a professional public health organization or research team with which they will complete practical experience hours the following semester. Graded as Satisfactory/Unsatisfactory.

EPID 594. MPH Practicum II. 1 Hour.
Semester course; 4 practicum hours. 1 credit. Prerequisite: EPID 593. Enrollment restricted to M.P.H. students. Students will be asked to work approximately 60 practical hours over the course of one semester in a professional public health setting and engage in selected training to develop a foundation of basic skills in areas such as communication, leadership and professionalism. The practicum placement will be made according to student area of interest. Students will work as members of collaborative public health teams fulfilling varied missions. They will complete assigned team tasks, shadow public health professionals, attend meetings and take part in other organizational activities that will provide a basic foundation of knowledge and experience in public health practice and/or research. Graded as Satisfactory/Unsatisfactory.

EPID 600. Introduction to Public Health. 3 Hours.
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 management, economics, law, ethics and education. Examines the use of epidemiology and statistics to determine personal, environmental, and occupational health problems.

EPID 601. Contemporary Issues and Controversies in Public Health. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course introduces students to current issues and controversies in public health such as HIV transmission risk behavior, poverty, globalization, gun control, health care access and obesity. Students will be able to describe these controversies and argue differing perspectives on the major issues.

EPID 603. Public Health Policy and Politics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides an understanding of the 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.

EPID 604. Principles of Environmental Health. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Major public health issues associated with exposure to toxic substances and harmful physical or infectious agents in the environment and the workplace. Covers naturally occurring and human contamination of air, water and land by toxic substances and other agents. Includes overview of relevant governmental legal and regulatory policy.

EPID 606. Epidemiologic Methods. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EPID 571, minimum grade of B. Focuses on examining the design, conduct and analysis of major epidemiologic studies and the methods to deal with the problems of bias, confounding and effect modification; using multivariate modeling techniques focusing on applications of logistic regression and Cox proprtional hazards 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 based on literature review and data analyses of a large dataset demonstrating application of essential epidemiologic abd biostatistical principles.

EPID 607. Nutritional Epidemiology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EPID 571. This course focuses on methods of measuring exposures to dietary factors for epidemiological investigations of diet-disease relationships and risk assessment. An introductory course in basic epidemiology is a prerequisite. Students learn to select the most appropriate method(s) of collecting and analyzing food intake and to evaluate the adequacy of dietary assessment methods used in published epidemiological studies.

EPID 620. Cancer Epidemiology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EPID 571, BIOS 547-548, minimum grade of B and EPID 547-548, minimum grade of B. Covers general principles of carcinogenesis and the genetics of cancer; domestic and international patterns in cancer incidence and mortality; cancer surveillance and screening, and their relation to cancer prevention; epidemiologic characteristics and risk factors for cancers to the lung, breast, prostate, gastrointestinal tract, pancreas, bladder, endometrium, ovary, cervix and skin, as well as cancer in children and young adults; and the public health implications of cancer. Additional focus on critical evaluation of different methodological approaches used in cancer research and potential biases inherent given study designs.

EPID 622. Maternal and Child Health. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EPID 571; BIOS 543 and BIOS 544, with minimum grades of B; and EPID 547 and EPID 548, with minimum grades of B; or permission of instructor. Exposes students to current issues in maternal and child health in the U.S., taking an applied approach that balances discussion of literature, applications to public health practice and practical data experience. The course will explore how policies and social determinants of health influence MCH outcomes. Students will learn about key MCH topics including intergenerational risk factors, low birth weight, infant mortality, developmental disabilities and injury and violence prevention. Students will use epidemiological methods to evaluate MCH data to determine risk and protective factors for women and children and describe how these data guide public health policy and program-planning efforts.

EPID 624. Chronic Disease Epidemiology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EPID 571 with a minimum grade of B or permission of the instructor. Course will cover the contribution of chronic diseases to population disease and disability as well as identify the incidence, prevalence and financial impact of each of the model diseases addressed. At the conclusion of the course, the student should be able to apply the concepts to all chronic diseases. The student will analyze selected current research in the area and determine points at which translational research is likely to improve the ability of the health care system to manage these problems.

EPID 642. Advanced Epidemiological Protocol Design. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EPID 571; EPID 606 or equivalent; 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 accurate exposure assessment, prevention of measurement errors, and statistical methods proposed for analysis.

EPID 646. Epidemiology of Psychiatric and Substance Use Disorders. 3 Hours.
Semester course; 2 lecture and 1 laboratory hours. 3 credits. This course is intended to introduce the descriptive and analytic epidemiology for major mental disorders of childhood, adulthood and late adult life. The course will address three main topics: (1) conceptual and methodological considerations in psychiatric epidemiologic research, (2) the descriptive epidemiology of major psychiatric and substance use disorders and (3) the analytic epidemiology of major psychiatric and substance use disorders. The course will also examine issues of classification and the nosology of psychiatric disorders as well as operational case definitions and the measurement techniques for field surveys and risk-factor research. Students will become familiar with epidemiologic surveys appropriate for risk factor research for psychiatric and substance use disorders. Prerequisitefor master's students: EPID 571 with a minimum grade of B; prerequisite for doctoral students: EPID 650 with a minimum grade of B; or permission of instructor.

EPID 648. Behavioral Epidemiology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EPID 571; SBHD 605 with a minimum grade of B; and BIOS 543 or BIOS 547 and EPID 547 with minimum grades of B; or permission of instructor. Covers behavioral epidemiology and its role in public health. Students will be able to identify and explain the appropriate methods for measuring health-related behaviors and related psychosocial constructs; critically analyze the appropriateness of methods used within published studies on behavior as well as determine appropriate methods for behavior-related research questions; and apply behavioral theory/models to current public health problems including, but not limited to, intervention development and evaluation.

EPID 649. Analysis of Health Datasets. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Corequisites: EPID 650 and BIOS 553 concurrently taken; or permission of instructor. Epidemiologic research, health services research and social/behavioral science research very often conduct "secondary analysis" of existing population-level datasets, as well as different forms of health care data (claims data, electronic prescribing data, electronic medical records). At the end of the course, students will be familiar with the scope of available large, population-based public datasets for health care and public health research. They will understand the strengths and limitations of using these datasets for secondary research and be able to apply this understanding to decisions regarding research questions, dataset use and analysis plans. In the process, they will also develop skills in manipulating complex administrative data sources (including claims data, electronic prescribing data and electronic medical records). Students will acquire knowledge to deal with potential challenges in implementing case-control or cohort studies based on data collected for reasons other than for research. Competencies in sampling methods, weighting, small area estimation techniques, probabilistic matching, multiple imputation methods, geocoding and other issues will be emphasized. Students will download, link and analyze several data sets to understand the advantages of these data. Familiarity with statistical analysis software is required.

EPID 650. Epidemiologic Methods for Research. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: Intermediate level epidemiology course (such as VCU's EPID 606) at the master's level, with minimum grade of B; or permission of the instructor. Students will learn principles of epidemiologic methods and their application for analysis and interpretation of public health data. This course provides advanced introductory training for conducting epidemiologic investigations of disease etiology, surveillance and health care services, as well as for interpretation of published epidemiologic studies. Upon completion, students should be sufficiently familiar with epidemiologic research methods to begin applying these methods in their own work. The course is intended for doctoral students in epidemiology or related disciplines.

EPID 651. Intermediate Epidemiologic Methods for Research. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EPID 650, minimum grade of B. Course will provide in-depth understanding of epidemiologic methods and their application for analysis and interpretation of public health data. This course emphasizes decision-making in research methods to increase the efficiency of study design by reducing bias. Students will gain expertise in methodologic thinking as applied to their own work. Nonexperimental study designs are the focus of the class. Course provides opportunities for students to develop expertise in reading epidemiologic methods research. Upon completion, students should have attained expertise in epidemiologic research methods to apply in their own work. The course is intended for doctoral students in epidemiology or related disciplines.

EPID 652. Advanced Epidemiologic Methods and Data Analysis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: Intermediate level epidemiology course at the master's level (such as VCU's EPID 606) with a minimum grade of B and BIOS 554, minimum grade of B. Focuses on development of analytical strategies for data analysis guided by epidemiologic principles. Specific statistical modeling will be tailored for analysis of data from cross-sectional, case-control and cohort studies with emphasis on causal inference, prediction, controlling for confounding and assessment of interaction and intermediate effects. Course topics include logistic regression, Poisson regression, Cox proportional hazards model, propensity score method, generalized estimating equations and path analysis technique.

EPID 690. Journal Club. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Talks given by students and faculty describing and critiquing recent published research or review articles. Graded as S/U/F.

EPID 691. Special Topics. 1-6 Hours.
Semester course; variable hours. 1-6 credits. This course provides the opportunity for students to focus in depth on a particular area of interest and allows students to tailor their education to their specific needs and interests. Such flexibility adds strength to the program and promotes the independence of dedicated students. Arrangements are made with the appropriate faculty member.

EPID 692. Independent Study. 1-6 Hours.
Semester course; variable hours. 1-6 credits. Provides the opportunity for students to explore a topic of interest under the direction of a faculty member. A proposal must be submitted for approval and credits are assigned commensurate with the complexity of the project. Arrangements are made directly with the appropriate faculty member and graduate program director.

EPID 693. Public Health Internship. 1-3 Hours.
Semester course; 3 lecture hours. 1-3 credits. Prerequisites: 18 credits in the M.P.H. program, EPID 571 and BIOS 547, both with minimum grades of B. Students will spend 180 hours in a planned, supervised experience with a community agency. Such agencies might include a local free clinic or other nonprofit organization, such as the American Cancer Society, or a local, state or federal public health agency. Graded as S/U/F.

EPID 694. MPH Capstone Project. 1-6 Hours.
Semester course; variable 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 or applied practice 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 a faculty member and approved by the graduate program director. Graded as S, U or F.

EPID 696. Special Topics. 1-3 Hours.
Semester course; 1-3 variable hours. 1-3 credits. Provides the opportunity for students to focus in depth on a particular area of interest and allows students to tailor their education to their specific needs and interests. Such flexibility adds strength to the program and promotes the independence of dedicated students. Arrangements are made with the appropriate faculty member. Graded as S/U/F.

EPID 697. Directed Research in Epidemiology. 1-15 Hours.
Semester course; 1-15 credits. Research leading to the Ph.D. degree. Graded as "S," "U" or "F.

FASHION DESIGN AND MERCHANDISING (FASH)

FASH 145. Computers for Fashion I. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Laptop computer required. Basic computer skills required. This course introduces students to contemporary technology with emphasis on basic computer graphics software used in the fashion industry today.

FASH 201. Construction Techniques. 3 Hours.
Semester course; 1 lecture and 4 studio hours. 3 credits. The basic principles involved in garment construction with emphasis on professional design-room practices in sewing, pressing and finishing of garments. Knowledge of basic sewing is advisable.

FASH 202. Draping. 3 Hours.
Semester course; 1 lecture and 4 studio hours. 3 credits. Basic principles of three-dimensional patternmaking by draping muslin on a dress form. Student will be required to purchase the specified dress form.

FASH 203. Patternmaking. 3 Hours.
Continuous courses; 1 lecture and 4 studio hours. 3-3 credits. Prerequisite: completion of FASH 203 to enroll in FASH 204. Basic principles of patternmaking, developing various styles from master patterns and creating designs to be constructed in muslin. Students also will draft a set of master patterns and learn to "true" the pattern to produce production-ready patterns.

FASH 204. Patternmaking. 3 Hours.
Continuous courses; 1 lecture and 4 studio hours. 3-3 credits. Prerequisite: completion of FASH 203 to enroll in FASH 204. Basic principles of patternmaking, developing various styles from master patterns and creating designs to be constructed in muslin. Students also will draft a set of master patterns and learn to "true" the pattern to produce production-ready patterns.

FASH 205. Fashion Drawing I. 3 Hours.
Continuous courses; 1 lecture and 4 studio hours. 3-3 credits. Prerequisite: completion of FASH 205 to enroll in FASH 206. Introduction to the fashion figure working from models and photographs. Covers flat drawing techniques and fashion design theory. Explores different media and the use of color.

FASH 206. Fashion Drawing I. 3 Hours.
Continuous courses; 1 lecture and 4 studio hours. 3-3 credits. Prerequisite: completion of FASH 205 to enroll in FASH 206. Introduction to the fashion figure working from models and photographs. Covers flat drawing techniques and fashion design theory. Explores different media and the use of color.

FASH 210. Visual Merchandising. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Theory and practical application of visual merchandising techniques in the fashion industry. Development of design concepts, fixturing, layout and presentation for retail, manufacturing and special events. Use of computer-aided design.

FASH 240. Survey of the Fashion Industry I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of the apparel industry emphasizing the role of the designer and the various stages of production.

FASH 241. Survey of the Fashion Industry II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An analysis of the apparel industry emphasizing retail aspects.

FASH 245. Computers for Fashion II. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisites: FASH 145. Laptop computer required. Assumes basic computer skills. This course introduces advanced skills in technology by utilizing graphic, illustration and desktop publishing software as they are used in the fashion industry.

FASH 250. Concepts of Fashion Merchandising Environment. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Basic research techniques and analysis skills for evaluating contemporary fashion and apparel topics.

FASH 260. Survey of Luxury Fashion. 3 Hours.
Semester course; 3 lecture hours. 3 credits Prerequisites: FASH 240 and FASH 241. Enrollment restricted to fashion design and merchandising majors. Provides an overview of the luxury fashion industry. The class includes the history of the luxury fashion industry, as well as covering the forecasting, development, branding, marketing, buying, selling and counterfeiting of luxury fashion products. Students explore the luxury fashion industry through lectures, assignments and face-to-face exposure to suppliers, manufacturers and retailers in the luxury sector.

FASH 290. Textiles for the Fashion Industry. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course is designed to develop an understanding of the factors which influence the tactile behaviors of fabrics during garment design, manufacture and wear. Apparel fiber construction, finish and properties both natural and man-made will be analyzed.

FASH 301. Design I Studio. 3 Hours.
Semester course; 1 lecture and 4 studio hours. 3 credits. May be repeated. Prerequisite: completion of all sophomore studio courses. A series of courses that focus on selected topics in design, reflecting current fashion emphasis. See the Schedule of Classes for specific topics to be offered each semester.

FASH 302. Design I Studio. 3 Hours.
Semester course; 1 lecture and 4 studio hours. 3 credits. May be repeated. Prerequisite: completion of all sophomore studio courses. A series of courses that focus on selected topics in design, reflecting current fashion emphasis. See the Schedule of Classes for specific topics to be offered each semester.

FASH 319. Contemporary Fashion. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 200 or HONR 200. An in-depth study of fashion beginning at the Industrial Revolution and continuing to the present from a historical and socioeconomic point of view. Hands-on examination of vintage garments and field trips to museum collections.

FASH 320. Twenty-first Century Fashion. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 200. Enrollment restricted to fashion students or those in the School of the Arts. This course explores the history of fashion starting in the 1980s and continues into the New Millennium. It explores trends, designers and movements that affect fashion.

FASH 330. The Business of Design. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course introduces basic global economics and general design business concepts such as the free enterprise system, legal forms of business and financial considerations. It also surveys business and management practices such as planning, decision-making, communication, global ethics, marketing, human resources, finance and entrepreneurial skills needed to open a design business. Crosslisted as: IDES 330/GDES 330.

FASH 341. Merchandise Planning and Control. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Theory and mathematical application of the major elements of retail buying and merchandising. Discussion covers planning and control of inventory, profit analysis, merchandise pricing and purchase negotiation.

FASH 342. Retail Buying Simulation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: FASH 341 and INFO 162. Practical application of retail buying in relation to the calculations for a six-month buying plan for a department within a department store. The simulation includes projection of sales, stock levels, markdowns, purchases, gross margins, markup, etc.

FASH 343. Fashion Forecasting. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Using basic principles to identify, track and analyze current trends, students will develop a fashion forecast. Demographic, economic, social and historical forces of behavior will be evaluated.

FASH 345. Computers for Fashion Design: Adobe Photoshop and Illustrator. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Laptop computer and basic computer skills required. Students will learn to conceptualize fashion design while gaining an understanding of graphic and illustration software through the utilization of the computer as a drawing and communication tool.

FASH 350. Fashion Promotion. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: junior standing. Through lecture and field experience, students are exposed to technical and creative aspects of fashion promotion and public relations. A variety of media are utilized. Students may be required to spend time outside the classroom on promotional activities.

FASH 370. Design History: 20th and 21st Centuries. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTF 105-106. Study of the major theories and styles on communication arts, fashion and interior environments of the 20th and 21st centuries. Contemporary analysis of cultural conditions and the manner in which designers respond to those conditions. Crosslisted as: GDES 370/IDES 370.

FASH 380. Fashion Branding. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Students will understand the concept of fashion branding and the processes necessary to successfully develop or redevelop a fashion brand.

FASH 390. Historic and Ethnic Textiles. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FASH 290 or IDES 446 or permission of instructor. An examination of the history of textile design and production around the world. Crosslisted as: INTL 390.

FASH 391. Fashion Workshop. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May be repeated for a maximum total of 6 credits. A topical workshop offered in various areas of fashion not included in the regular curriculum. See the Schedule of Classes for specific topics to be offered each semester.

FASH 401. Design II Studio. 3 Hours.
Semester course; 1 lecture and 4 studio hours. 3 credits. May be repeated. Prerequisites: completion of all sophomore studio courses and permission of instructor. A series of upper-level design classes for the advanced or skilled student, reflecting current topics in the fashion industry. See the Schedule of Classes for specific topics to be offered each semester.

FASH 402. Design II Studio. 3 Hours.
Semester course; 1 lecture and 4 studio hours. 3 credits. May be repeated. Prerequisites: completion of all sophomore studio courses and permission of instructor. A series of upper-level design classes for the advanced or skilled student, reflecting current topics in the fashion industry. See the Schedule of Classes for specific topics to be offered each semester.

FASH 403. Design Theory and Illustration I. 3 Hours.
Semester course; 1 lecture and 4 studio hours. 3 credits. May be repeated. Prerequisite: completion of all Department of Fashion sophomore studio courses. A series of design theory and illustration topics that address current fashion and support the Department of Fashion design courses. See the Schedule of Classes for specific topics to be offered each semester.

FASH 404. Design Theory and Illustration II. 3 Hours.
Semester course; 1 lecture and 4 studio hours. 3 credits. May be repeated. Prerequisites: Completion of all Department of Fashion sophomore studio courses and permission of instructor. A series of advanced design theory and illustration topics that address current fashion, challenge the skilled student and support the Department of Fashion design courses. See the Schedule of Classes for specific topics to be offered each semester.

FASH 442. Advanced Show Production. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A practical application of the production, planning and execution of a professionally staged and choreographed fashion show featuring the Department of Fashion Design and Merchandising students' juried work.

FASH 443. Supervision and Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The study of advanced leadership skills as they relate to the fashion industry. Topics include team building, negotiations, time and stress management, and communications. Emphasis placed on leadership and supervision skills across cultures.

FASH 445. Fashion Entrepreneurship. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: FASH 341 and FASH 342. Studies operational functions as related to the objective and decision-making procedures inherent in successful small-business retailing. Quantitative strategies will be applied as students develop a model plan for a retail business.

FASH 450. Line Development. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Pre- or corequisite: FASH 341. Students will learn the fundamentals of producing a line of apparel, accessories or home fashions from conception to consumer. Emphasis will be placed on market research, specification sheets, costing, sourcing, production and sales.

FASH 451. Importing and Exporting Fashion. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FASH 450. An overview and introduction to import/export theory, government regulations and global sourcing. Students will gain insight to the dynamics and cultures of the international fashion marketplace.

FASH 490. Fashion Seminar. 1 Hour.
Short course (5 weeks); 3 lecture hours. 1 credit. A professional seminar for senior fashion majors. Lectures will cover career opportunities and job preparation.

FASH 492. Independent Study in the Fashion Industry. 1-3 Hours.
Semester course; 1-3 credits. May be repeated. Prerequisite: junior or senior standing as a major in fashion design or fashion merchandising. Learning experiences should be designed with the supervising faculty member in the form of a contract between student and instructor; approval of department chair necessary prior to registration. This course will be limited to those students who have demonstrated intense commitment to a particular area of study within the fashion industry.

FASH 493. Fashion Internship. 1-6 Hours.
Semester course; variable hours. 1-6 credits. Repeatable in combinations for a maximum of 6 credits. Open to junior- and senior-level fashion majors only. An on-the-job practicum in which students apply the formal classroom and studio training they have received in their option (design, merchandising).

FAST TRACK INFORMATION SYSTEMS (ISTM)

ISTM 671. Organizational Culture and Team Building. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides students an understanding of the impact information technology has made in defining an organization's culture and the processes that are used to support operational and strategic decision making. Groupware tools are used to simulate how organizations use computer-based collaboration software for sharing information, ideas and knowledge designed for improved productivity and decision making in order to enhance the organization's competitiveness strategically. Topics include: organizational culture and team building in the age of new business models, virtual work environments, privacy, telecommuting, monitoring Internet access and content, and communication etiquette, electronic teleconferencing, video, data and web conferencing.

ISTM 672. Information Systems Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines the information requirements of an organization. The difference in the kinds of information needed at operational, administrative, strategic and organizational levels are emphasized. Planning and implementing a comprehensive information system and methods to measure its effectiveness are discussed. Topics include Capability Maturity Models, managerial support systems and information resources planning.

ISTM 673. Analysis and Decisions. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Focuses on the analysis and decisions required for selecting new systems or technology. Specifically, the course covers business requirements analysis, system life-cycle models, Unified Process and other system development methodologies, structural and behavioral system models, CASE tools, decision analysis for vendor and technology selection, feasibility and risk analysis, and implementation and transition management.

ISTM 674. Emerging Technologies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Designed to identify emerging computer hardware, software and communication/network technologies that impact the design and implementation of new information systems. Topics will address emerging technologies that are changing data storage, modes of information processing and media for dissemination. Managerial challenges and issues, including new and existing technology compatibility, the return on new technology investments, and strategies for assessing and mitigating an organization's risk exposure are examined.

ISTM 675. IS Planning and Project Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides a basic framework for understanding IT project management, building on the skills needed to manage projects of all sizes. Topics include the project life cycle, project team, project selection, project organization, project planning, negotiation and conflict resolution, and resource management. The responsibility and authority of a program manager and the integration of program functions in a complex organizational structure will be addressed. Through a combination of simulation activities with formal presentations and experiential learning, the following concepts will be addressed: definition of budgets, allocation of resources, consideration of ROI, earned value, management consideration of metrics accumulation and assessment, and control of scope creep.

ISTM 676. Information Systems Assurance and Security Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides a fresh look at managing and protecting the information resources of a firm. While identifying issues, concerns and problems, the course takes students through various tools and techniques that are useful in interpreting information systems security concerns in organizations. In a final synthesis, principles and models are presented that help in proactively managing IS security.

ISTM 677. Structuring Information for Decision Making. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Presents an overview of information systems methods that are used to structure information for decision making. Following a review of the basics of data management, the course examines various database management systems. The course then continues with an investigation of data warehousing, data mining, XML, knowledge management and business intelligence. Students successfully completing the course will understand the range of potential data management options used to present information for decision making and their various strengths and weaknesses.

ISTM 678. IS in the Digital Economy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Expounds on the innovative nature of the confluence of the Web and business. The notion of disruptive technologies is introduced and discussed. Further, the means by which the relative success and failure of IS in the digital economy can be assessed/measured are deliberated. A number of emergent issues related to the digital economy (viz. eTrust, eCRM, social responsibility, etc.) are discussed.

ISTM 679. Enterprise Information Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Over the past decade, organizations have been relying more and more on enterprise-wide deployment of software applications (ERP) to solve their integration problems. This course begins by describing the true size and magnitude of the enterprise integration challenge, then it examines the general form of problem solution offered by these ERP packages. Since implementation of ERPs continues to be a major challenge, the course fully examines both the track record and successful approaches to enterprise information systems implementation. Finally, new developments in this area are explored.

ISTM 691. Topics in IT Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Study of current topics. Topics may vary from semester to semester.

FAST TRACK MBA (FMBA)

FMBA 601. Team Building and Leadership. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 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 602. Team Building and Leadership. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 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. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Presents how to build a foundation in business quantitative techniques. Concepts of accounting/financial reporting, quality, finance concepts, control and hypothesis testing are developed and integrated across disciplines.

FMBA 604. Analysis and Decisions. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 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 605. Analysis and Decisions. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 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 606. Analysis and Decisions. 1-6 Hours.
Semester course; 1-6 lecture hours. 1-6 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. 3 Hours.
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. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 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. Productivity and Innovation. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 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 610. Productivity and Innovation. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 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. Strategic Management. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Presents how organizations define, plan and accomplish missions. Comprehensive integration of business functions and processes; systems thinking, managing shareholder value; anticipating and interacting with changing internal and external environments; formulation and implementation of strategy and integrated across disciplines.

FMBA 612. Strategic Management. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Presents how organizations define, plan and accomplish missions. Comprehensive integration of business functions and processes; systems thinking, managing shareholder value; anticipating and interacting with changing internal and external environments; formulation and implementation of strategy and integrated across disciplines.

FMBA 613. Strategic Management. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Presents how organizations define, plan and accomplish missions. Comprehensive integration of business functions and processes; systems thinking, managing shareholder value; anticipating and interacting with changing internal and external environments; formulation and implementation of strategy and integrated across disciplines.

FMBA 614. Health Care Management I: National Perspective. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Students develop an understanding of how health care evolved in the United States and articulate major policy issues. Course emphasizes the major components of health care reform and what policy issues they are intended to address. Focus is on how information technology supports quality of care, the business of health care and health care reform.

FMBA 615. Health Care Management II: Employer's Perspective. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Students will develop an understanding of the business and financing of health care. Course emphasizes the design of insurance costs, the associated costs and employer options. Also explores how wellness affects population health and health care costs.

FMBA 616. Health Care Management III: Industry Perspective. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Students will develop an understanding of the unique economic issues of health care, the importance of process improvement and compliance for health care organizations and the effect of costs. Course focuses on the roles of innovation and marketing in the health care industry.

FINANCE, INSURANCE AND REAL ESTATE (FIRE)

FIRE 291. Topics in Finance, Insurance and Real Estate. 1-3 Hours.
Variable hours. Variable credit. Maximum of 3 credits per topic. Prerequisite: permission of instructor. An in-depth study of selected business topics. Graded as pass/fail at the option of the department.

FIRE 301. Personal Financial Planning. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Designed to assist households and those providing financial services and advice to households in making complex financial decisions. Units include income and expenditure, credit, borrowing, banking, savings, insurance, home buying, investment, and estate planning.

FIRE 305. Principles of Real Estate. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Focuses on the language, principles, practices and laws that govern the real estate enterprise, including property rights, legal elements, physical aspects of location and production, brokerage, valuation, ethical dimensions, development, financing and land use.

FIRE 306. Regulatory Aspects of Safety and Risk Control. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course is restricted to students who have completed at least 54 credit hours (junior standing). Examines political, scientific and social concepts of risk that influence the regulation of certain societal hazards and threats. Includes a survey of federal and state laws, regulations and standards that impact upon employment, the environment, industrial security, consumer protection and occupational safety and health.

FIRE 307. System Safety. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course is restricted to students who have completed at least 54 credit hours (junior standing). Addresses the concepts and practices of system safety; included are basic system concepts, application of system safety techniques, qualitative and quantitative applications such as fault-free, failure-mode-and-effects, MORT and cost-benefit analyses.

FIRE 308. Incident Investigation and Analysis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course is restricted to students who have completed at least 54 credit hours (junior standing). Reviews various conceptual and analytical models used in accident/incident investigation strategies and reporting systems, report formats, data collection methods, causal inferences, problem identification and data analysis; in-depth case studies and epidemiological reviews of recent events will be emphasized.

FIRE 309. Risk and Insurance. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Nature of risk; insurance and other risk-handling methods; examination of basic life, health, property and liability principles and coverages.

FIRE 311. Financial Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MGMT 212, MATH 200 or SCMA 212; and ACCT 203 or ACCT 202 (for non-business majors). This course is restricted to students who have completed at least 54 credit hours (junior standing) or 24 credits with minimum cumulative GPA of 2.5. Principles of optimal financial policy in the procurement and management of wealth by profit-seeking enterprises; the application of theory to financial decisions involving cash flow, capital structure and capital budgeting.

FIRE 312. Financial Modeling. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FIRE 311 with a minimum grade of C. Enrollment is restricted to students with majors or concentrations offered by the Department of Finance, Insurance and Real Estate who have completed at least 54 credit hours (junior standing). This course is designed to introduce students to a wide array of primarily Excel techniques used in financial model building. Students will be introduced to techniques such as data tables, solver, matrix manipulation, array formulas, pivot tables, etc., to create financial models that are common in the areas of finance, risk management and real estate finance.

FIRE 313. Financial Management for Small Business. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FIRE 311. This course is restricted to students who have completed at least 54 credit hours (junior standing). This course emphasizes financial management needs for entrepreneurs or persons who expect to be employed in closely held corporations.

FIRE 315. Real Property Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course is restricted to students who have completed at least 54 credit hours (junior standing). Real property economics, planning, construction, marketing and management of leased properties.

FIRE 316. International Financial Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FIRE 311. This course is restricted to students who have completed at least 54 credit hours (junior standing). Financial management of business in an international environment. Emphasis on tools and techniques to prepare financial managers of multinational firms to effectively respond to the challenges of the international environment. Crosslisted as: INTL 416.

FIRE 317. Investments. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: FIRE 311; and SCMA 301, STAT 210, STAT 212, STAT 312 or STAT 541. This course is restricted to students who have completed at least 54 credit hours (junior standing). An analysis of the market for long-term corporate securities. Emphasis is given to the valuation of bonds, common stocks, options and convertible securities, and portfolio concepts. Designed to provide an understanding of the functioning of an efficient market.

FIRE 321. Intermediate Financial Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FIRE 312 with a minimum grade of C. Pre- or corequisite: SCMA 302, MATH/STAT 309, STAT 314 or STAT 321. This course is restricted to students who have completed at least 54 credit hours (junior standing). Advanced topics in financial management with emphasis on the theoretical bases for the valuation of the firm.

FIRE 325. Real Estate Law. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course is restricted to students who have completed at least 54 credit hours (junior standing). Legal fundamentals of real estate including contracts, risk management, environmental and ethical issues, concepts of title, title examination, easements, conveyances, liens and recording statutes affecting real estate.

FIRE 329. E-business Risk Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 202. This course is restricted to students who have completed at least 54 credit hours (junior standing). An analysis of the risks associated with e-business and the practice of e-commerce.

FIRE 359. Issues in Risk Management and Insurance. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: junior standing. The course focuses on timely issues in the field of risk management and insurance. Students will consider the role of government and the insurance industry as well as the use of other financial solutions in handling risks faced by businesses and individuals. The topics covered change to reflect current societal and industry issues and to explore new risk management innovations.

FIRE 413. Comparative Financial Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FIRE 311. This course is restricted to students who have completed at least 54 credit hours (junior standing). An analysis of the structure and functioning of financial systems in different parts of the world. Emphasis is on the evolution of such systems in relation to the U.S. financial system. Different regions of the world may be studied in different semesters. Crosslisted as: INTL 413.

FIRE 417. Security Analysis and Portfolio Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: FIRE 317 with a minimum grade of C; and SCMA 302, MATH 309/STAT 309, STAT 314 or STAT 321. This course is restricted to students who have completed at least 54 credit hours (junior standing). A detailed analysis of stocks and bonds as well as options and futures. Emphasis is on models for portfolio selection, revision and performance evaluation.

FIRE 419. Advanced Risk and Insurance. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FIRE 311. This course is restricted to students who have completed at least 54 credit hours (junior standing). It is a risk and insurance course with emphasis on more mathematical computations and analysis. Market, credit and operational risks are covered, along with legal and catastrophic risk assessments. Sustainability is important to this course. Topics covered include (but not limited to) forecasting of losses -- loss triangles and computations of reserves; risk mapping and the risk management matrix; cost/benefit and risk/award analyses; pricing; capital structure, risk-based capital and economic capital; financial statements using audit techniques (accounting); insurance regulation; life cycle financial risks; insurance solutions to property/casualty and life/health risks.

FIRE 424. Property and Liability Insurance. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FIRE 309. This course is restricted to students who have completed at least 54 credit hours (junior standing). Property and liability risk identification and measurement. Major commercial line coverages including fire, marine, automobile, general liability, worker's compensation, fidelity and surety bonds.

FIRE 425. Real Estate Appraisal. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FIRE 305 or FIRE 316. This course is restricted to students who have completed at least 54 credit hours (junior standing). Theory and practice of real property valuation from fundamental concepts to complex income-producing properties and partial-interest valuations. Technology-related tools are employed in the course, including financial modeling with various software programs.

FIRE 429. Property and Liability Insurance. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FIRE 309 or FIRE 333. This course is restricted to students who have completed at least 54 credit hours (junior standing). Property and liability risk identification and measurement. Major commercial line coverages including fire, marine, automobile, general liability, worker's compensation, fidelity and surety bonds.

FIRE 435. Real Estate Finance and Capital Markets. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Corequisite: FIRE 311. This course is restricted to students who have completed at least 54 credit hours (junior standing). Instruments, techniques and institutions of real estate finance; the mortgage market; financing process; mortgage risk analysis; creative financing; emphasis on policies and procedures used in financing residential and commercial properties and their interaction with the capital markets. Technology-related tools are employed in the course, including financial modeling with various software programs.

FIRE 439. Life and Health Insurance. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: junior standing. The function, nature and uses of life and health insurance and annuities; operational aspects of life insurance companies. The course covers insurance solutions for life cycle risks: death; health and longevity – sustainability; legal and tax aspects. Full-time students who pass this course can receive credit for the CLU HS323 examination from the American College. See instructor for details.

FIRE 441. Funds Management in Financial Institutions. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FIRE 312 with a minimum grade of C. This course is restricted to students who have completed at least 54 credit hours (junior standing). Funds management techniques for selected financial institutions including investment companies (mutual funds), life and casualty insurers, savings and loans, mutual savings banks, commercial banks, and pension funds.

FIRE 444. Occupational Safety, Health and Security. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Covers the principles and practices, and regulatory dimensions of occupational safety, health and security. Causes of workplace health hazard exposures, accidents and domestic and international industrial violence are studied with an emphasis on prevention. Characteristics of effective occupational safety, health and workplace security programs are studied to facilitate understanding and application in the workplace. Crosslisted as: MGMT 444.

FIRE 445. Real Estate Investment Analysis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: FIRE 425 and FIRE 435. This course is restricted to students who have completed at least 54 credit hours (junior standing). This is the capstone course for real estate majors and covers the analytical methods and tools useful for analyzing commercial real estate investments, including a multidisciplinary approach to financial, spatial and social economics, which builds a cohesive framework for analyzing complex investment decisions emphasizing fundamentals of property and financial markets.

FIRE 449. Employee Benefit Planning. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Management of group life, health, disability and retirement plans. Governmental and employers' solutions to life cycle risks -- sustainability through social insurance programs, group insurance and innovations. The course reflects the dynamic nature of this field and requires cost/benefits analysis, best solutions to risks and a complete portfolio project of plan design, cost considerations, funding, regulation and tax considerations.

FIRE 451. Options, Futures and Swaps. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FIRE 321 with a minimum grade of C or FIRE 317 with a minimum grade of C. This course is restricted to students who have completed at least 54 credit hours (junior standing). Analysis and valuation of speculative securities and markets, including options, futures and swaps, with emphasis on their use for hedging and speculative purposes. Major valuation models and term structure models are discussed with applications to problems in finance considered.

FIRE 459. Insurance Law. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: junior standing. The course covers the legal concepts and doctrines applicable to insurance. Fundamental legal aspects of all risks and aspects of sustainability. The course provides legislative issues for all solutions to life cycles risks: life and health insurance, pensions, catastrophes (natural and man-made such as terrorism) and property and liability insurance.

FIRE 461. Cases in Financial Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FIRE 321 with a minimum grade of C. This course is restricted to students who have completed at least 54 credit hours (junior standing). Cases involving financial decisions for various forms of business enterprises.

FIRE 469. Advanced Property/Casualty Insurance: Alternative Markets. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FIRE 309 or FIRE 419. This course is restricted to students who have completed at least 54 credit hours (junior standing). Property and liability risk with emphasis on alternative, less-regulated insurance solutions to all types of risks. The course includes sustainability issues and the way to mitigate natural and man-made catastrophes including sophisticated modeling and techniques. The course covers Lloyds of London; excess and surplus lines carriers; risk retention group, self-insurance, captives and shadow insurance; reinsurance; multilayers of coverage; catastrophe bonds; terrorism; regulation; liability issues globally; social responsibility.

FIRE 479. Managing Financial Risk. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: FIRE 309 and FIRE 317. This course is restricted to students who have completed at least 54 credit hours (junior standing). Sources of financial risk. Measurement and uses of enterprisewide financial risk techniques. A variety of analytical tools will be used to learn about value at risk, credit risk, stress testing, financial risk management and actuarial models, and how to manage financial risk.

FIRE 491. Topics in Finance, Insurance and Real Estate. 1-3 Hours.
Semester course; variable hours. Variable credit. Maximum of 3 credits per course; maximum total of 6 credits for all topic courses. Prerequisite: junior standing. An in-depth study of a selected business topic, to be announced in advance.

FIRE 492. Independent Study in Finance, Insurance and Real Estate. 1-3 Hours.
Semester course; 1-3 credits. Maximum total of 3 credits. Prerequisites: junior or senior standing as a major in a business curriculum and approval of adviser and department chair prior to course registration. Intensive study under supervision of a faculty member in an area not covered in-depth or contained in the regular curriculum.

FIRE 493. Internship in Finance, Insurance and Real Estate. 3 Hours.
Semester course; 3 credits. Course restricted to students with junior standing and a concentration in finance or risk management and insurance or a declared major in financial technology or real estate, a minimum GPA of 2.5, and permission of the Department of Finance, Insurance and Real Estate chair or the director of the insurance or real estate programs. Involves students in a meaningful experience in finance, insurance or real estate. Intention to enroll must be indicated to the chair or appropriate program director.

FIRE 520. Financial Concepts of Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Pre- or corequisites: MGMT 524, STAT/BIOS 543, STAT 541, or MGMT 301 and MGMT 302. Not open to students who have completed FIRE 311 or the equivalent. A study of the essential concepts of financial management in a global environment, including working capital management, capital budgeting, capital structure planning and dividend policy. This is a foundation course.

FIRE 533. Insurance Education Institute for High School Teachers. 3 Hours.
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 620. Introduction to Financial Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of essential concepts of financial management in a global environment, including time value, capital budgeting and valuation, cost of capital structure, divided policy, and working capital management, at a level appropriate to the Master of Management program.

FIRE 621. Cases in Financial Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FIRE 623. Analysis, in a global environment, of financial problems and policies of nonfinancial firms, including capital management, capital rationing and cost of capital, and capital structure.

FIRE 622. Financial Management of Financial Institutions. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FIRE 520. Understanding the application of concepts relevant to the financial management of financial institutions in a global environment.

FIRE 623. Financial Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FIRE 520. 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: FIRE 520 and MGMT 530. 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 directly 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FIRE 623 or FIRE 635. Property and liability risks faced by businesses and public institutions are studied. Insurance and alternative methods of controlling and financing these risks are analyzed and compared. Courses directly 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the development process; including market analysis, site selection, pre-acquisition strategic planning, and project management.

FIRE 628. Using GIS in Real Estate Decisions. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Acquaints students with Geographic Information Systems technology 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Housing demand forecasting, commercial site selection, and real estate investment analysis.

FIRE 635. Investments and Security Analysis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: FIRE 520; and MGMT 524, STAT/BIOS 543, STAT 541, or MGMT 301 and MGMT 302. The process 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 323 or MGMT 530. 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FIRE 520. A study of financial management of multinational enterprises, banks, firms with foreign subsidiaries, exporters, and service industries. Additionally, financing trade and investments, international money and capital markets, foreign exchange risks, and governmental policies will be covered.

FIRE 650. Derivatives. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FIRE 520. Analysis of derivatives contracts: forwards, futures, swaps and options. Study of valuation, pricing and use of derivatives to manage risk in a global environment.

FIRE 654. Short-term Financial Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FIRE 520. 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 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FIRE 431. 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: Approval of proposed work is required by graduate studies office in the School of Business. This course is designed to provide research experience for candidates not following the FIRE 798-799 program.

FIRE 691. Topics in Finance, Insurance and Real Estate. 1-3 Hours.
Semester course; 1-3 lecture hours. 1, 2 or 3 credits. Prerequisites vary by topic. Study of current topics. Topics may vary from semester to semester.

FIRE 693. Field Project in Finance, Insurance and Real Estate. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: Approval of proposed work is required by graduate studies office in the School of Business. Students will work under the supervision of a faculty adviser 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. 1-3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: Approval of proposed work is required by graduate studies office in the School of Business. Graduate students wishing to do research on problems in business administration or business education in an international environment 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.

FOREIGN LANGUAGES (FRLG)

FRLG 100. Basic Language and Cultural Awareness Abroad: ____. 1 Hour.
Semester course. 1 lecture hour. 1 credit. Introduces basic language skills and cultural customs and expectations to students of all disciplines planning foreign travel to a specific location. Students will learn useful vocabulary and phrases to apply in many different travel situations. Predominant focus will be placed on the culture of the specific region and include foundational communication skills. This course cannot be used to fulfill foreign language requirements for major, minor, collateral or General Education purposes. See Schedule of Classes for specific languages being taught each semester. Graded as pass/fail.

FRLG 101. Foreign Languages: ____. 4 Hours.
Continuous courses; 5 lecture/recitation hours. 4-4 credits. Prerequisite: completion of FRLG 101 to enroll in FRLG 102. Elementary grammar, reading and oral skills. Course may be repeated with different languages.

FRLG 102. Foreign Languages: ____. 4 Hours.
Continuous courses; 5 lecture/recitation hours. 4-4 credits. Prerequisite: completion of FRLG 101 to enroll in FRLG 102. Elementary grammar, reading and oral skills. Course may be repeated with different languages.

FRLG 201. Foreign Languages: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FRLG 102. Continuation of the essentials of grammar with emphasis on achieving proficiency in aural comprehension, speaking, reading and writing skills. Course may be repeated with different languages.

FRLG 202. Foreign Languages: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FRLG 201. Designed to increase the student's proficiency through the study of selected cultural and literary texts. Course may be repeated with different languages.

FRLG 204. Language and Groups in the United States. 3,4 Hours.
Semester course; 3-4 lecture hours. 3-4 credits. Taught in English. This course introduces students to the sociocultural experience and formation of identity of non-English-speaking peoples in the United States. Students explore the dynamic between English and a specific heritage language and its interaction with artistic, cultural and social issues through fiction and nonfiction texts, films and multimedia pertaining to specific language groups, such as: Latinos, Italian-Americans, German-Americans or Native Americans. See the Schedule of Classes for specific topics to be offered each semester. Crosslisted as: INTL 204.

FRLG 328. Language, Culture and Cognition. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ANTH 220 or 230. Introduces theoretical and methodological foundations for the study of language from sociocultural perspectives. The perspectives include linguistic, philosophical, psychological, sociological and anthropological contributions to the understanding of verbal and nonverbal communication as a social activity embedded in cultural contexts. No prior training in linguistics is presupposed. Crosslisted as: ANTH 328/ENGL 392/LING 392.

FRLG 345. Great Cities of the World. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated under different topics for a total of 6 credits. Enrollment restricted to students with sophomore standing or with permission of instructor. An interdisciplinary course with a focus on the origin, expansion and significance of one or more cities, the specifics of its/their culture and the role of language. Particular emphasis will be placed on relating the physical, social and economic aspects of the city's growth and development to the cultural expression of urbanism. Crosslisted as: INTL 345/URSP 350.

FRLG 493. World Languages Internship. 1-3 Hours.
Semester course; variable hours. 1-3 credits (40 clock hours per credit). May be repeated for a maximum of 6 credits, however only 3 credits can count toward the major concentration. Prerequisites: prior completion of 9 credits in the respective foreign language at the 300 level, with a course in advanced grammar and composition, one in conversation and one in civilization. Designed for the advanced student to gain workplace experience in the target foreign language in internationally oriented public and private organizations and agencies. All course work must be completed in the target language.

FRLG 510. Language Learning and Technology. 3 Hours.
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 also will be given to considerations of learning style, curricular integration and enhancement.

FRLG 575. Intercultural Communication. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An experientially oriented seminar for persons preparing for or in careers necessitating intercultural communication among persons of differing cultural and/or national backgrounds. Special attention is given to teachers and other professionals who work with a clientele from Latin America, the Middle East, Asia, Africa and Eastern Europe. American cultural patterns broaden understanding of specific groups and engagement in intercultural communication. Crosslisted as: TEDU 575.

FRLG 591. Topics in Foreign Languages. 1-4 Hours.
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.

FOREIGN LITERATURE IN ENGLISH TRANSLATION (FLET)

FLET 321. Early German Literature. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Changing perspectives in German literature from its pagan beginnings, through the Medieval Golden Age, Baroque extremism, the Enlightenment and Storm and Stress up to Classicism and Goethe's Faust. Treatment of The Nibelungenlied, the courtly epic, Simplicissimus, and selections by Lessing, Schiller and Goethe. This course will not satisfy foreign language requirements. No knowledge of German is required. All work is done in English.

FLET 322. Modern German Literature. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Growing psychological awareness and alienation of the individual in German literature of the 19th and 20th centuries. Representative works chosen from among writers of the past century and such modern writers as Thomas Mann, Kafka, Hesse, Brecht, Kafka, Hesse, Brecht, Boll and Grass. This course will not satisfy foreign language requirements. No knowledge of German is required. All work is done in English.

FLET 391. Topics in Foreign Literature in English Translation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with different topics for a maximum of 12 credits. An in-depth study of selected topics in foreign literature. This course will not satisfy foreign language requirements. No knowledge of a foreign language is required. All work is done in English. Crosslisted as: INTL 391.

FLET 492. Independent Study. 1-3 Hours.
Semester course; 1, 2 or 3 credits. Maximum of 3 credits per semester, maximum total of 6 credits for all FLET independent study courses. Open generally to students of only junior or senior standing who have acquired at least 12 hours in any literature course. Determination of course content and permission of the instructor and department chair must be obtained prior to registration of the course. A course designed to give students an opportunity to become involved in independent study in a literary or linguistic area or subject in which they have an interest and for which they have the necessary background.

FORENSIC SCIENCE (FRSC)

FRSC 202. Crime and Science. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Introduces the scientific theory, concepts and practices used in any physical science by relating them to the analysis of physical evidence performed in forensic laboratories and the fundamentals of crime scene investigation, and their relationship to the criminal justice system and criminal investigations. Not applicable for credit toward B.S. in Forensic Science.

FRSC 300. Survey of Forensic Science. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 151 and BIOZ 151, each with a minimum grade of C. Pre- or corequisites: CHEM 301 and CHEZ 301, and UNIV 200 or HONR 200. Enrollment restricted to forensic science majors or by permission of instructor. Introduces the theory, concepts and practices used in the analysis of physical evidence performed in crime laboratories, and the fundamentals of crime scene investigation. Also introduces ethical and quality assurance issues of crucial importance in modern crime laboratories.

FRSC 309. Scientific Crime Scene Investigation. 3 Hours.
Semester course; 3 lecture/laboratory hours. 3 credits. Prerequisites: CHEM 301 and either FRSC 300 or FRSC 350, each with a minimum grade of C. Enrollment restricted to forensic science majors or by permission of instructor. Provides scientific theory of crime scene investigation and crime scene reconstruction and basic knowledge of proper crime scene protocol and evidence processing techniques. Includes the processes for documentation, collecting and preserving physical evidence.

FRSC 310. Forensic Anthropology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ANTH 210 with a minimum grade of C. A comprehensive overview of forensic anthropology including its development and the theory and methodology on which it is based. Crosslisted as: ANTH 310.

FRSC 325. Forensic Medicine. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: FRSC 300, CHEM 301 and CHEZ 301, each with a minimum grade of C. Enrollment restricted to forensic science majors or by permission of instructor. An investigation of topics in death scene investigations as well as autopsy findings associated with natural and unnatural deaths.

FRSC 365. Forensic Microscopy. 4 Hours.
Semester course; 4 lecture/laboratory hours. 4 credits. Prerequisites: CHEM 301 and either FRSC 300 or FRSC 350, each with a minimum grade of C. An in-depth course in the theory and practical application of microscopy to the examination, identification and individualization of physical evidence submitted to forensic laboratories.

FRSC 375. Forensic Evidence, Law and Criminal Procedure. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Pre- or co-requisites: FRSC 300 or FRSC 350. Open only to forensic science majors or by permission of instructor. The law of criminal procedure and rules of evidence as applied to forensic science. Topics will include scientific versus legal burdens of proof, legal terminology and trial procedure.

FRSC 385. Forensic Serology. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisites: CHEM 301 and either FRSC 300 or FRSC 350, each with a minimum grade of C. Examines the application of basic chemical, biological, immunological and microscopic laboratory techniques to the examination and identification of body-fluid stains, including both presumptive and/or confirmatory identification of blood, semen, saliva, urine and feces. Applies methods that are used in forensic laboratories to identify the species of origin and includes a review of advanced methods for automated serological analysis. Laboratory exercises will supplement lectures to give students practical knowledge of the laboratory procedures.

FRSC 391. Topics in Forensic Science. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Maximum total of 6 credits for all forensic science topics courses may be applied to the major. Prerequisites: CHEM 301 and either FRSC 300 or FRSC 350, each with a minimum grade of C. A study in selected topics in forensic science. See the Schedule of Classes for specific topics to be offered each semester and additional prerequisites.

FRSC 400. Forensic Chemistry. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CHEM 409 and CHEZ 409; and either FRSC 300 or FRSC 350, each with a minimum grade of C. Provides an understanding of presumptive and confirmatory chemical analyses used in a forensic laboratory for the characterization and identification of physical evidence, such as accelerants and explosives, paints and polymers, suspected drug substances, and toxicology. Chemical analyses as pertaining to firearms, toolmarks and glass will also be explored.

FRSC 410. Forensic Pattern Evidence. 3 Hours.
Semester course; 3 lecture/laboratory hours. 3 credits. Prerequisite: FRSC 309 with a minimum grade of C. Enrollment restricted to forensic science majors or by permission of instructor. Covers topics in pattern evidence analysis including analysis of latent prints and impression evidence of footwear and tire treadmarks as applied to forensic casework. Covers both the theoretical and practical aspects using lectures and laboratory exercises focusing on the visualization, examination and interpretation of pattern evidence.

FRSC 412. Forensic Analysis of Firearms and Toolmarks. 3 Hours.
Semester course; 3 lecture/laboratory hours. 3 credits. Prerequisite: FRSC 365 with a minimum grade of C. Enrollment restricted to forensic science majors or by permission of instructor. An investigation of topics in firearms and toolmark examination for forensic applications. Covers both theoretical and practical aspects using lectures and laboratory exercises.

FRSC 438. Forensic Molecular Biology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CHEM 302, CHEZ 302, and BIOL 310 or equivalent, each with a minimum grade of C. Provides an understanding of molecular biology testing methodologies as applied to analysis of forensic samples. Current topics in forensic DNA analysis will include quality assurance, DNA databanking, contemporary research and population genetics. Crosslisted as: BIOL 438.

FRSC 445. Forensic Toxicology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CHEM 301, CHEM 302 and CHEZ 301, each with a minimum grade of C. Provides a comprehensive overview of the basic principles of toxicology and the practical aspects of forensic toxicology. 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 investigation. Crosslisted as: PATH 445.

FRSC 490. Professional Practices in Forensic Science. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CHEM 301; FRSC 300 or FRSC 350; and one additional forensic science course, each with a minimum grade of C. Enrollment restricted to seniors in forensic science with at least 85 credit hours toward the degree. An examination and evaluation of historical and current issues in the scientific analysis of physical evidence in criminal investigations. Individual and group activities relating to professional practices (ethics, quality control and testimony) of forensic scientists.

FRSC 492. Forensic Science Independent Study. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May be repeated for a maximum of 6 credits. Prerequisites: CHEM 301; and FRSC 300 or FRSC 350, each with a minimum grade of C. Enrollment restricted to forensic science majors with junior or senior standing and a minimum GPA of 2.5. A determination of the amount of credit and the written permission of both the instructor and the program director must be procured prior to registration for the course.

FRSC 493. Forensic Science Internship. 3 Hours.
Semester course; 3 credits. May be taken only once. Prerequisites: 27 forensic science core program credits and at least a 2.75 GPA. Open only to forensic science majors with senior standing. An application is required in advance of admission with permission of the internship coordinator. Through placement in an approved organization, the student will obtain a broader, more practical knowledge of forensic science and its applications. Written progress and final reports are required. Graded as pass/fail.

FRSC 505. Forensic Entomology. 3 Hours.
Semester course; 3 lecture and 1 laboratory hour. 3 credits. Enrollment requires permission of instructor. Course focuses on proper collection, preservation and identification of entomological evidence. Students collect entomological evidence from a mock crime scene and utilize these specimens for estimation of minimum postmortem interval. There is a significant laboratory component.

FRSC 510. Developmental Osteology. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: FRSC 300; ANTH 307 and ANTZ 307; ANTH 310; graduate standing in forensic science; or permission of instructor. Examines the human musculoskeletal system and its development from an embryonic state to the adult form. Students learn the developmental course of each bone in the human skeleton and those of the associated soft tissue structures. Students are provided with training in the recognition of skeletal elements and bony landmarks, siding skeletal elements (and fragments thereof), knowledge of muscle structure and function and knowledge of nervous and venous structures associated with bony landmarks. Developmental defects and trauma associated with birth and child abuse are discussed. Juvenile age estimation from bones and radiographic images are emphasized.

FRSC 515. Advanced Forensic Anthropology. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: FRSC 510; ANTH 307 and ANTZ 307; or permission of instructor. Focuses on estimation of the biological profile, statistical basis of estimations, pathological conditions, analysis of antemortem and perimortem trauma, human identification in mass casualty situations, age estimation of living individuals and writing of case reports. Techniques discussed will include macroscopic and microscopic analysis of morphology, histological analysis, radiographs and CT scans. There is a significant laboratory component.

FRSC 520. Forensic Fire Investigation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FRSC 375 with a minimum grade of C (for undergraduate students), FRSC 670 or equivalent. Examines the specialized field of forensic fire investigation including on-scene investigation, fire theory, accelerant-assisted burn patterns and expert-witness testimony.

FRSC 565. Scientific Crime Scene Investigation. 3 Hours.
Semester course; 3 lecture and/or laboratory hours. 3 credits. Presents the theory and techniques of scientific crime scene investigation including: recognition, documentation, collection and enhancement of physical evidence. A comprehensive introduction to the use of physical evidence for crime scene reconstruction is presented.

FRSC 566. Advanced Crime Scene Investigation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FRSC 309 with a minimum grade of C (for undergraduate students), FRSC 565 or equivalent. An advanced study of the methods and techniques of crime scene investigation with an emphasis on crime scene reconstruction by the use of physical evidence. Course will include extensive practical applications with mock crime scenes.

FRSC 570. Forensic Science Seminar. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Must be repeated a minimum of three times for three credits. A seminar course featuring presentations by faculty, crime laboratory staff, students and visiting lecturers. Instruction includes discussions of research and developments and current topics in various forensic science disciplines and related fields.

FRSC 580. Applied Statistics for Forensic Science. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: STAT 210, STAT 212 or equivalent statistics knowledge; or graduate standing in forensic science. The course will focus on the forensic applications of data visualization methods, hypothesis testing, analysis of variance, correlation measures, regression, multivariate analyses and concepts in database "matching" procedures. Techniques discussed will include ANOVA, MANOVA, principal component analysis, non-metric multidimensional scaling, discriminant function analysis and machine learning/neural network analysis.

FRSC 591. Topics in Forensic Science. 1-3 Hours.
Semester course; variable lecture hours. 1-3 credits; maximum of 6 credits for all forensic science topic courses may be applied to major. Prerequisite: graduate standing in the forensic science program or permission of instructor required for enrollment. A study in selected topics in forensic science. See the Schedule of Classes for specific topics to be offered each semester and additional prerequisites.

FRSC 607. Forensic Taphonomy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Focuses on the process and sequence of human decomposition, as well as the burial, water disposal and surface dispersal of human remains. The course covers current issues in taphonomic research and practical application, including both domestic and international examples of mass disasters and mass graves. An understanding of the principles of archaeological stratigraphy is an integral part of the course. There is a significant laboratory component.

FRSC 644. Forensic Toxicology. 3 Hours.
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. Crosslisted as: PHTX 644.

FRSC 661. Analysis of Pattern Evidence. 3 Hours.
Semester course; 2 lecture and 3 laboratory hours. 3 credits. Prerequisites: FRSC 673 and FRSZ 673L or equivalents. Covers topics in pattern evidence analysis including analysis of latent prints, impression evidence and bloodstain pattern analysis as applied to forensic casework. The course covers both the theoretical and practical aspects, using lectures and laboratory exercises focusing on the collection, analysis and interpretation of pattern evidence.

FRSC 662. Firearm and Toolmark Identification. 3 Hours.
Semester course; 2 lecture and 3 laboratory hours. 3 credits. Prerequisites: FRSC 673 and FRSZ 673L or equivalents. Covers topics in firearm and toolmark identification as applied to forensic casework. The course covers both the theoretical and practical aspects, using lectures and laboratory exercises.

FRSC 663. Forensic Medicine. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Covers the fundamentals of forensic medicine including topics such as forensic death investigations, postmortem changes, time-of-death determinations, identification of unknown human remains and the forensic pathology of natural and traumatic deaths in adults and children. The characteristics and diagnosis of various types of trauma as well as the characteristics of common natural diseases that cause sudden death will be presented.

FRSC 670. Forensic Evidence and Criminal Procedure. 3 Hours.
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.

FRSC 671. Instrumentation in Forensic Chemistry. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Theory and applications of chromatography, mass spectrometry and spectroscopy as used in modern crime laboratories. Instruction will focus on instrumental analysis as applied to drug analysis, toxicology, fire debris identification and general trace evidence examination.

FRSC 672. Advanced Drug Analysis. 3 Hours.
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.

FRSC 673. Forensic Microscopy. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Establishes the foundation for the theory of microscopy. The knowledge acquired in this course can be applied to forensic disciplines such as firearms examinations, forensic biology, controlled substances, questioned documents and trace evidence.

FRSC 675. Forensic Serology and DNA Analysis. 2 Hours.
Semester course; 2 lecture and/or laboratory hours. 2 credits. Presents the theory and methodology used for the examination and identification of body fluid stains and determination of species. Provides students an introduction to the theory and methodology of forensic DNA analysis as well as forensic DNA quality control issues. Instruction will focus on molecular biology techniques as they are applied in a forensic DNA crime laboratory setting.

FRSC 676. Advanced Forensic DNA Analysis. 3 Hours.
Semester course; 2 lecture and 3 laboratory hours. 3 credits. Focuses on the specific principles and modern procedures used for analysis of forensic nuclear and mitochondrial DNA evidence. Other topics include current research and development for forensic DNA instrumentation and applications, statistical interpretation of results and case report writing. Students gain individualized, hands-on experience with DNA procedures and instrumentation in the laboratory exercises. Students will process mock forensic casework.

FRSC 677. Professional Practices and Expert Testimony. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: must have successfully completed a minimum of 18 credit hours in the forensic science master's degree program. Topics related to professional practices in the forensic science field will be covered, including ethics, bias, quality assurance, laboratory management and professional development. Individual and group activities relating to these topics will be completed. Additionally, this course will examine forensic expert testimony in the courtroom, communication of scientific findings to a general audience, trial preparation and cross-examination in moot court format.

FRSC 680. Forensic Psychiatry. 3 Hours.
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. Crosslisted as: CRJS 680.

FRSC 681. Analysis of Fire Debris and Explosives. 3 Hours.
Semester course; 2 lecture and 3 laboratory hours. 3 credits. Prerequisites: FRSC 671, FRSC 673 and FRSZ 673L or equivalents. Presents the collection, analysis and interpretation of fire debris and explosives as they are applied in forensic casework. Covers the theoretical and practical aspects. Laboratory exercises include hands-on instruction with appropriate instrumentation and techniques, including stereomicroscopy, gas chromatography, GC-MS, thin layer chromatography, HPLC and FT-IR.

FRSC 682. Forensic Analysis of Paint and Polymers. 3 Hours.
Semester course; 5 lecture/laboratory hours. 3 credits. Prerequisites: FRSC 671, FRSC 673 and FRSZ 673L or equivalents. Covers topics in paint and polymer analysis including collection, classification and analysis of paint and fiber evidence as applied to forensic casework. The course covers the theoretical and practical aspects, using lectures and laboratory exercises. Laboratory exercises include hands-on instruction with appropriate instrumentation and techniques, including stereomicroscopy, microchemical testing, fluorescence molecular tomography, fluorescence microscopy, FT-IR and polarizing light microscopy.

FRSC 690. Scientific Writing. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Enrollment restricted to students in the M.S. in Forensic Science program. Focuses on scientific writing techniques, including abstracts, posters, review articles and research proposals. Emphasis will be placed on writing for scientific journals in forensic science and other peer-reviewed journals.

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

FRSC 693. Current Topics in Forensic Science. 1 Hour.
Semester course; 1 lecture hour. 1 credit. May be repeated for credit. A course designed to develop skills in reading journal manuscripts and delivering oral presentations in conjunction with an in-depth study of a current topic in forensic science. Student will conduct library research, present talks and lead discussions on the selected topic. See the Schedule of Classes for specific current topics course to be offered each semester and prerequisites.

FRSC 792. Research Techniques. 1 Hour.
Semester course; 3 laboratory hours. 1 credit. Enrollment restricted to students with graduate standing in forensic sciences and with permission of faculty mentor. Application of basic laboratory methods used in forensic science to the investigation of topics of interest. Emphasis on experimental design, data collection and analysis, communication skills, and critical thinking. Graded as Satisfactory/Unsatisfactory.

FRSC 793. Directed Research in Forensic Science. 1-3 Hours.
Semester course; variable laboratory hours. 1-3 credits. Prerequisite: must have successfully completed a minimum of 18 credit hours in the forensic science master's degree program or have permission of the instructor. Students must apply to the program director for this directed research experience one semester in advance of enrollment. A capstone course in which students will conduct independent, original laboratory research in a forensic specialization area of interest, while also gaining practical experience in crime laboratory practices and methods. This laboratory research experience will culminate in a presentation of the project results at a campus seminar and/or professional conference, and a written technical report of publishable quality. A minimum of 300 hours of laboratory research and a minimum of 3 credits are required for graduation.

FORENSIC SCIENCE LAB (FRSZ)

FRSZ 391. Topics in Forensic Science Laboratory. 1-3 Hours.
Semester course; variable laboratory hours. 1-3 credits. Maximum total of 6 credits for all forensic science topics courses may be applied to the major. Prerequisite: FRSC 300 or 350. Laboratory investigations in a selected topic in forensic science. See the Schedule of Classes for specific topics to be offered each semester and additional prerequisites.

FRSZ 400. Forensic Chemistry Laboratory. 2 Hours.
Semester course; 4 laboratory hours. 2 credits. Pre- or corequisite: FRSC 400. Practical laboratory application with instrumentation used in a forensic laboratory for the chemical analysis of various types of physical evidence, including accelerants, explosives, paints, fibers, glass, suspected drug substances and other evidence.

FRSZ 438. Forensic Molecular Biology Laboratory. 2 Hours.
Semester course; 3 laboratory hours. 1 credits. Pre- or corequisite: BIOL/FRSC 438. Provides comprehensive coverage of the various types of DNA testing currently used in forensic science laboratories. Students will have hands-on experience with the analytical equipment employed in forensic science laboratories and the techniques for human identification in forensic casework. Students also will explore and practice both scientific writing and writing of DNA case reports. Crosslisted as: BIOZ 438.

FRSZ 673. Forensic Microscopy Laboratory. 1 Hour.
Semester course; 3 laboratory hours. 1 credit. Establishes the foundation for the application and methodology of microscopy. The knowledge acquired in this course can be applied to forensic disciplines such as firearms examinations, forensic biology, controlled substances, questioned documents and trace evidence. The course consists of laboratory exercises and demonstrations.

FRSZ 675. Forensic Serology and DNA Analysis Laboratory. 1 Hour.
Semester course; 3 laboratory hours. 1 credit. Presents the chemical, immunological and microscopic laboratory techniques commonly used for the examination and identification of body fluid stains and determination of species. Provides working knowledge and hands-on practice with basic forensic DNA procedures, including DNA extractions, quantitation, PCR amplification analysis/genotyping. Instruction focuses on molecular biology techniques as applied in a forensic DNA laboratory.

FRSZ 792. Research Techniques. 1 Hour.
Semester course; 3 laboratory hours. 1 credit. Enrollment restricted to students with graduate standing in forensic science and permission of faculty mentor. Application of basic laboratory methods used in forensic science to the investigation of topics of interest. Emphasis on experimental design, data collection and analysis, communication skills, and critical thinking. Graded as Pass/Fail.

FRENCH (FREN)

FREN 101. Elementary French. 4 Hours.
Continuous courses; 5 lecture/recitation hours. 4-4 credits. Prerequisite: completion of FREN 101 to enroll in FREN 102. Elementary grammar, reading and oral drill.

FREN 102. Elementary French. 4 Hours.
Continuous courses; 5 lecture/recitation hours. 4-4 credits. Prerequisite: completion of FREN 101 to enroll in FREN 102. Elementary grammar, reading and oral drill.

FREN 110. Intensive French I. 8 Hours.
Semester course; 10 lecture and laboratory hours. 8 credits. This intensive course combines FREN 101 and 102 into a single semester.

FREN 201. Intermediate French. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FREN 102. Continuation of the essentials of grammar with emphasis on achieving proficiency in aural comprehension, speaking, reading and writing skills.

FREN 202. Intermediate French Readings. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FREN 201. In order to complete French through the intermediate level, a student may select FREN 202 or 205. Designed to increase the student's proficiency through the study of selected cultural and literary texts.

FREN 205. Intermediate Conversation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FREN 201. Designed to increase the student's proficiency in the spoken language through audio-oral exercises, dialogues and free conversation.

FREN 210. Intensive French II. 6 Hours.
Semester course; 6 lecture and laboratory hours per week. 6 credits. Prerequisites: FREN 101 and 102, or FREN 110. This intensive course combines FREN 201 and 202/205 into a single semester.

FREN 295. Gateway to the French Major/Minor. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FREN 201 or permission of instructor. Non-foreign language majors who wish to take one or two upper-level classes only need to complete FREN 202, 205 or equivalent. This course is composed of three different areas: 1) writing and analytical skills: enhancement of grammatical and writing skills and development of analytical techniques using a variety of texts; 2) improving students' oral communication; 3) listening skills: extensive use of recorded material and Language Learning Center resources to improve and enhance listening skills in a variety of authentic contexts.

FREN 300. Advanced Grammar and Writing. 3 Hours.
Semester courses; 3 lecture hours. 3, 3 credits. Prerequisites: for FREN 300: FREN 202 or 205; for 301, FREN 202, 205 or 300. Conducted in French. A systematic review of French grammar with emphasis on the elements of style and vocabulary building; translation and composition.

FREN 301. Advanced Grammar and Writing. 3 Hours.
Semester courses; 3 lecture hours. 3, 3 credits. Prerequisites: for FREN 300: FREN 202 or 205; for 301, FREN 202, 205 or 300. Conducted in French. A systematic review of French grammar with emphasis on the elements of style and vocabulary building; translation and composition.

FREN 305. Advanced Conversation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FREN 202 or 205. Conducted in French. Development of advanced oral skills while conversing about topics on current French culture and society. Proficiency in listening comprehension is stressed through regular activities based on a variety of different situations of communication.

FREN 307. French Conversation and Film. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FREN 202, 205 or 300. The course is designed to develop the student's conversational skills, oral comprehension ability and knowledge of contemporary culture through discussion of selected French films. Emphasis is also placed on vocabulary development and writing practice.

FREN 320. French Civilization and Culture I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FREN 202, 205 or 300. Conducted in French. A survey of French civilization and culture from its origins to the French Revolution. Introduction to and analysis of the most important aspects of Gallo-Roman society and of the Merovingian, Carolingian and Capetian dynasties which influenced the institutions of the Ancien Regime and still serve as cultural archetypes and icons in contemporary French culture.

FREN 321. French Civilization and Culture II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FREN 202, 205 or 300. Conducted in French. A survey of French civilization and culture from the Napoleonic era to the present. This course retraces important cultural and social traditions found during the first Empire, the Restoration, the Second Republic, the Second Empire, the Commune, the Third and Fourth Republics which influenced and continue to shape contemporary French civilization and culture of the Fifth Republic.

FREN 330. Survey of Literature. 3 Hours.
Semester courses; 3 lecture hours. 3, 3 credits. Prerequisite: FREN 202, 205 or 300. Conducted in French. First semester: through the 18th century. Second semester: 19th and 20th centuries.

FREN 331. Survey of Literature. 3 Hours.
Semester courses; 3 lecture hours. 3, 3 credits. Prerequisite: FREN 202, 205 or 300. Conducted in French. First semester: through the 18th century. Second semester: 19th and 20th centuries.

FREN 410. Explication de Textes. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Course can be repeated with different topics up to a total of 6 credits. Prerequisites: FREN 301; FREN 305 or 307; FREN 320 or 321 or 330 or 331. Conducted in French. This course provides an introduction to terms encountered in text analysis: prosody, versification, rhetorical language, narratology and genres. It presents traditional and current schools of literary criticism and applies them to an interdisciplinary selection of texts. See the Schedule of Classes for the specific topic to be offered each semester.

FREN 420. French Regional Culture. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Course can be repeated with different topics up to a total of 6 credits. Prerequisites: FREN 301; FREN 305 or 307; FREN 320 or 321. Conducted in French. Focuses on the culture and civilization specific to each of France's 22 regions. History, culture, architecture as well as sociopolitical, linguistic identities, artisanal trades and folklore are presented for each region. See the Schedule of Classes for the specific topic to be offered each semester.

FREN 421. French Contemporary Culture. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Course can be repeated with different topics up to a total of 6 credits. Prerequisites: FREN 301; FREN 305 or 307; FREN 320 or 321. Conducted in French. Focuses on the contemporary culture found in French society. The individuals and events shaping current French social, political, artistic and cultural life are examined. Each theme is illustrated by current audiovisual materials. See the Schedule of Classes for the specific topic to be offered each semester.

FREN 422. French Cinema. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Course can be repeated with different topics up to a total of 6 credits. Prerequisites: FREN 301; FREN 305 or 307; FREN 320 or 321. Conducted in French. Tracing French cinema from les Frores Lumiore and Georges Melius through the New Wave to new contemporary directors, this course focuses on the thematic selections and stylistic techniques particular to French cinematographic culture. The class is offered concurrently with the annual VCU French Film Festival, thereby permitting students to directly communicate with French actors and directors participating in the festival. See the Schedule of Classes for the specific topic to be offered each semester.

FREN 425. French Media. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Course can be repeated with different topics up to a total of 6 credits. Prerequisites: FREN 301; FREN 305 or 307; FREN 320 or 321 or 330 or 331. Conducted in French. Analysis of the French media: written press, radio and television. Advanced comprehension skills required and stressed through regular exercises pertaining to different journalistic discourses and styles. Proficiency in journalistic writing is developed in class through the creation of an electronic French newspaper on the Internet. See the Schedule of Classes for the specific topic to be offered each semester.

FREN 426. Pop France. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Prerequisites: FREN 301; FREN 305 or 307; FREN 321or 331. Conducted in French. Explores contemporary French popular culture, put in a wider historical context. Discusses mainstream media, new media, commercial cinema, comic strips, pulp fiction and food, while devoting several weeks to music. Investigates the complex sociolinguistics of argot (slang), with a special interest in the banlieues' (suburbs') multicultural subculture and multifaceted codes. Also questions the possibility of a "pop philosophy" in French thought.

FREN 430. Great Poets and Their Times. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Course can be repeated with different topics up to a total of 6 credits. Prerequisites: FREN 301; FREN 305 or 307; FREN 330 or 331. Conducted in French. Poetry of select major poets of a select century or centuries within a context of the historical, artistic and broad cultural setting of the poets' times. See the Schedule of Classes for the specific topic to be offered each semester.

FREN 431. The 16th Century. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Course can be repeated with different topics up to a total of 6 credits. Prerequisites: FREN 301; FREN 305 or 307; FREN 330 or 331. Conducted in French. A contextualization and detailed study of a selection of works representative of literary schools, genres and major works of the period: Rabelais, the Pleiade, Minting and the Baroque poets. See the Schedule of Classes for the specific topic to be offered each semester.

FREN 432. The 17th Century. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Course can be repeated with different topics up to a total of 6 credits. Prerequisites: FREN 301; FREN 305 or 307; FREN 330 or 331. Conducted in French. A contextualization and detailed study of a selection of texts representative of literary schools, genres and major works of the period: Baroque and Classical readings including prose, poetry and drama of the authors of the reign of Louis XIV; Pascal, La Rochefoucauld, La Bruyure, Corneille, Racine and Moliere. See the Schedule of Classes for the specific topic to be offered each semester.

FREN 433. The 18th Century. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Course can be repeated with different topics up to a total of 6 credits. Prerequisites: FREN 301; FREN 305 or 307; FREN 330 or 331. Conducted in French. A contextualization and detailed study of a selection of texts representative of literary schools, genres and major works of the period: the "philosophes" including Montesquieu, Voltaire, Diderot and Rousseau and readings from Marivaux, Provost and Vauvenargues. See the Schedule of Classes for the specific topic to be offered each semester.

FREN 434. The 19th Century. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Course can be repeated with different topics up to a total of 6 credits. Prerequisites: FREN 301; FREN 305 or 307; FREN 330 or 331. Conducted in French. A contextualization and detailed study of a selection of texts representative of literary schools, genres and major works of the period: Romanticism, Realism, Naturalism and Symbolism. See the Schedule of Classes for the specific topic to be offered each semester.

FREN 435. Contemporary French Literature. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Prerequisites: FREN 301; FREN 305 or 307; FREN 330 or 331. Conducted in French. An overview of French literature from 1900 to the present. Discusses texts that have particular resonance in relation to contemporary issues, including literary works that have contributed most saliently to French culture over this time period.

FREN 440. Commercial French. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Course can be repeated with different topics up to a total of 6 credits. Prerequisites: FREN 301; FREN 305 or 307; FREN 320 or 321 or 330 or 331. This course introduces students to the cultural, economic and linguistic dimensions of the Francophone commercial sector. It builds the student's reading, writing, listening and speaking proficiencies through active engagement with business-related materials and activities. See the Schedule of Classes for the specific topic to be offered each semester.

FREN 450. Francophone Literatures and Cultures. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Course can be repeated with different topics up to a total of 6 credits. Prerequisite: FREN 301; FREN 305 or 307; FREN 320 or 321 or 330 or 331. Conducted in French. Introduces students to the literatures and cultures of the Francophone world. Provides an overview of the Francophone world and an in-depth study of literary works written in French from Africa, the Caribbean, North America, Asia and Europe. Also explores the impact of Colonial history on Francophone literatures and cultures. See the Schedule of Classes for the specific topic to be offered each semester. Crosslisted as: INTL 450.

FREN 491. Topics in French. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May be repeated with different topics for a maximum of 9 credits. Prerequisites: FREN 301; FREN 305 or 307; FREN 320 or 321 or 330 or 331. An in-depth study of selected topics in French. See the Schedule of Classes for specific topics to be offered each semester.

FREN 492. Independent Study. 1-3 Hours.
Semester course; variable hours. Variable credit. Maximum of 3 credits per semester; maximum total of 6 credits for all independent study courses in French. Prerequisite: FREN 301; FREN 320 or 321; Senior standing with a minimum of 85 credits earned toward the degree. Determination of course content and permission of the instructor must be obtained prior to registration of the course. A course designed to give students an opportunity to become involved in independent study in a literary or linguistic area or subject in which they have an interest.

FREN 500. French for Graduate Students. 3 Hours.
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. 1-4 Hours.
Semester course; 1-4 lecture hours. 1-4 credits. An intensive study of communication in French. Variable credits; primarily oral, written and listening skills.

FREN 511. French Civilization. 1-4 Hours.
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.

GENDER, SEXUALITY AND WOMEN'S STUDIES (GSWS)

GSWS 201. Introduction to Gender, Sexuality and Women's Studies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An interdisciplinary and cross-cultural introduction to the perspectives and core concerns pertaining to gender, sexuality and women's studies.

GSWS 206. African American Family Relationships. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Focuses on the African-American family from the 1940s to the present. Examines the values and the interpersonal/role relationships that are involved in forming and maintaining African-American families in the contemporary United States. Topics include dating and sexual relationships, marital relationships, parent-child relationships and relationships with members of the extended family. Crosslisted as: AFAM 206/SOCY 206.

GSWS 236. Women in Literature. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 112 or both ENGL 295 and HONR 200. An introduction to literature by and/or about women. Crosslisted as: ENGL 236.

GSWS 291. Topics in Women's Studies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with different topics for a total of 6 credits. An in-depth examination of specialized areas of interest in women's studies. See the Schedule of Classes for specific topics to be offered each semester.

GSWS 301. Feminist Social Theory. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Pre- or corequisite: UNIV 200 or HONR 200. This course examines the major theoretical traditions and thinkers of feminist theory from the works of early liberal feminists like Wollstonecraft to the present thought of postmodern and lesbian feminists like Wittig. It examines arguments about human nature, the origins and effects of patriarchy, the conflict between equality and gender difference and feminist critiques of traditional theories of knowledge.

GSWS 304. Sociology of Families. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 101 or ANTH 103/INTL 103. The family in its social and cultural context. Analysis of child rearing, marriage, kinship, family crises and family change in various societies around the world. Crosslisted as: ANTH 304/SOCY 304.

GSWS 305. African American Family in Social Context. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 101. A socio-historical examination of the development of the family system of Americans from Africa. Focuses on large-scale (macro level) processes such as changes in the major mode of economic production and in political systems and the corresponding changes in black family structure and functioning. Presents the theoretical material on African-American families and social change that prepares students for further study of the family as a social institution and for the study of family policy. This course is designed to meet the needs of upper-division social science majors. Crosslisted as: AFAM 305/SOCY 305.

GSWS 309. Global Women's Health. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Explores issues in women's health from a national and international perspective with an emphasis on the experiences of women in the African diaspora. Theories in medical anthropology are employed to examine key themes. Crosslisted as: AFAM 309/ANTH 309/INTL 309.

GSWS 316. Women and the Law. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course will introduce students to the history, politics and status of women under the American legal system. Topics to be covered may include equal protection, sexual violence, the particular rights of women of color and lesbians, reproductive rights of women of color and lesbians, reproductive rights, women criminals and women in the legal profession. Crosslisted as: POLI 316.

GSWS 318. Politics of Race, Class and Gender. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the racial, class and gender influences on the history and development of political values, conflicts, processes, structures and public policy in the United States. Crosslisted as: AFAM 318/POLI 318.

GSWS 319. Women and American Politics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course analyzes the participation of women in American politics. Attention is given to both women's historical and contemporary roles in politics, their participation as voters and citizens, and their behavior as candidates and office holders. Additional topics may include workplace, family and education issues and reproductive rights. Crosslisted as: POLI 319.

GSWS 333. Gender in Society. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 101 or permission of instructor. Explores different theoretical approaches to gender and its intersections with other sources of inequality, including sexuality, race, class and age. Possible topics include masculinities, gender and the body, and how gender operates in various institutional settings, such as the economy and the family. Crosslisted as: SOCY 333.

GSWS 334. Sociology of Women. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 101 or consent of instructor. This course will examine the position and status of women across societies and the social forces that maintain existing patterns and arrangements. The integration of family and work in women's lives will be emphasized. Crosslisted as: SOCY 334.

GSWS 335. Psychology of Women. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PSYC 101. Overview of issues in psychology relevant to women. Topics include: research methods of women's issues; sex-role socialization; women and hormones; psychological androgyny; personality theory and counseling strategies for women; women and language; women and violence; and rape and abuse. Crosslisted as: PSYC 335.

GSWS 336. Violence Against Women. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 101 or GSWS 201. An examination of violence against women from a global and local perspective with a primary focus on violence perpetrated against women in the U.S. Requires a minimum of 20 hours of community service. Crosslisted as: SOCY 336.

GSWS 339. History of Women in Europe I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of European women from antiquity to the Enlightenment. A major focus will be primary sources by and about women. Crosslisted as: HIST 330.

GSWS 340. History of Women in Europe II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of European women from the French Revolution to the present. A major focus will be primary sources by and about women. Crosslisted as: HIST 331.

GSWS 341. American Women's History I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Students will analyze historical changes in the social, cultural, political and economic position of women in America from the colonial period through the 1848 Seneca Falls Convention. Methods include reading, lecture and discussion. Topics include differences and similarities of women's experiences across lines of class, race and ethnicity, the struggle for suffrage and social reform, shifting gender roles and changing employment opportunities. Crosslisted as: HIST 365.

GSWS 352. Feminist Literary Theory. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. The study of contemporary feminist thought and feminist approaches to analyzing literature and culture. This course examines the history and development of feminist theory as a methodology in the humanities, explores several of the major theoretical trends of the past 30 years and examines applications of feminist theory to specific works of literature. Crosslisted as: ENGL 352.

GSWS 353. Women Writers. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated once when a different group of writers is studied. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. A study of selected literature written by women and about women writers. Crosslisted as: ENGL 353.

GSWS 354. Queer Literature. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. A study of queer literature. Considers issues of history, theory, aesthetics, politics, authorship and interpretive communities and examines the intersection of social identities with particular attention to race/ethnicity, sex, sexual orientation, gender expression, class and/or nationality. Crosslisted as: ENGL 354.

GSWS 355. Queer Cinema. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 200 or HONR 200. Theoretical focus on cinematic works about and/or by those identifying as lesbian, gay, bisexual, transgender or queer. Examines concepts of gender, sexuality and women's studies through analysis of selected works in the medium of film as well as engages with theoretical texts in the field.

GSWS 356. Open Minds. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 200 or HONR 200. Experiential seminar held at a local correctional institution that connects students to inmates as learning partners. Examines the history and development of American prisons in context, supplementing theoretical studies with the lived experiences of inmates.

GSWS 366. Women and Global Politics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of women and global politics, providing both a feminist re-examination of traditional international-relations theories and a comparative analysis of the political, legal and economic status of the world's women. The impact of women on global political institutions such as the United Nations will be addressed as well as other feminist and grass roots means of taking political action. Crosslisted as: POLI 366/INTL 368.

GSWS 371. Women in Islam. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 200 or HONR 200, RELS 108, GSWS 201 or ENGL 215. Critical study of the roles and rights of women in Islam. Crosslisted as: RELS 371.

GSWS 372. Global Women's Spirituality. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Explores the spiritual writings of women in various cultures and religious traditions. Crosslisted as: RELS 372/INTL 372.

GSWS 373. Gender and the Bible. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: RELS 108 or GSWS 201 or RELS 301 or RELS 302; and ENGL 215 or UNIV 200 or HONR 200. Studies the Hebrew and Christian scriptures with emphasis on gender. Attention to traditional, feminist, womanist and postcolonial interpretation. Crosslisted as: RELS 373.

GSWS 380. Lesbian and Bisexual Women. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course examines the lives of contemporary lesbian and bisexual women from psychological, sociological, developmental, political and cultural perspectives. The intersection of race, class, ethnicity, religion, age, disability and locale with lesbian/bisexual identity will be explored.

GSWS 382. Gender, Crime and Justice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CRJS 181 or permission of instructor. Examines the role of gender as it relates to crime and justice. Special attention will focus on the gendered experiences of practitioners, offenders and victims within the criminal justice system in terms of processing, adjudication and institutional responses. Crosslisted as: CRJS 382.

GSWS 390. Africa and the Americas: Slavery, Gender and Race. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines various aspects of slavery in Africa and selected parts of the African diaspora, including the United States, Canada and the Caribbean, with special emphasis on the role played by race and gender. Topics will include African conditions of servility, the trans-Atlantic trade in enslaved Africans, and chattel slavery, demography, labor, law, discipline, abuse, resistance and status. Crosslisted as: AFAM 390/HIST 380.

GSWS 391. Topics in Gender, Sexuality and Women's Studies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with different topics for a maximum of 12 credits. An in-depth examination of specialized areas of interest in gender, sexuality and women's studies. See the Schedule of Classes for specific topics to be offered each semester.

GSWS 392. Women's Health Care Across the Life Span. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course is intended for upper-level undergraduate students. Introduces students to the health issues that affect women throughout the life span. The impact of physiological, psychological, cultural and political factors upon women's well-being will be addressed.

GSWS 393. Feminist Research and Methods. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Completion of STAT 210 (or equivalent) is strongly recommended. Explores the implications of feminist theorizing across disciplinary and cultural contexts for both methodology and epistemology. Examines how knowledge and power intersect, how gender theory and feminist politics influence research, how the knower influences knowledge production and how social location shapes inquiry.

GSWS 401. Topical Senior Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: 21 credits in gender, sexuality and women's studies or permission of the instructor. Students are required to produce a senior research project on a topic related to the theme of the seminar.

GSWS 414. Psychology of Women's Health. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Overviews the psychological research on women's health. Topics include health behavior change, personality and individual differences, cognitive factors, disease-specific behaviors and interventions. Crosslisted as: PSYC 414.

GSWS 450. Black Feminist Thought. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 200 or HONR 200. Theoretical focus on black feminist thought, spanning the first wave of feminism in the U.S. from the late-19th and early 20th century onward. Though primarily U.S.-focused, this course examines black feminist thought globally, as well as that of lesbians, transgendered or queer individuals, foregrounding topics such as race, gender, class, sexuality, activism, liberation, labor and social movements. Also examines the history and development of black feminist thought, considers it as a methodology in the humanities and social sciences, explores several of its major theoretical trends of the past 100 years and examines its applications to cultural phenomena and current events.

GSWS 452. Language and Gender. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211,215, 236, 291 or 295. A study of relationships between gender and language by focusing on such issues as differences between the ways women and men use language, relationships between language and power and ways in which language reflects and reinforces cultural attitudes toward gender. May not be used to satisfy the literature requirement of the College of Humanities and Sciences. Crosslisted as: ENGL 452/LING 452.

GSWS 453. Western Religions, Women and Social Justice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: UNIV 200 or HONR 200; and RELS 108, GSWS 201 or WRLD 210. Explores the experience and portrayal of women in the three Abrahamic traditions: Judaism, Islam and Christianity. Study focuses on how these religions and their texts bear upon the social, economic, political and spiritual lives of women. Special attention is given to the impact of globalization and religious fundamentalism on women. Crosslisted as: INTL 453/RELS 453.

GSWS 457. Women, Art and Society. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTH 103, ARTH 104 and UNIV 200 or HONR 200. Open to School of the Arts majors only. A re-examination of a variety of issues concerning women, art and society: the position assigned women within the history of art as it relates to historical place and the aesthetic values of the canon, the gendering of style, patronage, audience and gaze. Through a survey of images of and by women, as well as through an analysis of art historical and critical texts, this course addresses the question: "How are the processes of sexual differentiation played out across the representations of art and art history? Crosslisted as: ARTH 357.

GSWS 491. Topics in Women's Studies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with different topics for a total of 12 credits. An in-depth examination of specialized areas of interest in women's studies. See the Schedule of Classes for specific topics to be offered each semester.

GSWS 492. Independent Study. 1-4 Hours.
Semester course; variable hours. Variable credit. Maximum of 4 credits per semester; maximum total of 4 credits in all independent study courses. Open generally to students of only junior and senior standing who have acquired at least 12 credits in women's studies courses. Determination of the amount of credit and permission of the instructor and coordinator must be obtained prior to registration for the course.

GSWS 493. Internship. 1-3 Hours.
Semester course; variable hours. 1, 2 or 3 credits. May be repeated for a maximum total of 6 credits. Prerequisites: internship credit is limited to students with a minimum grade point average of 3.0 and junior or senior status. Directed internship, local or abroad, or other approved study-abroad experience with the objective to provide real-life experience. Determination of the amount of credit (based on hours or effort required) and permission of departmental internship coordinator must be obtained prior to registration for the course. Graded pass/fail.

GSWS 501. Feminist Theory. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This seminar provides an overview of the theories of feminisms.

GSWS 602. Feminist Research Epistemology and Methods. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course explores the implications of feminist theorizing across disciplinary and cultural contexts for both epistemology (theories of knowledge) and methods (theories and approaches in the research process). Students will examine how knowledge and power intersect, how gender theory and feminist politics influence research, how the knower influences knowledge production and how social location shapes inquiry. Students will experiment with feminist methods and approaches to researching issues related to gender, sexuality and women, and ethical considerations as these issues affect vulnerable populations.

GSWS 620. Theorizing Sexuality. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course examines and explores constructions of human sexuality (sexualities) and theorizes how these constructions operate within contemporary culture.

GSWS 622. Women and Public Policy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This seminar differentiates theories of feminisms and explores the effects of polices, or their absence, for women in the U.S., briefly examining theories of policymaking and the policy process in relation to feminist theories and the feminist project.

GSWS 624. Gender and Cultural Production. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This seminar takes as a starting point an understanding of culture as the expressive practice of meaning making that lies at the intersection of art, imagination, technology, space and politics.

GSWS 691. Topics in Gender, Sexuality and Women's Studies. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Course may be repeated with different topics as approved. Prerequisite: permission of instructor. An in-depth study of a selected topic in gender, sexuality and/or women's studies. See Schedule of Classes for specific topics to be offered each semester.

GSWS 692. Independent Study. 1-4 Hours.
Semester course; variable hours, variable credit. Maximum 4 credits per semester. Maximum total of 4 credits in all independent study courses. Prerequisites: completion of 6 credits in gender, sexuality and women's studies courses.

GENERAL PRACTICE (GENP)

GENP 302. Dental Materials. 2 Hours.
Semester course; 1 lecture and 3 laboratory hours. 2 credits. Provides the scientific foundation for understanding the factors guiding the use of biomaterials in dentistry as they relate to the practice of dental hygiene. Dental and material science concepts are defined and their relationships developed to establish an understanding of the influence of material properties and manipulation on the longevity and success of treatment. Dental materials are discussed in terms of their physical, mechanical, chemical, biological and esthetic properties. Factors that influence tooth sensitivity, caries prevention, tissue irritation, longevity of restoration, dental bonding, materials selection and allergic reactions are emphasized. Primary dental materials will be discussed in relation to their properties and manipulation with an approach to aid in patient education and to recognize adverse affects on the patient's health from improper manipulation or placement failures.

GENP 311. Oral Anatomy and Occlusion. 3 Hours.
Short course; 2 lecture hours; 15-20 hours seminar/recitation and online discussion. 10 weeks. 3 credits. This course combines lecture with readings and research for online discussion and addresses the dental terminology and the crown and root morphology of the permanent dentition. Students become familiar with the basic principles of occlusion: how teeth occlude, the diverse occlusal classifications, the arrangement of teeth in the dental arches, and the relationship of the dental arches to one another with focus on review of the anatomy and function of masticatory muscles and the temporomandibular joints. The lecture portion of the course is devoted to the didactic aspects of learning tooth anatomy. The online portion of this course is devoted to the fundamentals of occlusion and making application of both course segments to the clinical environment.

GENP 511. Dental Anatomy. 1.5,2.5 Hour.
Semester course; 2 lecture and 4.5 laboratory contact hours. 2.5 credits lecture and 1.5 credits lab. A lecture and laboratory course pair designed to develop the student's knowledge of the morphology and anatomical features of the human adult dentition.

GENP 512. Operative Dentistry Lecture. 4 Hours.
Yearlong course; 67 lecture contact hours. 4 credits. Paired with GENP 513, the courses consist of lectures and laboratory exercises, including both virtual reality-based training and conventional mannequin simulation sessions. Information is presented regarding caries as a disease process, and students are presented with the knowledge and develop the skills necessary to treat the disease with both non-invasive and invasive operative treatment techniques. Extensive didactic instruction and laboratory simulation experience is provided in tooth preparation and restoration. Experience is also provided concerning properties, chemistry and manipulation of the various direct dental restorative materials used to restore teeth to their correct anatomical and functional form. Students receive a grade of CO for fall, with a grade and all credit hours earned in spring.

GENP 513. Operative Dentistry Laboratory. 4.5 Hours.
Yearlong course; 213 laboratory contact hours. 4.5 credits. Paired with GENP 512, the courses consist of lectures and laboratory exercises, including both virtual reality-based training and conventional mannequin simulation sessions. Information is presented regarding caries as a disease process, and students are presented with the knowledge and develop the skills necessary to treat the disease with both non-invasive and invasive operative treatment techniques. Extensive didactic instruction and laboratory simulation experience is provided in tooth preparation and restoration. Experience is also provided concerning properties, chemistry and manipulation of the various direct dental restorative materials used to restore teeth to their correct anatomical and functional form. Students receive a grade of CO for fall, with a grade and all credit hours earned in spring.

GENP 514. Fundamentals of Occlusion. 2 Hours.
Semester course; 1 lecture and 3 laboratory contact hours. 2.0 credits. Covers theories of occlusion, foundational concepts and fundamental lab skills essential for developing an understanding of occlusion. Through this course students begin to develop their working understanding of the concept of occlusion.

GENP 552. Emergency Clinic. 1 Hour.
Semester course; clinical hours. 1 credit. Part of the AEGD curriculum, students must enroll in this course for two consecutive semesters for a total of 2 credits. Students learn how to identify and manage emergency care needs of patients during evening and weekend hours when VCU dental practices are closed.

GENP 558. General Dentistry Seminar. 1 Hour.
Semester course; 1 seminar hour. 1 credit. Part of the AEGD curriculum, students must enroll in this course for two consecutive semesters for a total of 2 credits. Students will participate in discussions of resident patient cases and relative current literature.

GENP 566. Specialty Lecture Seminar Series. 1 Hour.
Semester course; 1 seminar hour. 1 credit. Part of the AEGD curriculum, students must enroll in this course for two consecutive semesters for a total of 2 credits. Covers a range of dental interdisciplinary topics and is designed to develop advanced critical thinking skills in AEGD residents.

GENP 580. AEGD Clinic. 1-6 Hours.
Semester course; clinical hours. 6 credits. Part of the AEGD curriculum, students must enroll in this course for two consecutive semesters for a total of 12 credits. Provides the core clinical patient care experience for residents in the Advanced Education in General Dentistry residency program.

GENP 620. Cariology. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Designed to help students understand major aspects of cariology, which include the process of dental caries, diagnosis and detection, prevention and treatment, and clinical application.

GENP 700. Selective in Aesthetic Dentistry. 1 Hour.
Semester course; 16 seminar contact hours. 1 credit. Prerequisites: D4 standing and selection by course faculty. This course is designed to give the tools in understanding proper diagnosis, treatment planning and approaches in execution of the proposed treatment plan of more advanced multidisciplinary cases. Graded as pass/fail.

GENP 739. Clinical Operative III. 5 Hours.
Yearlong course; clinical contact hours. 5 credits. Will introduce dental students to the basic skills required for an entry-level general practitioner. This is a practical, hands-on two-semester clinical skill-development course where students learn to develop treatment plans for oral disease control in patients, restore teeth to form and function, manage emergency patients and manage an efficient recall system.

GENP 742. Treatment Planning Seminar. 2 Hours.
Semester course; 4 seminar hours. 2 credits. Designed to assist each D-3 student in the continual development of their treatment planning skills in particular and critical-thinking skills in general. The treatment planning seminar utilizes faculty-facilitated, case-based and problem-solving teaching strategies to provide each student with the opportunity to gain experience in developing and discussing treatment plans for both simulated and current clinical comprehensive care patients. The course will build on and solidify the concepts of diagnosis and treatment planning taught in the various D-1, D-2 and D-3 courses as well as augment student clinical experiences to date.

GERMAN (GRMN)

GRMN 101. Elementary German I. 4 Hours.
Semester course; 5 lecture/recitation hours. 4 credits. For students with no prior knowledge of German. Elementary grammar, reading and oral skills.

GRMN 102. Elementary German II. 4 Hours.
Semester course; 5 lecture/recitation hours. 4-4 credits. Prerequisite: GRMN 101 Elementary grammar, reading and oral skills.

GRMN 201. Intermediate German I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: GRMN 102. Conducted in German. Continuation of the essentials of grammar with emphasis on building proficiency in aural comprehension, speaking, reading and writing skills.

GRMN 202. Intermediate German II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: GRMN 201. Conducted in German. Designed to increase student’s proficiency in German through the continued focus on aural comprehension, speaking, reading and writing skills.

GRMN 205. Intermediate Conversation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: GRMN 201. Conducted in German. Designed to increase the student's proficiency in the spoken language through audio-oral exercises, dialogues and free conversation.

GRMN 300. Composition and Communication. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: GRMN 202 or 205. Conducted in German. Development of written and oral skills through review of selected aspects of German grammar, writing practice and speaking activities based on a variety of situations.

GRMN 301. Grammar and Writing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: GRMN 202, GRMN 205 or GRMN 300. Conducted in German. A study of key aspects of advanced German grammar with emphasis on the elements of style and vocabulary building.

GRMN 305. German Conversation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: GRMN 202, GRMN 205 or GRMN 300. Conducted in German. Practice in the spoken language with emphasis on discussions relating to topics of current interest.

GRMN 307. German Conversation and Film. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: GRMN 202, GRMN 205 or GRMN 300; GRMN 300 recommended. Conducted in German. The course is designed to develop the student's communication skills, oral comprehension ability and knowledge of contemporary culture through discussion of selected German films. Emphasis is also placed on vocabulary development and writing practice.

GRMN 311. German Through the Media. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: GRMN 202, GRMN 205 or GRMN 300; GRMN 300 or GRMN 301 recommended. Designed to develop language proficiency by using material available through the various media: newspapers, magazines, films, Internet, podcasts and radio broadcasts.

GRMN 314. Commercial German. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: GRMN 301. Designed to develop the student's ability to use German as a means of oral and written communication in the business world. Emphasis on the acquisition of technical tools necessary for business exchanges in specialized fields.

GRMN 320. From the Vandals to Kant: Civilization and Literature I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: GRMN 202, GRMN 205 or GRMN 300; GRMN 300 or GRMN 301 recommended. Conducted in German. A survey of German-speaking culture and literature from its origins to the Enlightenment. Also emphasizes enhancing German-language skills in vocabulary, reading, speaking and writing.

GRMN 321. From Faust to Nazism: Civilization and Literature II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: GRMN 202, GRMN 205 or GRMN 300; GRMN 300 or GRMN 301 recommended. Conducted in German. A treatment of German culture and literature from the Age of Goethe to the rise of Nazism. Also emphasizes enhancing German language skills in vocabulary, reading, speaking and writing.

GRMN 322. From Kafka's World to the EU: Civilization and Literature III. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: GRMN 202, GRMN 205 or GRMN 300; GRMN 300 or GRMN 301 recommended. Conducted in German. A survey of German culture and literature from the 1920s to today. Also emphasizes enhancing German language skills in vocabulary, reading, speaking and writing.

GRMN 420. The Turn of the Century. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: GRMN 300; GRMN 305 or 307 or 311; GRMN 301 or 320 or 321 or 322. Conducted in German. A course dealing with the major intellectual, philosophical, artistic and cultural trends from the turn of the century through the Weimar period as reflected in the writings of authors such as Kafka, Mann and Hesse. Includes impressionism, expressionism and neue Sachlichkeit.

GRMN 421. The Postwar German Scene. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: GRMN 300; GRMN 305 or 307 or 311; GRMN 301 or 320 or 321 or 322. Conducted in German. A course dealing with the political, social and intellectual developments of the German-speaking countries from the end of World War II to the present as reflected in the literary works of their major authors.

GRMN 422. German Film. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. May be repeated with different topics for a total of 6 credits. Prerequisites: GRMN 300; GRMN 305 or 307 or 311; GRMN 301 or 320 or 321 or 322. Study of selected topics in German film from the beginnings to today, particularly as seen in their social, historical and cultural contexts. See the Schedule of Classes for the specific topic to be offered each semester.

GRMN 423. Folk/Popular Culture. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. May be repeated with different topics for a total of 6 credits. Prerequisites: GRMN 300; GRMN 305 or 307 or 311; GRMN 301 or 320 or 321 or 322. Study of selected topics related to folk traditions and/or popular culture in German-speaking countries. See the Schedule of Classes for the specific topic to be offered each semester.

GRMN 424. Culture and Society. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. May be repeated with different topics for a total of 6 credits. Prerequisites: GRMN 300; GRMN 305 or 307 or 311; GRMN 301 or 320 or 321 or 322. Study of issues in the culture and society of German-speaking countries today. See the Schedule of Classes for the specific topic to be offered each semester.

GRMN 425. Language in Context: ____. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Course can be repeated with different topics up to a total of 6 credits. Prerequisites: GRMN 300; GRMN 301, 305, 307 or 311; and GRMN 320, 321 or 322. Conducted in German. Study of German language and linguistics. See the Schedule of Classes for the specific topic to be offered each semester.

GRMN 491. Topics in German. 1-3 Hours.
Variable hours. 1-3 credits. May be repeated with different topics for a maximum of 9 credits. Prerequisites: GRMN 300; GRMN 305 or 307 or 311; GRMN 301 or 320 or 321 or 322. An in-depth study of selected topics in German. See the Schedule of Classes for specific topics to be offered each semester.

GRMN 492. Independent Study. 1-3 Hours.
Semester course; variable hours. Variable credit. Maximum of 3 credits per semester; maximum total of 6 credits for all independent study courses in German. Prerequisites: GRMN 301; GRMN 320 or 321 or 322; GRMN 420 or 421 or 422 or 423 or 424 or 491; and senior standing with a minimum of 85 credits earned toward the degree. A course designed to give students an opportunity to become involved in independent study in a literary or linguistic area or subject in which they have an interest.

GRMN 500. German for Graduate Students. 3 Hours.
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. 1-4 Hours.
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. 1-4 Hours.
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.

GERONTOLOGY (GRTY)

GRTY 410. Introduction to Gerontology. 3 Hours.
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 Hours.
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 510. Aging. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Introduces the student to the biological, psychological, social, ethical, economic and cultural ramifications of aging. Presents an interprofessional approach to the complex issues and realities of aging. Discusses aging concepts and biopsychosocial theoretical frameworks relevant to the field of aging studies.

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

GRTY 602. Psychology of Aging. 3 Hours.
Semester course; 3 seminar hours. 3 credits. Enrollment requires 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. Crosslisted as: PSYC 602.

GRTY 603. Social Gerontology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: permission of instructor. 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 offer an in-depth analysis of particular role changes that accompany aging (i.e., retirement, widowhood, institutionalization).

GRTY 604. Problems, Issues and Trends in Gerontology. 4 Hours.
Semester course; 4 lecture hours. 4 credits. Covers a broad range of topics of critical interest to practitioners, policymakers and researchers working with older persons. Explores how societal trends affect the health and social services systems. Recognizes the importance of interdisciplinary approaches to the study of aging issues: Insights from practitioners and the knowledge of researchers will be combined to investigate viable responses to emerging trends. Provides a multifaceted view of these issues based on research expertise and practical experience. Students will experience a visit to the General Assembly and will follow and critically evaluate current aging-related legislation in state government.

GRTY 605. Social Science Research Methods Applied to Gerontology. 3 Hours.
Semester course; 3 lecture hours. 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 606. Aging and Human Values. 3 Hours.
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. 1-5 Hours.
Semester course; variable hours. 1-4 credits. May be repeated to the required maximum of 4 credits. Focuses on identification and systematic exploration and study of a community-identified need, issue or task germane to the student's gerontology concentration with special attention given to funding opportunities and grant writing. Applies specific concepts and approaches to assessment analysis as determined in consultation with the student's program adviser. Implementation and evaluation of a terminal project and dissemination of the results through a portfolio collection, as well as potential professional presentation, grant submission or manuscript submissions. Graded as S/U/F.

GRTY 608. Grant Writing. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Provides the skills necessary to research and write a grant. Explores how to find grant funding opportunities through both private and public sources. Describes the process of preparing a proposal including writing the narrative and preparing a budget.

GRTY 609. Career Planning. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Focuses on the transition from academia to the professional role and workforce. Identifies individual strengths and evaluates career goals. Prepares students to deliver resumé and communication strategy for job seeking in the aging workforce.

GRTY 610. Gero-pharmacology. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: undergraduate course in statistics. Discusses description of medication-related problems that may be experienced by older adults. Identifies strategies to prevent medication-related problems in older adults, defines the role of the pharmacist as a partner in resolving medication-related problems, applies the strategies for preventing medication-related problems to patient cases and evaluates the medication regimen for an older adult residing in assisted living.

GRTY 611. Death and Dying. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Focuses on questions surrounding death, dying and bereavement, with a special focus on developmental and cultural issues. Explores concepts through research, experiential learning and reflection.

GRTY 612. Recreation, Leisure and Aging. 3 Hours.
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 613. GLBT in Aging. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Explores the biopsychosocial and ecopolitical aspects of the intersection of aging and being a member of the gay, lesbian, bisexual and/or transgender-identified minority populations. Reviews normative aging factors in the context of being a member of the GLBT population. Discusses the intersection of these with such factors as race, socioeconomic status and other confounding factors.

GRTY 615. Aging and Mental Disorders. 3 Hours.
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. Crosslisted as: PSYC 615.

GRTY 616. Geriatric Rehabilitation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides an overview of the process in geriatric rehabilitation with an assessment, psychosocial aspects and rural issues in rehabilitation. Considers major disabling conditions in late life, and emphasizes the nature of the interdisciplinary rehabilitation process with aging clients.

GRTY 618. The Business of Geriatric Care Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Evaluates information and materials needed for a basic understanding of the fundamentals of geriatric care management. Distinguishes and critically evaluates the tasks required of a geriatric care manager and the knowledge and skills needed to perform those tasks. Compares and contrasts multiple geriatric care management business models.

GRTY 619. Geriatric Care Management Practicum. 1-3 Hours.
Semester course; variable hours. 1-3 credits. Prerequisites: GRTY 601, GRTY/PSYC 602 and GRTY 603. Pairs a student with a geriatric care manager practicing in the field. Applies information learned in gerontology core classes to hands-on clinical experience with a geriatric care manager. Supervises field experience with clients, providing advocacy and supervision, and coordinating needs to ensure independence and safety.

GRTY 620. Geriatric Interdisciplinary Team Training. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Emphasizes interdisciplinary teamwork with a focus on geriatrics. Increases the awareness of the importance of interdisciplinary teamwork when working with older adults. Uses a case-focused approach to discuss care for older adults in a variety of settings, including acute care, long-term care, rehabilitation, PACE and home health care.

GRTY 621. Professional Writing. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Provides instruction on APA guidelines for writing and referencing articles in scholarly papers. Emphasizes critical thinking and awareness skills for reviewing journal articles.

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

GRTY 625. Aging and the Minority Community. 3 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 also will focus on dominant social problems and federal policies toward the aged.

GRTY 627. Psychology of Health and Health Care for the Elderly. 3 Hours.
Focuses on factors in the etiology, course and treatment of illness; patient/practitioner relationship; patient compliance and psychosocial issues in terminal care.

GRTY 629. Spirituality and Aging. 2-3 Hours.
Semester course; 2 or 3 lecture hours. 2 or 3 credits. Explores the spiritual, psychological and social dynamics associated with aging. Provides special attention to the spiritual and emotional impact on caregivers who work with aging patients. Crosslisted as: PATC 629.

GRTY 638. Long-term Care Administration. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Explores the history and development of the long-term care continuum in the United States. Emphasizes assisted living and the knowledge and skills required to be a successful assisted living administrator. Utilizes the five domains of assisted living administration as the framework. Facilitates learning on leadership and management, with a focus on providing optimal, person-centered care and services to older adults living in a licensed and regulated environment.

GRTY 639. Human Resource Management and Leadership for Gerontologists. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Provides an introduction and foundation to human resources in aging services geared toward administrative and entrepreneurial gerontologists. Emphasizes leadership theory and utilizes the human resource management domain of practice as a guide for structure. Emphasizes developing the culture of an organization to facilitate effective practices in managing a safe and healthy work environment. Reviews state and federal laws, rules and regulations. Allows students to apply skills through cases and exercises relevant to their intended career path.

GRTY 640. Financial Management for Gerontological Leaders. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Provides an introduction and foundation to financial management in aging services geared toward administrative and entrepreneurial gerontologists. Utilizes the financial management domain of practice as structure for this course. Emphasizes creating and managing organizational finances and multiple payment systems. Reviews state and federal laws, rules and regulations. Allows students to apply skills through cases and exercises relevant to their intended career path.

GRTY 641. Survey of Psychological Assessment and Treatment of the Older Adult. 3 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 paraprofessional delivery systems; evaluation of crisis intervention and consultation team approaches; lectures, demonstration and classroom practice of actual treatment techniques. Crosslisted as: PSYC 641.

GRTY 642. Practicum in Clinical Geropsychology. 3 Hours.
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 in the Richmond community; 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. Crosslisted as: PSYC 642.

GRTY 691. Topical Seminar. 3 Hours.
3 credits. Seminars on specialized areas of gerontological interest. Examples of special topic courses taught in previous years: nutrition and aging; psychophysiology and neurobiology of aging; wellness and aging; and preretirement planning.

GRTY 692. Independent Studies. 1-3 Hours.
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. 3 Hours.
Semester course; 3 credits. Independent study in selected area under supervision of gerontology faculty. Focuses 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. Thesis. 3-6 Hours.
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.

GRTY 799. Thesis. 3-6 Hours.
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.

GLOBAL EDUCATION (GLED)

GLED 101. Introduction to VCU Globe. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Open only to students enrolled in the VCU Globe program. An introduction to the organizational components of VCU Globe and to the intellectual and conceptual foundations of global education. Students will be introduced to the academic, service and professional expectations of the VCU Globe program. This seminar will prepare students for the engaged activities that form the core of the VCU Globe's curriculum. Graded as pass/fail.

GLED 201. Global Education Seminar. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: GLED 101. Open only to students enrolled in the VCU Globe program. A seminar covering core concepts in global education, including global education as a learning paradigm; the role of the "culture broker" in professional fields; cultural, national, linguistic and personal "community borders"; global paths of migration; and the emerging idea of world citizenship. Students will explore the skills they are expected to learn and practice in the VCU Globe curriculum and the programs in which they will practice those skills. This seminar will prepare students for the engaged activities that form the core of the VCU Globe's curriculum. Includes community service activities.

GLED 202. Global Engagement Seminar. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: GLED 201. Open only to students enrolled in the VCU Globe program. An introduction to the central concepts of global engagement, including defining culture and community in the contemporary world, global communication styles and skills, identity's relationship to migration, cultures within cultures, and sustainable asset-based development. Includes community service activities.

GLED 301. Planning for Global Leadership Seminar. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: GLED 202. Open only to students enrolled in the VCU Globe program. An introduction to the core concepts in global leadership, including global trends in community leadership, citizen-leadership, governmental and nongovernmental organizations, transcultural organizations, and inter- and intraorganizational sustainability. Working in teams, students will complete a proposal for an applied global community service project. Includes community service activities.

GLED 302. Preparing for Global Leadership Seminar. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: GLED 301. Open only to students enrolled in the VCU Globe program. Working in teams, students will refine and present to multiple audiences proposals for applied global community-service projects. Proposals will be reviewed by a faculty board and a small number will be selected for support the following year. Includes community service activities.

GLED 391. Topics in Global Education. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. May be repeated with different topics for a maximum of nine credits, with a limit of six credits in a single semester. Open only to students enrolled in the Global Education Living-Learning Community. An in-depth study of a selected topic in global education. See the Schedule of Classes for specific topics to be offered each semester.

GLED 401. Global Education Senior Seminar. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: GLED 302. Open only to seniors enrolled in the VCU Globe program. Students will focus on professional self-assessment, completion of curricular and co-curricular portfolios, career and graduate school preparation, and articulating links between global education and their professional plans.

GLED 493. Global Leadership Practicum. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May be repeated for a maximum total of 6 credits, with a limit of 3 credits in a single semester. Prerequisites: GLED 302 and permission of instructor. Open only to seniors enrolled in the VCU Globe program. Working in teams, students will implement selected proposals. Includes 30 hours of service work per credit.

GOVERNMENT AND PUBLIC AFFAIRS (GVPA)

GVPA 391. Special Topics in Government and Public Affairs. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. A maximum 6 credits in all special topics courses offered in the Wilder School may be applied to any of the school's majors. Intended for sophomores and juniors. An intensive focus on a selected field of interest relevant to all majors in the school. See the Schedule of Classes for specific topics to be offered each semester.

GVPA 399. Introduction to Science and Technology Studies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introduction to the study of science, technology and medicine from political, sociological and historical perspectives, focusing on case studies that illustrate the methods and theories used to examine the structure and behavior of the scientific community and the role of scientific knowledge in shaping public culture. Crosslisted as: HIST 399/SCTS 300.

GVPA 423. Virginia Capital Semester Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Open only to students in the Virginia Capital Semester program. Designed as an integral part of the program, this course provides an examination of state policy issues and state legislative processes using the current Virginia General Assembly session as illustration.

GVPA 491. Advanced Special Topics in Government and Public Affairs. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. A maximum 6 credits in all special topics courses offered in the Wilder School may be applied to any of the school's majors. Intended for advanced students and seniors. An intensive focus on a selected field of interest relevant to all majors in the school. See the Schedule of Classes for specific topics to be offered each semester.

GVPA 493. Government and Public Affairs Internship. 1-6 Hours.
Semester course; variable hours. 1-6 credits. (50 hours per credit.) May be repeated for a maximum of 6 credits. Permission of internship coordinator required. Designed to provide the student with an opportunity to relate theory to practice through observation and actual experience within the field of government and public affairs.

GVPA 494. Virginia Capital Semester Internship. 3 Hours.
Semester course; 3 internship hours. 3 credits. Corequisite: GVPA 423. Enrollment restricted to students in the Virginia Capital Semester program. Designed to provide students with an opportunity to relate theory to practice through participation in activities related to the annual session of the Virginia General Assembly. Graded as Pass/Fail.

GVPA 495. UROP Directed Study. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Students enrolling in this course must meet the eligibility requirements of the Undergraduate Research Opportunity Program. Designed to provide advanced research opportunities to undergraduate students. Topics chosen in consultation with the UROP coordinator. Students may take a total of six GVPA 495 credits; only three of those credits may be applied to the major.

GVPA 499. Wilder School Scholars Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Capstone seminar course focusing on a broad topic in one of several disciplines of interest to Wilder School Scholars. Topics, structure and content determined each semester.

GVPA 591. Special Topics in Government and Public Affairs. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An intensive focus on a specialized subject area relevant to graduate programs in the L. Douglas Wilder School of Government and Public Affairs. See the Schedule of Classes for specific topics to be offered each semester. Also open to graduate students in programs outside of the Wilder School with permission of the instructor.

GVPA 601. Principles of Public Administration. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Dynamics of governmental administration including administrative principles, decision-making, communication, leadership, organizational models, and the social, economic, legal and political milieu of administration. Crosslisted as: PADM 601.

GVPA 623. Research Methods for Government and Public Affairs. 3 Hours.
Semester course; 3 lecture hours. 3 credits. 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. Crosslisted as: URSP 623/PADM 623/CRJS 623.

GVPA 625. Public Policy Analysis. 3 Hours.
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. Crosslisted as: PADM 625.

GVPA 632. Planning Theory and Processes. 3 Hours.
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. Crosslisted as: URSP 632.

GVPA 635. Theorizing Gender Violence. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Teaches students to think structurally about gender and violence. Familiarizes students with social science and feminist scholarship and explanatory theories related to preventing and responding to gender violence. Students will learn about the experiences of and responses to sexual and domestic violence in specific social contexts, with a focus on less visible and underserved populations. Guest lectures provided by community experts in these areas. Also examines social policy and research implications of various approaches.

GVPA 640. River Policy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines public policy related to rivers and watersheds. Uses the James River for exploring and illustrating generic river policy issues. Crosslisted as: ENVS 640.

GVPA 672. Social Equity and Public Policy Analysis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Designed to provide an overview of the concept of social equity and its relationship to public policy. A survey course that will introduce students to an array of public policy areas along the core dimensions of race, ethnicity, gender and class.

GVPA 683. Administrative Ethics. 2,3 Hours.
Semester course; 2 or 3 lecture 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 interest. Crosslisted as: PADM 683/PHIL 683.

GVPA 691. Special Topics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An intensive focus on a specialized subject area relevant to graduate programs in the L. Douglas Wilder School of Government and Public Affairs. Also open to graduate students in programs outside of the Wilder School, with permission of the instructor. See the Schedule of Classes for specific topics to be offered each semester.

GVPA 693. Internship. 1-9 Hours.
Semester course; 1-9 hours. 1-9 credits. Permission of instructor required. A graduate-level internship that allows students to explore professional opportunities that relate to one or more of the graduate programs in the Wilder School. See graduate coordinator for specific hour requirements.

GRADUATE MEDICAL EDUCATION (GMED)

GMED 600. Research for Residents and Fellows. 2 Hours.
Semester course; 2 contact hours. 2 credits. Prerequisites: second year of medical training or beyond, plus approval of residency/fellowship program director. Course restricted to physician trainees (M.D., M.B.B.S., D.O.). This course is designed to be an introduction to research for medical residents and fellows. Teamwork activities will focus on the application of concepts so that participants get “hands on” experience with topics discussed in class: formulating a research question, selecting a study design, choosing appropriate biostatistical analyses, designing a survey, writing an IRB proposal and understanding the responsible conduct of research and protection of human subjects. The class will culminate in a required final assignment in the form of a capstone project.

GRADUATE SCHOOL (GRAD)

GRAD 601. The Academic Profession. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Restricted to graduate or professional students. 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. Graded as pass/fail.

GRAD 602. Teaching and Learning in Higher Education. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Restricted to graduate or professional students. This course focuses on the art and science of teaching and learning in higher education. Graded as pass/fail.

GRAD 604. Teaching, Learning, Technology and the Future of Higher Education. 2 Hours.
Semester course; 2 lecture hours. 2 credits. This course is designed to provide students with an introduction to contemporary technologies and the implications for instructional practices that can serve as both a foundation and a process for continued growth and development in understanding teaching and learning. Throughout the course students will explore and critically examine how the World Wide Web and emerging digital technologies are changing the landscape of learning in higher education. Class sessions will consider key instructional contexts/issues and explore the ways in which digital technology might enhance learning. Specific attention will be given to the ways in which students explore, select, use and assess the use of technology in teaching.

GRAD 605. Professional Specialty Seminar. 1 Hour.
Short course; 1 lecture hour. 1 credit. Prerequisites: GRAD 601, GRAD 602 and OVPR 603. Restricted to graduate or professional students. Registration by permission of PFF Program Office. Seminars will provide students with the opportunity to focus on the full range of faculty responsibilities specific to their chosen disciplines/professions in such a way that builds on the more general knowledge and skills covered in GRAD 601 and GRAD 602. Students will be enrolled in a professional cluster section related to their academic disciplines (such as fine arts, social sciences, physical and life sciences, health sciences, etc.). There are no substitutions for this seminar course. See PFF Program website (http://www.graduate.vcu.edu/programs/pff/courses.html) for additional information on cluster sections and course registration. Contact the PFF program office or the instructor with questions regarding which professional cluster section is most appropriate. Graded as pass/fail.

GRAD 606. Internship/Externship in Professional Teaching. 1-3 Hours.
Intern course; vairable hours. 1-3 credits. Prerequisites: GRAD 601, 602, 605 and OVPR 603. Restricted to graduate or professional students. Registration by permission of the PFF Program Office after proposal submission and approval. The internship in professional teaching is the capstone experience of the Preparing Future Faculty Program in which students will gain experience and practice in clinical/field or studio instruction under the tutelage of a senior faculty mentor at an institution that most likely mirrors the institution of interest to the student. A proposal agreement must be signed by the faculty mentor who will direct the project and assign the final grade and must be submitted to the PFF Program office for approval before the student enrolls or begins the internship/externship. The proposal must define the project and the intended outcomes, must specify the learning goals and the agreed-upon methods for evaluation, and must identify the institution where the project will take place. At the end of the project, the student must submit to the faculty mentor a report describing the experience and the extent to which the stated goals were accomplished. The faculty mentor will submit the student report, along with an evaluation of the project and the grade to be awarded, to the director of the PFF Program. Each internship/externship course requires approximately 150 contact hours in the form of preparing for and carrying out the project. The student's role is to be one of "junior faculty member" and the faculty member's as guide and mentor. Students must complete all three hours of GRAD 606 for the PFF Certificate of Achievement and must have made final edits and uploads of all relevant materials to their PFF electronic portfolios. Refer to PFF Program website for proposal instructions and electronic portfolio requirements: http://www.graduate.vcu.edu/programs/pff/courses.html. Graded as pass/fail.

GRAD 610. Career and Professional Development Planning for Graduate Students. 1 Hour.
Semester course; 2 lecture hours per week for seven weeks. 1 credit. Prerequisite: graduate standing. This course is designed to assist participants as they navigate the challenges faced when making career choices in a complex global economy. Includes opportunities for self- and career-skills assessment.

GRAD 611. Professional and Personal Development. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Open to graduate students and postdoctoral fellows with permission of instructor. The course will involve self-assessment and development of the student's personal mission statement and individual development plan in consultation with faculty and alumni mentors from the student's discipline.

GRAD 612. Oral Presentation Skill-building for Career Professionals. 1 Hour.
Semester course; 1 lecture hour.1 credit. Graduate standing required. This course focuses exclusively on developing and delivering presentations. Students are expected to create professional presentations representative of their focused research area to be delivered to a "lay" audience. Class exercises focus on audience analysis and strategic choices, theme development, argument construction, and impromptu public speaking as a means to develop confidence in speaking to an audience. Graded as S/U/F.

GRAD 614. Introduction to Grant Writing. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Enrollment requires graduate standing. This course introduces the graduate student to the grant-writing process. Topics include basic components of a grant application, writing the proposal, identifying funding sources, understanding proposal guidelines and the grant proposal review process. Graded S/U/F.

GRAD 615. Biomedical Science Careers Seminar Series. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Open to graduate students and postdoctoral fellows with permission of instructor. Trainees investigate the broad spectrum of potential careers available to biomedical scientists by participating in weekly discussions, each with a scientist who has been successful in a different career path. Graded P/F.

GRAD 616. Becoming an Entrepreneur. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Enrollment requires graduate standing. This course introduces the student to the core concepts and resources of entrepreneurship. Topics include recognizing the need for innovation, how to develop a business plan, building an effective team, intellectual property, patent and trademark strategy, marketing strategy and cultivating funding sources. Graded S/U/F.

GRAD 617. Biomedical Sciences Projects in the Community. 2 Hours.
Semester course; 1 lecture hour and 1 service-learning/laboratory hour. 2 credits. Prerequisite: Enrollment requires graduate standing. The community service based experiential learning project is selected to provide an integrative learning experience that addresses the practice of citizenship and promotes an awareness of and participation in public affairs. Service projects will be selected to benefit a community organization, agency, public service provider, the VCU BEST program or another unit within the university. The goal of these projects is to provide students with an opportunity to gain firsthand exposure to specific target populations/organizations, observing the needs and current efforts, if any, to address those needs. Community partners will include nonprofit agencies, schools, worksites, hospitals and state and local health departments. Approved experiential learning placements and assignments will vary depending on the specific project topic and learning objectives. Reflection, project/activity presentation and website narratives will be required for the experiential learning project.

GRAD 691. Topics in Graduate Education. 1-15 Hours.
Variable lecture hours. Variable credit. Restricted to graduate or professional students. A seminar course for the examination of specialized issues, topics, readings, problems or areas of interest for all graduate students, such as the responsible conduct of research, globalization, mentoring, service-learning and areas of interest for graduate students interested in careers within and outside of academe. This course is open to all graduate, postgraduate and professional students unless specifically restricted. Graded as P/F.

GRAD 693. Graduate Internship. 1-9 Hours.
Semester course; variable hours (60 hours per credit). 1-9 credits. Students will spend 60 to 540 hours in a planned, supervised experience with an agency or business. A summary of work duties and how internship relates to degree program along with confirmation of hours worked must be submitted. Must consult with and have approval from current degree program director for course to count in degree program. Graded as S/U/F.

GRAD 697. Directed Research. 3,6 Hours.
Semester course; 3, 6 research hours. 3, 6 credits. Prerequisite: completion of all course work in M.I.S. program's individualized course of study concentration and approval of final research project proposal and degree candidacy. Restricted to graduate or professional students. Registration by permission of M.I.S. graduate program director. A final directed research study for the M.I.S. capstone project culminating in a synthesis of the academic focus areas of the student's M.I.S. curriculum plan. Students must receive a grade of A or B. A maximum of 6 credits applicable to the M.I.S. degree.

GRAPHIC DESIGN (GDES)

GDES 202. Design Technology. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: successful completion of the Art Foundation Program. A design foundation workshop that emphasizes skills development and application of design technology: time and project management, visual thinking, image capturing and editing.

GDES 205. Design Methods and Processes. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. An in-depth investigation of the theoretical aspects of the design process within the context of designing effective visual communications.

GDES 211. Typography I. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. An introduction to communication problem-solving through the visual medium of language. The fundamentals of typography and typographic design are explored in experimental and practical projects.

GDES 212. Design Form and Communication. 3,6 Hours.
Semester course; 2 lecture and 3 studio hours or 4 lecture and 6 studio hours. 3 credits for Richmond; 6 credits for VCUQ. The relationship of form and communication in graphic design is explored through theoretical and applied projects. The impact of typography and imagery and their syntactic relations upon audience and content is stressed.

GDES 213. Typography II. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: GDES 211. An intermediate exploration of typography as an expressive and functional communication vehicle. Emphasis is placed on defining effective design criteria to meet the reader's needs, the communicator's intent and the designer's formal sensibilities.

GDES 214. Imaging I. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: successful completion of the Art Foundation Program. Cannot be taken for credit with COAR 331. A studio course focusing on the use of digital imaging techniques for communication purposes. The processes and techniques for making and working with digital images are explored.

GDES 216. Imaging II. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: GDES 214. A studio course focusing on the creation of visual images for communication purposes. The processes and media for making visual images and the limits of visual literacy are explored.

GDES 252. History of Visual Communication. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An investigation of contemporary visual communication concepts, media and images, and their role in contemporary society.

GDES 253. Theory and Philosophy of Visual Communication. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An overview of theoretical and philosophical issues influencing the practice of visual communication design.

GDES 300. Creative Strategies. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. A course in which alternative creative communication problem-solving strategies are investigated.

GDES 301. Beginning Letterpress. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. An introductory/intermediate printmaking studio course designed for students interested in developing their visual vocabulary in letterpress and relief printing. Students will undertake critical analysis of the letterpress medium and utilize techniques to develop and produce finished editions of each assigned task.

GDES 302. Book Arts. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. An introduction to the tools, materials and craft of contemporary bookmaking. Investigation of bookbinding, handcraft and related techniques.

GDES 308. Web Design. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequiste: permission of instructor. A course developing the design of websites. Emphasis is placed on the visual design, navigation, development, communication and authoring of websites.

GDES 330. The Business of Design. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course introduces basic global economics and general design business concepts such as the free enterprise system, legal forms of business and financial considerations. It also surveys business and management practices such as planning, decision-making, communication, global ethics, marketing, human resources, finance and entrepreneurial skills needed to open a design business. Crosslisted as: IDES 330/FASH 330.

GDES 343. Systems in Design. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: successful completion of the sophomore GDES courses. The study of systematic and methodological approaches to communication design through the solving of complex problems in visual communication. Emphasis is placed on objective process and research in approaches to various professional situations.

GDES 345. Print I. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisites: UNIV 200 or HONR 200 and successful completion of the sophomore GDES courses. An introduction to the design process and applied realizations of print-based materials and outcomes. Addresses the form and communication of the printed page from the tradition of print to the organizational principles outside that tradition. Objectives accomplished through lectures, demonstrations and problem-solving.

GDES 346. Visual Narrative I. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: successful completion of the sophomore GDES courses. Studio course that introduces the conceptual and technical issues involved in the design and production of sequential documents and time-based compositions. Addresses the possibilities and limitations of the integration of word, image, video and sound as they relate to problem-solving in visual communication.

GDES 347. Interaction I. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: successful completion of the sophomore GDES courses. An introduction to the conceptual and technical issues involved in the design and production of interactive documents and environments. Addresses the possibilities and limitations of computer-generated images, sound and digital video as they relate to problem-solving in visual communication.

GDES 356. Studio Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of business and management factors that relate to creative design. Topics include marketing, structure and organization; financial factors; ethical and legal aspects; and management of design, illustration and photography studios.

GDES 365. Print II. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: GDES 345. An advanced studio course devoted to the study of systematic and methodological approaches to the design process and applied realization of print-based materials and outcomes. Emphasizes rigorous objective and experimental research methods in approaches to various professional situations. Objectives accomplished through lectures, demonstrations and team-based approaches to problem-solving.

GDES 366. Visual Narrative II. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: GDES 346. A studio course devoted to the design and production of advanced projects in sequential design, with focus on research, problem definition and team-based approaches to problem-solving.

GDES 367. Interaction II. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: GDES 347. A studio course devoted to the design and production of advanced projects in interaction design and experience design with focus on research, problem definition and team-based approaches to problem-solving.

GDES 370. Design History: 20th and 21st Centuries. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTF 105-106. Study of the major theories and styles on communication arts, fashion and interior environments of the 20th and 21st centuries. Contemporary analysis of cultural conditions and the manner in which designers respond to those conditions. Crosslisted as: FASH 370/IDES 370.

GDES 391. Lecture Topics in Design. 1-3 Hours.
Semester course; variable hours. 1-3 credits per semester. May be repeated for a maximum of 9 credits. Topical lectures in design issues and visual communications.

GDES 392. Research/Individual Study. 2-4 Hours.
Semester course; 1-2 lecture and 3-6 studio hours. 2-4 credits. May be repeated for a total of 6 credits. Enrollment requires permission of instructor, approval of faculty adviser and chair. The structuring, research, execution and presentation of an independent project in visual communications under the direction of a faculty adviser. The student will be encouraged to become a self-generating problem seeker and solver with the ability to carry out self-stated goals.

GDES 401. Advanced Letterpress. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. May be repeated for a maximum of 6 credits. Prerequisite: GDES 301. An advanced print studio course designed for students interested in exploring their visual vocabulary in digital and letterpress relief printing. Students will undertake critical analysis of the combined media of digital and letterpress and utilize techniques inherent within each technology to develop and produce finished editions.

GDES 403. Design Activism. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. An overview of the ethical issues faced by practitioners in the field of design and proactive roles available outside of the traditional client/designer relationship. The course presents critiques of the various roles that designers play in the areas of marketing, advertising, product development, and as entrepreneurs and content generators. The course includes a component in which problem identification, team work and real-world engagement are required.

GDES 404. Typeface Design. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Glyph construction is explored through historical and methodological analysis as well as the creation of typographic systems. Formal mechanics of typefaces are emphasized in discussion of their function as vehicles for communication. Both the functional and expressive nature of typefaces are examined through hands-on exercises.

GDES 408. Advanced Web Design. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: GDES 308. Investigation into the design and development of dynamic websites. Introduces database integration, webhost management and advanced coding techniques. Emphasis is placed on the semantic design and development of content-rich websites and blogs.

GDES 412. Typography III. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: successful completion of the sophomore GDES courses. Advanced problems in typographic design with emphasis upon the development of a personal creative approach to form and communication.

GDES 413. Package Design. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisites: GDES 213 and 367. Theoretical and studio investigation of three-dimensional structural principals as they relate to the area of packaging, exhibition and environmental design.

GDES 414. Exhibition and Environmental Graphic Design. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisites: GDES 213 and 366. Study of the presentation of information in large-scale, three-dimensional formats. Exploration of exhibition and environmental design, including developing imagery and typography, understanding the use of "wayfinding" (identification, interpretation and orientation) and human factors, communicating of programmed content.

GDES 417. Interdisciplinary Team Design. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisites: GDES 213 and 366. Advanced projects in visual communication in which student design teams solve complex problems requiring collaboration.

GDES 418. Design Center. 3-9 Hours.
Semester course; 2-6 lecture and 3-9 studio hours. 3-9 credits. May be repeated for a total of 12 credits. Enrollment requires portfolio review by faculty. A professional studio to give students practicum experience working with faculty on self-initiated and client-initiated, real-world design projects.

GDES 445. Problem Seeking. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A seminar exploring the nature, scope and implications of defining design objectives in terms of limitations, requirements and potentials of a product's implementation, performance and life cycle.

GDES 470. Senior Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An examination of selected theoretical, historical, aesthetic and social areas of concern to the graphic designer. Scholarly research, critical analysis and discussion are expected.

GDES 472. Senior Studio. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. A capstone course oriented toward the creation of a professional portfolio, self-promotional materials and business system. The course culminates in the annual Senior Show.

GDES 491. Studio Topics in Design. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. May be repeated for a total of 12 credits. Topical studio focusing on research and experimentation in specialized visual communication media.

GDES 492. Design Internship. 1-3 Hours.
Semester course; 1-3 credits. May be repeated for a maximum of 3 credits. Prerequisites: senior standing, 3.0 GPA or permission of the chair. Supervised pragmatic work experiences. Training is provided under the direction and supervision of qualified professional practitioners.

GDES 567. Visual Interface Design. 4 Hours.
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.

GDES 591. Advanced Studio Topics in Visual Communications. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: permission of instructor. May be repeated for a maximum of 6 credits. Topical studio focusing on research and experimentation in specialized visual communication media.

GDES 593. Visual Communications Internship. 3,6 Hours.
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.

GDES 610. Visual Communications Workshop. 4 Hours.
Semester course; 3 lecture and 3 studio hours. 4 credits. Prerequisite: permission of the graduate director. A studio course focusing on the philosophical, communicative and aesthetic relationships of visual communications problem-solving and the effective articulation of concepts.

GDES 611. Visual Communications Workshop. 4 Hours.
Semester course; 3 lecture and 3 sutdio hours. 4 credits. May be repeated for a maximum total of 16 credits. Prerequisite: permission of the graduate director. A studio course focusing on the philosophical, communicative and aesthetic relationships of visual communications problem solving and the effective articulation of concepts.

GDES 612. Research Methods in Visual Communications. 4 Hours.
Semester course; 3 lecture and 3 studio hours. 4 credits. Prerequisite: permission of program director. A studio-based examination of design research methods with emphasis place on linking knowledge, comprehension and application of historic and emerging methods of experimentation to generative and iterative studies. The course culminates in the writing and presentation of a research proposal for the second year of study.

GDES 621. Visual Communications Seminar. 4 Hours.
Semester course; 4 lecture hours. 4 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.

GDES 631. Visual Communications Teaching Practicum. 3 Hours.
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.

GDES 692. Visual Communications Research/Individual Study. 3 Hours.
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.

GDES 698. Research Documentation and Exhibition Design. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: permission of program director. A studio-based course focusing on the design and production of final research documentation in both book and exhibition formats.

GDES 699. Directed Thesis Research in Visual Communications. 1-8 Hours.
Semester course; variable hours (three studio hours per credit). 1, 4 or 8 credits. May be repeated for a maximum of 12 credits. Prerequisites: successful completion of 30 credit hours of graduate study and permission of department chair. Supervised investigation and presentation of selected problems in visual communications. Executed under the supervision of a graduate adviser and review committee.

HEALTH ADMINISTRATION (HADM)

HADM 602. Health System Organization, Financing and Performance. 3 Hours.
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, provider and payer effectiveness and efficiency.

HADM 606. Health Care Managerial Accounting. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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 the graduate program's foundation and required courses in accounting and finance.

HADM 609. Managerial Epidemiology. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: undergraduate course in statistics. Introduces and uses analytical techniques to study and measure the health status of populations and to evaluate programs. Topics covered include health status measurement, evaluation design and managerial applications of epidemiology.

HADM 610. Health Analytics and Decision Support. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: undergraduate course in statistics. Applications of analytics and decision support to health services institutions. Applications of operations research and industrial engineering techniques using large institutional data for health care planning, control and decision-making including deterministic and stochastic decision analysis models and their use in health services administration.

HADM 611. Health Care Law and Bioethics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Presents elements of law and legal principles as they apply to the administration of hospitals and health care systems. Emphasizes medical malpractice, 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.

HADM 612. Information Systems for Health Care Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course is restricted to majors only. Introduces and applies basic vocabulary, foundational principles and practical strategies associated with information systems relevant to the health care administrator. Examines health care information and information systems, technology standards and security, as well as management challenges.

HADM 614. Health Care Marketing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Foundational theories, concepts and techniques of marketing applied to the distinctive properties of health care services. Emphasis placed on the role of marketing and aligning organizational capacity and health care needs; market analysis and planning; strategic marketing management; tactical marketing mix design; designing and managing service delivery systems and developing new offerings.

HADM 615. Health Care Politics and Policy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines the political process with particular emphasis on the impact of politics on health care. Focuses on current political issues in the health field, examining conflicts and anticipating effects on the health system.

HADM 621. Advanced Medical Informatics: Technology-Strategy-Performance. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Focuses on use of technology for improving operational efficiencies, quality of care and market competitiveness. Explores various application technologies within the framework of technology-strategy-performance including: telemedicine, cyber surgery, Web-enabled clinical information systems, clinical decision support systems, artificial intelligence and expert systems, and risk-adjusted outcome assessment systems.

HADM 624. Health Economics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ECON 203 with a minimum grade of B and ECON 211. Develops an 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 issues in the health care field. Crosslisted as: ECON 624.

HADM 626. International Health. 3 Hours.
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.

HADM 638. Administration of Long-term Care Facilities and Programs. 3 Hours.
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. 3 Hours.
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. Health Care Organization and Leadership. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Explores the challenges of managing and leading health care organizations in the 21st century. Introduces concepts, vocabulary and ways of thinking to enable students to be more effective and insightful participants in organizational life in health care. Intended to provide the student with the basic knowledge necessary to benefit from the more detailed and advanced courses that follow in the curriculum.

HADM 647. Management of Health Care Organizations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: HADM 646. Analyzes the current state of management study and practice with the objective of achieving a balanced development of both knowledge and skills in solving the operations problems of health care institutions. Examines critically the managerial process; emphasizes leadership behavior and development, performance improvement, structure and purpose of health care organization subunits, interfunctional coordination, and organizational processes.

HADM 648. Strategic Management in Health Care Organizations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: 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 649. Human Resources Management in Health Care. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Presents concepts in human resources management as applied to health care organizations. Explores relationships between human resources management and general management, nature of work and human resources, compensation and benefits, personnel planning, recruitment and selection, training and development, employee appraisal and discipline, organized labor issues, and employment and labor law.

HADM 661. Physician Practice Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: 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 681. Clinical Concepts and Relationships. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Introduces students without clinical backgrounds (nursing, medicine, other) to medical and health care terminology. Reviews and discusses concepts that are related to health, healing, health professions and the experience of the patient. Examines the role of health professionals; emphasizes communication, problem solving and patient care improvements across professional boundaries.

HADM 682. Executive Skills I. 1 Hour.
Semester course; 1 lecture hour. 1 credit. 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. 1 Hour.
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. 1-9 Hours.
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 Hours.
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 Hours.
1-3 credits. Prerequisite: Permission of instructor. Special study conducted under the guidance of a faculty sponsor.

HADM 693. Internship in Health Administration. 3 Hours.
3 credits. Prerequisite: Completion of year one of the MHA curriculum. Restricted to dual-degree students (MHA/MD and MHA/JD). Assesses and examines administrative and organizational structures and cultures of the assigned site with perspectives from macro- and micro-organizational views. Students develop an understanding and gain knowledge of the complex health care industry and the internal and external factors that influence decision-making in the organization. Students will research and prepare a management project with recommendations to assist the organization in decision-making, policy development and/or performance improvement. Graded as S/U/F.

HADM 694. Practicum in Health Administration I. 5 Hours.
5 credits. Course is restricted to students completing a one-year administrative residency. Examines contemporary problems and issues in the organization, administration and evaluation of health services. Focuses on the application of alternative approaches to administrative problem solving. Emphasizes internal and external stakeholder interests and factors that influence decision-making in health care organizations. Graded as S/U/F.

HADM 695. Practicum in Health Administration II. 3-5 Hours.
3-5 credits. Course is restricted to students completing a one-year administrative residency. Students will examine contemporary problems and issues in the organization, administration and evaluation of health services. Focus on the application of alternative approaches to administrative problem solving. Course emphasizes internal and external stakeholder interests and factors that influence decision-making in health care organizations. Students design, conduct and present the results of a management project. Additional projects will be required for students enrolling in more than 3 credits. Graded as S/U/F.

HADM 697. Directed Research. 1-6 Hours.
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. Organizational Behavior for Health Services Research. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: HADM 704 and HADM 705, or permission of instructor. Provides intellectual insights into central topics of micro organizational behavior. Requires critical evaluation of organizational behavior and health services research based on organizational behavior topics. Requires identification and application of organizational behavior theoretical perspectives to issues in the health sector.

HADM 702. Research in Health Care Financing and Delivery Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: HADM 701, HADM 704 and HADM 705, or permission of the instructor. Critically reviews and evaluates emerging research in organization, delivery and financing of health care services.

HADM 704. Foundations of Health Service Organization Theory. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: HADM 704 or permission of instructor. Covers contemporary perspectives in health organization theory in depth, with emphasis on their research application in health care organizations. Critically assesses current examples of research on health care organizations using these perspectives.

HADM 711. Introduction to Health Services Organization Research I. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Open only to Ph.D. students in health services organization and research. Assists doctoral students in becoming members of the health services research community and developing skills to be successful researchers. Introduces students to health services research as a field, major databases for health services research, career paths and related ethical issues. Develops key foundational skills including database management, statistical software, grant applications and career development. First in a two-course sequence.

HADM 713. Introduction to Health Services Organization Research II. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Open only to Ph.D. students in health services organization and research. Assists doctoral students in becoming members of the health services organization research community and developing skills to be successful researchers. Introduces students to health services organization research as a field, major databases for health services research, career paths and related ethical issues. Develops key foundational skills including management of frequently used health services organization research databases, statistical software, grant applications and career development. Second in a two-course sequence.

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

HADM 761. Health Services Research Methods I. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: HADM 761 and MRBL 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. Applied Health Services Research. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: HADM 761 and ECON 501, or permission of instructor. Seminar for Ph.D. students who have had courses in quantitative analysis of health care data and research methods. Develops framework for classifying the major topics and issues addressed by health services research. Explores the relationships between health services research, policy analysis and program evaluation. Emphasizes assessment of the effectiveness, efficiency and equity of the health system at various levels of analysis. Stresses the importance of conceptual modeling as a foundation to rigorous empirical research.

HADM 792. Independent Study in Health Services Organization and Research. 1-3 Hours.
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. 1-3 Hours.
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. Doctoral Dissertation in Health Services Organization and Research. 1-9 Hours.
Semester course; 1-9 credits. A minimum of 9 semester hours required for Ph.D. degree. Prerequisite: Completion of required course work and comprehensive examination. Dissertation research under direction of faculty adviser.

HADM 899. Doctoral Dissertation in Health Services Organization and Research. 1-9 Hours.
Semester course; 1-9 credits. A minimum of 9 semester hours 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)

HADE 602. Health Systems Organization, Financing and Performance. 3 Hours.
Semester course; 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, provider and payer effectiveness and efficiency.

HADE 606. Health Care Managerial Accounting. 3 Hours.
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. 3 Hours.
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 609. Managerial Epidemiology. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Focuses on analytical techniques to study and measure the health or populations and to evaluate programs. Topics covered include health status measurement, evaluation design and managerial applications of epidemiology.

HADE 610. Health Analytics and Decision Support. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: undergraduate course in statistics. Applications of analytics and decision support to health services institutions. Applications of operations research and industrial engineering techniques using large institutional data for health care planning, control and decision-making, including deterministic and stochastic decision analysis models and their use in health services administration.

HADE 611. Health Care Law and Bioethics. 3 Hours.
Semester course; 3 credits. Presents elements of law and legal principles as they apply to the administration of hospitals and heath care systems. Emphasizes medical malpractice, medical-legal issues, informed consent, antitrust, heath 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. Information Systems for Health Care Management. 3 Hours.
Semester course; blended on-campus/online format. 3 credits. This course is restricted to majors only. Introduces and applies basic vocabulary, foundational principles and practical strategies associated with information systems relevant to the health care administrator. Examines health care information and information systems, technology standards and security, as well as management challenges.

HADE 614. Health Care Marketing. 3 Hours.
Semester course; 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; designing and managing service delivery systems and developing new offerings.

HADE 615. Health Care Politics and Policy. 3 Hours.
Semester course; blended on-campus/online format. 3 credits. Examines the political process with particular emphasis on the impact of politics on health care. Focuses on current political issues in the health field, examining conflicts and anticipating effects on the health system.

HADE 621. Advanced Medical Informatics: Technology, Strategy and Performance. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: HADE 612 and permission of the instructor. Focuses on using technology for improving operational efficiencies, quality of care and market competitiveness. Explores various application technologies within the framework of technology-strategy-performance including: telemedicine, cyber surgery, Web-enabled clinical information systems, clinical decision support systems, artificial intelligence and expert systems, and risk-adjusted outcome assessment systems.

HADE 624. Health Economics. 3 Hours.
Semester course; 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 646. Health Care Organization and Leadership. 3 Hours.
Semester course; blended on-campus/online format. 3 credits. Explores the challenges of managing and leading health care organizations in the 21st century. Introduces concepts, vocabulary and ways of thinking to enable students to be more effective and insightful participants in organizational life in health care. Intended to provide the student with the basic knowledge necessary to benefit from the more detailed and advanced courses that follow in the curriculum.

HADE 647. Management of Health Care Organizations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: HADE 646. Analyzes the current state of management study and practice with the objective of achieving a balanced development of both knowledge and skills in solving the operations problems of health institutions. Critically examines the managerial process with emphasis on leadership behavior and development, performance improvement, structure and purpose of health care organization subunits, interfunctional coordination, and organizational processes.

HADE 648. Strategic Management in Health Care Organizations. 3 Hours.
Semester course; 3 credits. Focuses on the formulation, implementation, and evaluation of strategy in health care financing/delivery organizations. Emphasizes concepts dealing with industry structure; the strategic management process; achieving and sustaining competitive advantage.

HADE 649. Human Resources Management in Health Care. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Presents concepts in human resources management as applied to health care organizations. Explores relationships between human resources management and general management, nature of work and human resources, compensation and benefits, personnel planning, recruitment and selection, training and development, employee appraisal and discipline, organized labor issues, and employment and labor law.

HADE 681. Special Topics in Health Administration. 1-3 Hours.
Variable hours. 1-3 credits. Investigate a specialized content area in a semester-long, seminar format. Topics may change from semester to semester.

HADE 691. Health Care Organization Diagnosis and Planning. 3 Hours.
1 credit. Provides an opportunity for students to integrate as well as 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. 1-5 Hours.
Variable hours. Variable credit. Offered in all semesters for students to investigate and study topics of major interest.

HEALTH AND MOVEMENT SCIENCES (HEMS)

HEMS 500. Motor Development of Young Children. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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. Topical Seminar. 1-3 Hours.
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 health, physical education, exercise science, recreation and sport. Crosslisted as: SPTL 591.

HEMS 600. Introduction to Research Design in Health and Movement Sciences. 3 Hours.
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. Movement Physiology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: HPEX 375 or equivalent. Investigates the physiological processes in relation to bodily exercises in everyday life and sports activities. Physiological 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. Statistical Applications in Health and Movement Sciences. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Presents theory and techniques involved in the analysis and interpretation of data pertinent to research in health and movement sciences. Includes statistics applied to data encountered in published health and movement sciences research.

HEMS 603. Applied Fitness and Nutrition for Health and Movement Science Professionals. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: HPEX 350 or equivalent. Provides an in-depth examination of the basic nutrients 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: Introductory psychology, personal health or equivalent. Examines psychological issues related to exercise and physical activity. Includes individual and group motivation theory and techniques, leadership effectiveness, 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. 3 Hours.
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; patterns 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. 3 Hours.
Semester course; 3 hours. 3 credits. Prerequisite: HPEX 375 or equivalent. 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. Biomechanics of Human Motion. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: BIOL 205 or equivalent. Recommended: PHYS 201, or HPEX 374 or 373, or equivalents. 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. Crosslisted as: REMS 611.

HEMS 612. Administration and Supervision of Physical Education. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Investigates the theory of the construction of evaluative instruments in physical education with emphasis on a critical examination of existing measurement devices. Emphasis on the use of measurement as a tool for improving physical education programs.

HEMS 614. Motor Assessment for Special Populations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: HEMS 514 or permission of instructor. Provides the student with basic information 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 items purporting to measure these components; 2) administration, i.e., time, administrator's experience, group size, validity and reliability and standardization; 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides in-depth exposure to procedures 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Analysis of early patterns of behavior and the development of physical skills in childhood, 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: HEMS 521 or permission of instructor. Designed to give the student knowledge in the advanced principles of prevention and treatment of athletic injuries. The course includes advanced first aid techniques and the more sophisticated means of athletic care and prevention. 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 637. Advanced Technology in Teaching Health and Physical Education. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Designed to prepare students to apply knowledge and skills in using technology in the physical education setting. Emphasis is placed on creating lessons using pedometers, downloadable heart-rate monitors, flip cams, computerized observational systems and the pocket PC. Focus is also on the use of local county grade-reporting systems.

HEMS 640. Health Care Organization and Delivery in the U.S.. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides an overview of the U.S. health care system and its many diverse components. Within the context of the U.S. health system, the course also provides students a perspective on the growing role of health behavior coaches as part of the interdisciplinary health team, the variety of employment opportunities and the business development potential of the field.

HEMS 641. Human Disease Prevention, Prevalence and Lifestyle Risk Factors. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines major categories of diseases, i.e., infectious, noninfectious, acute and chronic, including significant examples in each category. Current modalities for the prevention, treatment and control of diseases will be studied. In addition, the course will provide learning experiences to prepare students to convey information as health behavior coaches to a variety of audiences, including individual patients/clients, groups, specific priority populations and the general public.

HEMS 642. Theoretical Foundations of Health Behavior Change. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Investigates the relationship between health and behavior, with emphasis on both theory and application. The course addresses the theoretical foundations of behavior change, including an overview of leading theories as well as critical evaluation of their utility in promoting health behavior change.

HEMS 643. Fundamentals of Motivational Interviewing. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Restricted to health behavior coaching certificate students only. Introduces students to the fundamentals of motivational interviewing, a state-of-the-art, evidence-based communication and counseling technique. MI is designed to build clients' and patients' inner motivation and self-efficacy for positive health behavior change and maintenance. This course will expose students to the theory, principles and skills of MI that can be utilized with individuals or with groups.

HEMS 644. Advanced Motivational Interviewing. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: HEMS 643. Expands the students' exposure, understanding and practice of motivational interviewing, a state-of-the-art, evidence-based communication and counseling technique. MI is designed to build clients' and patients' inner motivation and self-efficacy for positive health behavior change and maintenance. This course will reiterate the importance of the theoretical foundation underlying MI, examine applications of MI and provide opportunities for advancing students' skills through role-playing specific to health behavior change.

HEMS 645. Application of Motivational Interviewing in Clinical Settings. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisites: HEMS 644, HEMS 647 and HEMS 648. Expands the student's knowledge, skills and competencies in motivational interviewing by focusing on the utilization of this communication and counseling technique in clinical settings (i.e., health/medical care settings). Students will be exposed to applications of MI that can be employed with individual patients or clients who present with single disease processes or comorbidities.

HEMS 646. Application of Motivational Interviewing in Group and Community Settings. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisites: HEMS 644, HEMS 647, HEMS 649. Expands the student's knowledge, skills and competencies in motivational interviewing by focusing on the utilization of this communication and counseling technique in group or community settings (e.g., support groups, groups in community organizations, groups in faith-based organizations, etc.). Students will be exposed to applications of MI that can be employed with groups who present with common health challenges or groups who are concerned with health promotion and disease prevention.

HEMS 647. Concepts and Applications in Chronic Disease Self-management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: HEMS 640, HEMS 641, HEMS 642 and HEMS 643. Evidence-based course designed to enhance the student's knowledge of lifestyle factors such as physical activity, nutrition, weight management, stress management, medication compliance and tobacco cessation, etc., as they relate to the self-management of the most prevalent chronic diseases that affect the U.S. Students will learn hands-on skills to assist patients/clients across the lifespan.

HEMS 648. Health Behavior Change Counseling Techniques for Clinical Interventions. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: HEMS 640, HEMS 641, HEMS 642, HEMS 643. Focuses on the development of knowledge and skills that are essential to effective interpersonal communication and counseling, which will lay the foundation for effective health behavior coaching. Emphasis will be placed on fundamental counseling techniques and motivational interviewing and their applications to individual level health behavior change.

HEMS 649. Planning, Implementing and Evaluating Group/Community Health Behavior Change Interventions. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: HEMS 640, HEMS641, HEMS 642 and HEMS 643. Addresses the fundamentals of planning, implementing and evaluating health behavior change interventions in a variety of group or community settings, including support groups, worksite health promotion groups, community groups, faith-based groups, etc. Students will operationalize and apply the knowledge and skills essential to the effective practice of certified health behavior coaches.

HEMS 660. Neuromuscular Performance. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: HEMS/REMS 601 and HEMS 611. Examines the interrelationships between the musculoskeletal and neuromuscular systems. Includes examination of normal and abnormal biomechanics of the musculoskeletal system, biomechanical 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. Crosslisted as: REMS 660.

HEMS 675. Clinical Exercise Physiology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: Permission of instructor. Examines theoretical and functional techniques of graded exercise testing for functional and/or diagnostic assessment. Topics include pulmonary, cardiovascular, respiratory and myocardial physiology, and the principles and skills of exercise prescription based on metabolic calculations.

HEMS 690. Research Seminar in Health and Movement Sciences. 1-3 Hours.
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. 1-3 Hours.
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. Independent Study. 1-3 Hours.
Semester course; 1-3 hours. 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. Crosslisted as: REMS 692.

HEMS 695. Externship. 1-6 Hours.
Semester course; 1-6 credits. May be repeated for 6 credits. Prerequisite: Permission of instructor. 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. 1-3 Hours.
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. 1-6 Hours.
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.

HEALTH CARE MANAGEMENT (HCMG)

HCMG 300. Health Care Organization and Services. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines the structure and function of the U.S. health services delivery system. Examines the role and responsibilities of health care professions and occupations, technology and financing arrangements in the delivery system.

HEALTH, PHYSICAL EDUCATION AND EXERCISE SCIENCE (HPEX)

HPEX 107. Badminton. 1 Hour.
1 credit.

HPEX 121. Self Defense: Karate or Judo. 1 Hour.
1 credit.

HPEX 201. Individual Sports and Lifelong Leisure Activities. 3 Hours.
Semester course; 3 lecture/laboratory hours. 3 credits. Health, physical education and exercise science majors only. Prepares students to develop educational skills and methodology for instruction of individual sports in the classroom, gymnasium and outdoor field settings; students acquire skills needed to teach individual sports in middle and high school environments.

HPEX 202. Team Sports and Activities. 3 Hours.
Semester course; 3 lecture/laboratory hours. 3 credits. Open only to general health and physical education majors in the health, physical education and exercise science program. Students develop educational skills and methodology for instruction of team sports and group activities in classroom, gymnasium and outdoor field settings. Students acquire skills needed to teach team sports and activities in middle and high school environments.

HPEX 203. Wilderness Education I. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Designed to examine the principal philosophical foundations of adventure theory and wilderness leadership. Concepts of judgment, decision-making, leadership and environmentally correct practices are introduced.

HPEX 211. Tumbling and Elementary Rhythmics. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Prepares students to work with elementary children 4 to 12 years of age in rhythmic activities; includes elementary tumbling, activities and games designed to help a child's rhythmic ability.

HPEX 216. Lifeguard Training. 1,2 Hour.
1-2 credits.

HPEX 217. Water Safety Instruction. 1,2 Hour.
1-2 credits.

HPEX 218. Scuba. 1 Hour.
1 credit.

HPEX 220. Introduction to Athletic Training. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 205 and BIOZ 205L. Corequisite: HPEZ 220L. An introduction to the field of athletic training. Includes the prevention and basic care of athletic injuries in the physically active.

HPEX 230. History and Philosophy of Health and Physical Education. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An overview of the professional aspects of health and physical education. Historical and philosophical concepts, evaluation and research methods, current issues and trends, and career opportunities are discussed. Field experiences allow exposure to various professionals and facilities related to the health and physical education domains.

HPEX 231. Principles of Accident Prevention. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course is designed to provide information on the magnitude of the accident problem in the nation. Special attention is given to concepts and theories of accident prevention, particularly as they relate to use of highways.

HPEX 232. Introduction to Driver Education. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A current automobile operator's permit is required. An introduction to the vehicle operator's task within the highway transportation system: driver task analysis.

HPEX 250. Medical Terminology. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Self-directed learning experience for students entering a medical or allied health profession. Presents medical terms by their root word, suffix and prefix. Develops skills to build and decode medical terms by their word parts. Develops ability to recognize and use common medical abbreviations.

HPEX 271. Safety, First Aid and CPR. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course includes American Red Cross and/or American Heart Association certification in Multimedia Standard First Aid and Basic Life Support (cardiopulmonary resuscitation). In addition, basic principles of accident causation and prevention are presented.

HPEX 291. Special Topic in Health, Physical Education and Exercise Science. 1-3 Hours.
Semester course; 1-3 credits. May be repeated for a maximum of 3 credits. Restricted to health, physical education and exercise science majors only. Offers students the opportunity to participate in an approved professional experience related to the students' knowledge base of general education and professional introduction courses; may include participatory and experimental formats dictated by the faculty supervisor; credits determined by the number of contact hours of the experience.

HPEX 292. Independent Study in Health, Physical Education and Exercise Science. 1-3 Hours.
Semester course; 1-3 credits. Health, physical education and exercise science majors only. May be repeated up to a maximum of 3 credits. Enables a student to create an individualized research project or professional experience based on specific professional needs and goals; must have adviser's approval; experiences based on the student's knowledge base of general education and professional core introduction courses; credits determined by the number of contact hours and extensiveness of the project.

HPEX 293. Field Practicum I. 3-6 Hours.
Semester course; variable practicum hours. 3-6 credits. Health, physical education and exercise science majors only. Provides observational and small group experiences for the pre-professional student; includes planned observations, tutorials and small group involvement under the supervision of the faculty and field supervisor; summary papers, observational logs, resumes and updated five-year plans are completed in this writing intensive course; minimum of 50 contact hours per credit hour required; consult with adviser to obtain specific course requirements.

HPEX 294. Field Practicum II. 3-6 Hours.
Semester course; variable practicum hours. 3-6 credits. Health, physical education and exercise science majors only. Provides observational and small group experiences for the pre-professional student; includes planned observations, tutorials and small group involvement under the supervision of the faculty and field supervisor; minimum of 50 contact hours per credit hour required; consult with adviser to obtain specific course requirements.

HPEX 295. Clinical Practicum I. 3-6 Hours.
Semester course; variable practicum hours. 3-6 credits. Health, physical education and exercise science majors only. Provides observational and small group experiences for the pre-professional student; includes planned observations, tutorials and small group involvement under the supervision of the faculty and clinical supervisor; summary papers, observational logs, resumes and updated five-year plans are completed in this writing intensive course; a minimum of 50 contact hours per credit hour required; consult with adviser to obtain specific course requirements.

HPEX 296. Clinical Practicum II. 3-6 Hours.
Semester course; variable practicum hours. 3-6 credits. Health, physical education and exercise science majors only. Provides observational and small group experiences for the pre-professional student; includes planned observations, tutorials and small group involvement under the supervision of the faculty and clinical supervisor; a minimum of 50 contact hours per credit hour required; consult with adviser to obtain specific course requirements.

HPEX 300. Health Care Delivery in the U.S.. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Introduces students to the American health care system and provides an opportunity to analyze the diverse components comprising the system. Major components of the system are examined, including inpatient and outpatient services, financing, insurance and technology. Provides the student a perspective of the variety of career choices in health care.

HPEX 310. Fitness and Health. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to HPEX majors. Presents the knowledge and pedagogical principles of strength, flexibility, aerobic and anaerobic training programs, as well as the role that exercise and lifestyle play on overall health. Emphasis is on understanding, experiencing and applying conditioning principles for individuals and how they impact health.

HPEX 325. Pathology and Pharmacology in Athletic Training. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: HPEX 220, HPEZ 220L, PHIS 206 and PHIZ/BIOZ 206L. Acquaints the student with the pathology of athletic injuries and the proper use of pharmacology in the treatment of athletic injuries. Includes the pathomechanics of sports injuries and the use of medication in the treatment of sports injuries.

HPEX 330. Elementary Health and Physical Education. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prequisites: HPEX 230, and either HPEX 201 or HPEX 202. Open only to general health and physical education majors in the health, physical education and exercise science program. Emphasis is given to the role of movement and theory in the education program and its implications for curriculum development and learning. Major consideration is given to the development of movement competency through thematic instruction.

HPEX 331. Methods in Driver Education. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: HPEX 232. This course is designed to provide driver education instructional principles and methodology.

HPEX 332. Motor Learning and Performance. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course is designed to introduce the student to the major concepts of motor control and motor learning and the influencing conditions. It will provide a framework for understanding the structure and function of the nervous system in relation to perception and motor control. Other topics include the general nature of skill acquisition and how learners interact with the environment while performing motor tasks. The theoretical framework underlying learning and memory are related to the acquisition of motor skills.

HPEX 333. Psychosocial Aspects of Sport and Physical Activity. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The focus of this course is the scientific study of the behavior of individuals and groups within sport and physical activity in terms of the psychological effects and factors of sport participation, and in terms of the social relationships and social settings within which sport participation occurs.

HPEX 334. Measurement and Analysis in Teaching and Exercise Science. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Corequisite: HPEZ 334. Topics include selecting, administering, scoring and evaluating tests in the areas of general motor performance, health screening, fitness, sport skills and knowledge. Includes scientific test construction and basic statistical analysis.

HPEX 335. Elementary Physical Education for Physical Education Majors. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Designed to enhance knowledge of elementary physical education through an analysis of the aims, goals, objectives, programs and teaching methods. Construction of year-round curriculum and daily lesson plans. Emphasis also placed upon the acquisition of administrative and organizational knowledge dealing with facilities, equipment, teaching aids, testing, measurement and safety.

HPEX 337. Technology in Teaching Health and Physical Education. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Emphasis is placed on the application of the latest software and hardware technology used in the field of health and physical education. Students use public school settings and authentic data whenever possible.

HPEX 345. Nutrition for Health and Disease. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to HPEX majors. Overview of basic nutritional knowledge for both healthy individuals and those with increased risk of cardiovascular disease. The course relies on evidence-based research when discussing food and nutrition. Topics include science and politics of dietary guidelines; the science and controversies of carbohydrates, proteins, fats, vitamins and minerals; supplements; obesity and weight loss; digestion and absorption; allergies and intolerances; functional foods, phytochemicals and organic food.

HPEX 350. Nutrition. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides learning opportunities that enable the student to acquire a practical and useful knowledge based on the sound principles of applied human nutrition. Emphasis will be on nutritional needs through the cycles of life providing information that will enhance the student's own lifestyle and provide experience in interpreting nutritional information for the public.

HPEX 351. Issues in Sexuality. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An overview of content, principles and strategies relating to issues in human sexuality both in the community and school settings. Basic concepts of human sexuality as they develop in today's world are presented. Issues include sexual maturity, reproductive systems, conception, birth, abortion and varieties of sexual behavior and sexual dysfunctions and disorders.

HPEX 352. Substance Abuse. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of drugs that are used and abused in contemporary society. Multidisciplinary lectures and discussions include the historical and sociological perspectives of drugs in the school and community; the psychological and physiological effects of drug use; and the role of local and regional resources. Designed for students, teachers, counselors, administrators and other interested persons. Rehabilitation methods and prevention programs also will be discussed.

HPEX 353. Disease Trends, Prevention and Control. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Pre- or corequisite: HPEX 250. Provides students an opportunity to examine the major categories of diseases, infectious and noninfectious, including significant examples in each category. Students will also research major diseases affecting the U.S. population as well as global populations. Current modalities for the prevention, treatment and control of these diseases will be studied.

HPEX 354. Coping and Adaptation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Focuses on common stress factors in life such as death, personal loss, life changes, divorce and emotional problems, such as anger, loneliness and frustration. Strategies for dealing with such stressors are discussed and applied to both personal and professional settings.

HPEX 355. School and Community Health Resources. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Acquaints the student with current available school and community resources and educational materials for health information. Available services in a community health program will be surveyed.

HPEX 356. Community Health Education and Promotion: Theory and Practice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: HPEX 300 and 353. Pre- or corequisite: HPEX 355. Introduces theories, roles and skills that are the foundation for the professional practice of community health education. Emphasizes the growing significance of health education in preventing and/or treating health problems, health promotion and improving quality of life. Presents the historical evolution and development of the profession and the various settings in which health educators practice. Assists in the preparation of students for certification as health education specialists.

HPEX 357. Personal Health and Behavior Change. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Designed to provide students with a basic understanding of various contemporary personal and community health issues. Special emphasis placed on increasing awareness of multiple factors that affect individual health-behavior change and, subsequently, influence current and future health status.

HPEX 358. Introduction to Epidemiology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: STAT 210. Enrollment restricted to HPEX majors. Introduction of students to the field of public health epidemiology, emphasizing methods for assessing factors associated with the distribution and etiology of health and disease. Skills include methods for identifying and evaluating sources of health information, calculation of key epidemiologic measures, epidemiological investigation techniques, and evaluation of the strengths and weaknesses of different study designs.

HPEX 370. Coaching Seminar. 1 Hour.
Semester course; 1 lecture hour. 1 credit. A lecture/discussion course that identifies the practical administrative and organizational responsibilities coaches encounter. Realistic problem-solving is stressed.

HPEX 371. Psychology of Physical Activity. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines psychological issues related to physical activity, exercise and sport participation. Topics include individual and group motivation theory and techniques, leadership effectiveness, mental health, mental skills training, injury rehabilitation, eating disorders, exercise adherence, addiction, overtraining and use of ergogenic aids. Emphasizes examination of current research and application of psychological principles in a physical activity setting.

HPEX 372. Survey of Kinesiology and Physiology of Exercise. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines the basic concepts of human biomechanics and exercise physiology. Includes basic and applied kinesiology and metabolic, endocrinological, cardiovascular and respiratory responses and adaptations to exercise. Emphasizes the integration of kinesiological and physiological principles.

HPEX 373. Structural Kinesiology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOL 205. Corequisite: HPEZ 373. Presents the anatomical aspects of human motion with particular attention given to application of anatomical structure and terminology in analysis of physical activities; emphasizes structure and function of the human musculoskeletal system and qualitative analysis of motor skills.

HPEX 374. Musculoskeletal Structure and Movement. 4 Hours.
Semester course; 3 lecture and 2 laboratory hours. 4 credits. Prerequisite: BIOL 205. Pre- or corequisite: PHYS 201. Enrollment restricted to HPEX majors. Provides an understanding of the mechanical aspects of human motion with particular attention given to application of anatomical structure, terminology and biomechanics in the analysis of physical activity. Laboratory learning allows students to acquire practical knowledge and skills in palpation, biomechanical analysis and instrumentation.

HPEX 375. Physiology of Exercise. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PHIS 206. Corequisite: HPEZ 375. Physiological changes in the human organism resulting from exercise, investigation of recent research in diet, drugs, fatigue, cardiovascular/respiratory fitness, conditioning programs for various age groups and the effects of exercise upon various components of physical fitness and health. Application of specific problems to physical education programs. Laboratory experience in the use of research instruments.

HPEX 380. Resistance Training for Health and Performance. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: HPEX 310 and HPEX 375. Enrollment restricted to HPEX majors. Provides students with the knowledge, skills and abilities to design and implement resistance training programs for a variety of populations. Covers the scientific and practical basis for resistance training to reduce injuries, improve health and optimize performance. Students actively participate in and demonstrate knowledge of a range of resistance exercise techniques, as well as preparticipation screening. Helps prepare those students wishing to attempt the National Strength and Conditioning Association's Certified Strength and Conditioning exam.

HPEX 391. Special Topic in Health, Physical Education and Exercise Science. 1-3 Hours.
Semester course; 1-3 credits. Health, physical education and exercise science majors only. May be repeated up to a maximum of three credits. Offers students the opportunity to participate in an approved professional experience related to the students' knowledge base of general education, professional introduction and some core professional courses; may include participatory experiences in which the student plays an active role in the experience; credits determined by the number of contact hours of the experience.

HPEX 392. Independent Study in Health, Physical Education and Exercise Science. 1-3 Hours.
Semester course; 1-3 credits. Health, physical education and exercise science majors only. May be repeated up to a maximum of 3 credits. Enables a student to create an individualized research project or professional experience based on specific professional needs and goals; must have adviser's approval; experiences based on the student's knowledge base of general education and professional introduction and some professional core courses; credits determined by the number of contact hours and extensiveness of the project.

HPEX 393. Field Experience I. 3-6 Hours.
Semester course; variable hours. 3-6 credits. Prerequisites: permission of instructor; acceptance into teacher preparation program; and CPR certification. Health, physical education and exercise science majors only. Precedes the in-depth student teaching experience or the in-depth exercise science field experience; includes planned observations, tutorials, small group involvement under the supervision of the faculty and field supervisor; practices routine, basic and advanced procedures; minimum of 50 contact hours per credit hour required; consult with adviser to obtain specific course requirements.

HPEX 394. Field Experience II. 3-6 Hours.
Semester course; variable hours. 3-6 credits. Health, physical education and exercise science majors only. Designed to provide supervised practical experience in the teaching process or delivery of health education/health promotion programs; opportunities to further abilities in physical education and exercise science through practical application of skills in school or agency settings; a minimum of 50 contact hours per credit hour required; consult with adviser to obtain specific course requirements.

HPEX 395. Clinical Experience I. 3 Hours.
Semester course: 3 clinical hours. 3 credits. Prerequisites for students in the exercise science concentration: HPEX 375, junior standing and permission of instructor. Prerequisites for students in the health sciences concentration: HPEX 250, HPEX 300, HPEX 353 and BIOL 205, junior standing, and permission of instructor. Enrollment restricted to HPEX majors. Students are also expected to maintain current CPR/AED/FA certification throughout the semester. Students should consult with an adviser or course instructor to obtain concentration-specific course prerequisites and course requirements. Addresses competencies in exercise science, health promotion and/or health science. Provides experiences at an approved affiliate site under the supervision of faculty and approved site supervisors. Students gain practical experience in routine and basic procedures associated with exercise science, health promotion and/or health science. A minimum of 40 contact hours per credit hour required.

HPEX 396. Clinical Experience II. 3-6 Hours.
Semester course; variable clinical hours. 3-6 credits. Health, physical education and exercise science majors only. Addresses required competencies in the athletic training, kinesiotherapy or community wellness education programs; provides experiences in an approved affiliate site under the supervision of faculty and approved clinical instructors; gains practical experience in routine, basic and advanced procedures associated with athletic training, kinesiotherapy or community wellness; a minimum of 50 contact hours per credit hour required; consult with adviser to obtain specific course requirements and clinical competencies addressed.

HPEX 420. Athletic Training Administration. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: HPEX 395 and HPEX 396. Acquaints the student with the proper organization and management techniques used in health care administration of athletic training programs. Includes organization, management and administration of health care of the physically active in the athletic setting.

HPEX 430. The Organization, Administration and Supervision of the Intramural Sports Program. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Experiences in the organization and administration of an intramural sports program. Lecture will be devoted to the theory, philosophy, history and plans for the conduct of an intramural sports program. Laboratory experience will be obtained by working in intramural programs.

HPEX 431. Adapted Physical Activity. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prepares future teachers and professionals to meet the needs of persons with disabilities in organized health, physical education and rehabilitation programs in the school, community or hospital setting. Provides an overview of those disabilities found most frequently in public school and rehabilitation settings.

HPEX 432. Methods and Curriculum in Physical Education. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prepares students to become independent problem-solvers and decision-makers by applying previously acquired knowledge to curriculum design and instruction in multiple settings; students acquire pedagogical skills and gain insight into the development of a physical education curriculum for elementary, middle and high school levels.

HPEX 433. Methods and Curriculum in Health Education. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prepares students to become independent problem-solvers and decision-makers by applying previously acquired knowledge to curriculum design and instruction in a classroom setting; students acquire pedagogical skills and gain insight into the development of a health education curriculum for elementary, middle and high school levels.

HPEX 435. Health Disparities in the U.S.. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: HPEX 353 and HPEX 358. Enrollment restricted to HPEX majors. Provides an exploration into the magnitude of health disparities in the U.S. and the association with socioeconomic status, race, ethnicity, country of origin, cultural history and access to health services. Students are encouraged to broaden their perspectives and understand how various sociocultural factors impact health and health care delivery as it relates to the patient/consumer as well as the health care practitioner. Targets the values, beliefs, attitudes and customs of multiple segments of the population in relationship to age, gender, disability status, sexual orientation, area of residence, etc. Emphasizes and provides learning experiences to assist in the development of cultural competence.

HPEX 440. Chronic Disease and Exercise Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: HPEX 375 and HPEZ 375L. Presents in-depth information of various concepts specifically related to exercise management of persons with chronic disease and/or disability. Provides scientific knowledge of various chronic diseases and disabilities that are commonplace and can be managed with physical activity. General topics include cardiovascular and pulmonary diseases, metabolic diseases, immunological and hematological diseases, orthopaedic diseases and disabilities, neuromuscular disorders, and cognitive, emotional and sensory disorders. Focuses on the understanding of specific physical and physiological characteristics associated with the various diseases and disabilities.

HPEX 441. Assessment and Exercise Intervention in Health and Disease. 3 Hours.
Semester course; 2 lecture and 1 laboratory hours. 3 credits. Prerequisite: HPEX and HPEZ 375. Provides in-depth information of various concepts specifically related to exercise assessment and prescription for healthy persons and those with chronic disease and/or disability. Examines the various concepts specifically related to measurement of cardiorespiratory fitness, pulmonary function, body composition, flexibility and muscular strength and endurance. Focuses on the development of exercise and physical activity prescriptions for healthy and diseased populations.

HPEX 445. Principles of Health Care Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: HPEX 240 or 300. Exposes the student to basic aspects of administration and management in various health care settings. The traditional areas of administration and management, such as planning, organizing, staffing, directing and controlling will be addressed. Contemporary issues such as cultural competence, quality of care, ethics, and fraud and abuse will be examined. The course will provide a theoretical base that will enhance and facilitate the student's application of sound management principles in various practice settings.

HPEX 450. Program Planning and Evaluation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: HPEX 356. Corequisite: HPEZ 450. Presents the foundations of planning, implementation and evaluation of community health education programs. Exposes students to programming and evaluation in a variety of community health settings, including schools, work sites, hospitals, state and local health departments and nonprofit agencies.

HPEX 451. Professional Conference in Community Health Education. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Offers the student an opportunity to participate in a professional conference focusing on community health education. This experience includes observing, summarizing and critically evaluating presentations, as well as preparing and delivering presentations and networking.

HPEX 470. Exercise Programming and Leadership. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: HPEX 310, HPEX 380 and HPEX 441. Provides knowledge and skills necessary for assessing, interpreting and designing health and activity programs for apparently healthy populations. Students develop leadership skills through presentation of ACSM exercise testing procedures and implementation of exercise prescriptions.

HPEX 475. Cardiovascular Pathophysiology and Pharmacology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: HPEX 375 and HPEX 440 or equivalents. Enrollment restricted to HPEX majors. Presents theoretical principles of electrocardiography and the effects of pharmacological intervention in the treatment of cardiovascular disease. Specific emphasis placed on myocardial ischemia, myocardial infarction and their treatment through exercise rehabilitation protocols. The impact of pharmacological agents on the ECG and on exercise is explored.

HPEX 480. Professional Certification Seminar. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisites: HPEX 380, HPEX 441 and HPEX 470. Enrollment restricted to seniors in HPEX major. Provides structured experiences in the classroom, laboratory and exercise arenas to improve knowledge, skills and abilities in health-related physical fitness assessment and exercise programming. Supplements existing course work by correcting any deficiencies in learning competencies toward being a successful exercise professional. A review of certification materials is also an important component of the course.

HPEX 491. Special Topic in Health, Physical Education and Exercise Science. 1-3 Hours.
Semester course; 1-3 credits. Health, physical education and exercise science majors only. May be repeated up to a maximum of 3 credits. Offers students the opportunity to participate in an approved professional experience related to the students' knowledge base of general education, professional introduction and extensive core professional courses; may include research-based projects or more academically rigorous experiences; credits determined by the number of contact hours of the experience.

HPEX 492. Independent Study in Health, Physical Education and Exercise Science. 1-3 Hours.
Semester course; 1-3 credits. Health, physical education and exercise science majors only. May be repeated up to a maximum of 3 credits. Enables a student to create an individualized research project or professional experience based on specific professional needs and goals; must have adviser's approval; experiences based on the student's knowledge base of general education, professional introduction and extensive core courses; credits determined by the number of contact hours and extensiveness of the project.

HPEX 493. Field Experience III. 3-12 Hours.
Semester course; variable hours. 3-12 credits. Prerequisites: pass Praxis II; HPEX 393 with a minimum grade of C. Health, physical education and exercise science majors only. An in-depth field experience in a public school, health education/health promotion agency or other approved setting; designed to provide the pre-professional student with greater practical application of skills culminating in full responsibility for planning, implementing and evaluating the classroom, agency or facility activities; a minimum of 50 contact hours per credit hour required; consult with adviser to obtain a course syllabus regarding prerequisites and specific course requirements.

HPEX 494. Field Experience IV. 3-6 Hours.
Semester course; variable hours. 3-6 credits. Prerequisites: pass Praxis II; HPEX 393 with a minimum grade of C. Health, physical education and exercise science majors only. An in-depth field experience in a public school, health education/health promotion agency or other approved setting; designed to provide the pre-professional student with greater practical application of skills culminating in full responsibility for planning, implementing and evaluating the classroom, agency or facility activities; a minimum of 50 contact hours per credit hour required; consult with adviser to obtain a course syllabus regarding prerequisites and specific course requirements.

HPEX 495. Clinical Experience II. 6 Hours.
Semester course: 6 clinical hours. 6 credits. Prerequisites: HPEX 395, senior standing, permission of instructor and minimum grade of C in all HPEX prerequisite courses. Enrollment restricted to HPEX majors. Students are also expected to maintain current CPR/AED/FA certification throughout the semester. Students should consult with an adviser or course instructor to obtain concentration-specific course prerequisites and course requirements. Fulfills capstone requirement. Addresses competencies in exercise science, health promotion and/or health science. Provides experiences at an approved affiliate site under the supervision of faculty and approved site supervisors. Students gain practical experience in routine, intermediate and advanced procedures associated with exercise science, health promotion and/or health science. A minimum of 40 contact hours per credit hour required.

HPEX 496. Clinical Experience III. 3-6 Hours.
Semester course: 6 clinical hours. 6 credits. Prerequisites: HPEX 395, senior standing, permission of instructor and minimum grade of C in all HPEX prerequisite courses. Enrollment restricted to HPEX majors. Students are also expected to maintain current CPR/AED/FA certification throughout the semester. Students should consult with an adviser or course instructor to obtain concentration-specific course prerequisites and course requirements. Addresses competencies in exercise science, health promotion and/or health science. Provides experiences at an approved affiliate site under the supervision of faculty and approved site supervisors. Students gain practical experience in routine, basic and advanced procedures associated with exercise science, health promotion and/or health science. A minimum of 40 contact hours per credit hour required.

HEALTH, PHYSICAL EDUCATION AND EXERCISE SCIENCE LAB (HPEZ)

HPEZ 220. Introduction to Athletic Training Laboratory. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Corequisite: HPEX 220. Laboratory fee required. A laboratory to introduce the basic skills used by an athletic trainer in the prevention and care of athletic injuries in the physically active.

HPEZ 320. Upper Extremity Assessment of Athletic Injuries Laboratory. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Corequisite: HPEX 320. Laboratory fee required. This laboratory course includes practice in the skills of assessment and management of upper extremity athletic injuries in the physically active. Includes head, neck, thoracic, abdominal, shoulder, elbow, forearm, wrist, hand and finger injuries.

HPEZ 321. Lower Extremity Assessment of Athletic Injuries Laboratory. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Corequisite: HPEX 321. Laboratory fee required. This laboratory course is designed to acquaint the student with the proper assessment and treatment procedures for lower extremity athletic injuries in the physically active. The lab will include prevention, care and treatment of lower back, hip, thigh, knee, lower leg, ankle and foot athletic injuries.

HPEZ 322. Therapeutic Exercise in Athletic Training Laboratory. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Corequisite: HPEX 322. This laboratory course is designed to acquaint the student with the proper use of therapeutic exercise in the treatment and rehabilitation of athletic injuries in the physically active. The lab course will include the skills of the therapeutic exercise used in the treatment of groin, thigh, hip, knee, lower leg, ankle, foot, shoulder, elbow, wrist, hand, finger and back athletic injuries.

HPEZ 324. Therapeutic Modalities in Athletic Training Laboratory. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Corequisite: HPEX 324. Laboratory fee required. This laboratory course will allow the student to develop the practical skills required to properly apply therapeutic modalities used to treat athletic injuries in the physically active.

HPEZ 334. Measurement and Analysis in Teaching and Exercise Science Laboratory. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Corequisite: HPEX 334. Laboratory experience applying knowledge and skills presented in HPEX 334.

HPEZ 373. Structural Kinesiology Laboratory. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Prerequisite: BIOL 205. Corequisite: HPEX 373. Laboratory experience applying knowledge and theory from HPEX 373.

HPEZ 375. Physiology of Exercise Laboratory. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Prerequisite: PHIS 206. Corequisite: HPEX 375. Provides practical application of the physiological principles presented in HPEX 375; assists students in the development of practical application competencies associated with assessment of acute and chronic effects of exercise on the human body.

HPEZ 450. Service-learning in Community Health Education Planning and Evaluation. 1 Hour.
Semester course; 1 service-learning/laboratory hour. 1 credit. Corequisite: HPEX 450. Provides experience working with community partners to gain firsthand exposure to specific target populations, observing the needs of those populations and current efforts, if any, to address those needs. Community partners include nonprofit agencies, schools, worksites, hospitals and state and local health departments.

HEALTHCARE POLICY AND RESEARCH (HCPR)

HCPR 601. Introduction to Health Policy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The course will familiarize students with the major players and issues in health care policy, using health reform in the U.S. as a framework through which to analyze the issues of cost, quality and access, and will focus on the roles of payers, providers and patients in the health care system. This course is interactive and uses studies from the scientific literature, class discussion and lectures from experts in the field. Students are required to write a paper evaluating the challenges regarding a public health policy topic in the U.S. and prepare a group presentation addressing questions related to key issues of the U.S. health care system.

HCPR 610. Foundations in Health Services Research Methods. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Will provide students with the opportunity to learn and apply basic data analysis skills and statistical methods common in health services research including programming, data cleaning and fundamental approaches in univariate, bivariate and multivariate analyses.

HCPR 691. Special Topics in Healthcare Policy and Research. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. May be repeated for a maximum of 6 credits. Prerequisite: permission of instructor. The course may include discussion of research topics of emerging interest/importance and published papers of current interest; new findings in health services research, health economics and health policy; and the application of research methods and study design to current topics within the broad field of healthcare policy and health services research, focusing on interdisciplinary research and applied methods. Graded S/U/F.

HCPR 692. Special Topics in Healthcare Policy and Research. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. May be repeated for a maximum of 6 credits. Prerequisite: permission of instructor. The course may include discussion of research topics of emerging interest/importance and published papers of current interest; new findings in health services research, health economics and health policy; and the application of research methods and study design to current topics within the broad field of healthcare policy and health services research, focusing on interdisciplinary research and applied methods.

HCPR 697. Independent Study in Healthcare Policy and Research. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. May be repeated for a maximum of 6 credits. Provides the opportunity for students to conduct research under the direction of a faculty member. A proposal for a course of study must be submitted to and approved by the program director of the Ph.D. in Healthcare Policy and Research. Credits will be assigned commensurate with the complexity of the project. Arrangements are made directly with the appropriate faculty member and department chair. Graded as S/U/F.

HCPR 699. Departmental Seminar. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Students will attend seminars presented by faculty and invited guests on topics and trends within health policy and health services research. Students and faculty will meet weekly to discuss the theoretical concepts and papers presented and other related topics. Graded as S/U/F. Crosslisted as: SBHD 690.

HCPR 701. Health Services Research and Policy I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The first course of a two-semester sequence intended to familiarize students with the major players and issues in health care policy, using health reform in the U.S. as a framework through which to analyze the issues of cost, quality and access and to help students develop an independent research proposal. The focus is on the roles of payers, providers and patients in the health care system. This course will be interactive and use studies published in the scientific literature, policy briefs, government reports and textbooks about the health care system as teaching tools. Students will be required to write several short response papers addressing questions related to key issues under health reform as well as develop a research topic and conduct a literature review related to that topic.

HCPR 702. Health Services Research and Policy II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: HCPR 701 or permission of instructor. The second course of a two-semester sequence intended to familiarize students with the major health care providers and issues in health care policy and health services in the U.S. The course will mainly focus on health care delivery and quality of care and also introduce the issues of costs and access. The course will be interactive and use studies published in the scientific literature. Students will be required to critique and present research articles related to the topics studied while developing conceptual frameworks, hypotheses and key measures of quality, cost or access for their own research papers.

HCPR 703. Health Economics: Theory and Principles. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A doctoral-level course in health economics with a focus on the theory and principles forming the basis of the field. Students will study foundational theory and research as well as recent applied studies contributing to the current knowledge in the field. Upon completing the course, students should have the theoretical grounding to allow them to frame applied research questions in health economics in terms of past theory and research as well as a sense of where further evidence is needed.

HCPR 720. Economics of Health Disparities. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This doctoral-level survey course is designed to study the causes and consequences of population health disparities from an economic perspective. In addition to studying theories and current approaches from health, labor, public and stratification economics, students will also integrate perspectives from other disciplines, including sociology and psychology. Students will be expected to complete problem sets, in-class presentations and a research paper that will demonstrate the ability to use theoretically grounded approaches to the empirical study of health inequality. After completing this course, students should have an understanding of the economic approaches to health disparities and how to apply these approaches to empirical research.

HCPR 730. Survey Research Methods and Analysis for Health Policy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ECON 612 or equivalent or permission of instructor. This course is intended to familiarize students with the design and use of surveys for health services research and health policy; to understand the strengths and limitations of health surveys; and to compare and contrast health surveys with other data sources such as administrative records, claims data and electronic medical records. The course is designed to focus more on the applied use of health surveys for research and less on the theoretical aspects of survey and sample design. Class lectures and assignments are designed to guide students incrementally through the actual development and completion of a research project using publicly available survey data.

HCPR 732. Research Design and Proposal Preparation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Focuses on the design of experimental, quasi-experimental and nonexperimental studies in the healthcare field. Issues related to measurement will be stressed. Specific learning objectives include exploring the methodological issues in health services research; assessing scientific research and casual inference; evaluating a research problem and developing testable hypotheses; conducting data collection and assessing the sampling process; evaluating variable definition in terms of validity and reliability; assessing the various facets of experimental, quasi-experimental and observational designs; and preparing a healthcare research proposal.

HCPR 733. Statistical Methods in Analysis of Healthcare Research. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOS 553; ECON 612; and one of BIOS 625, BIOS 631, BIOS 646 or ECON 642; or permission of instructor. Exposes students to large survey and administrative databases that are commonly used in health services research. Students will learn how to organize files, protect data and link databases from multiple sources by applying state-of-the-art deterministic and probabilistic linkage methods. Students will check the quality of merged datasets and learn the advanced techniques used in handling common problems such as missing data, selection bias and handling extreme outliers. Students will also apply the statistical methods that meet the qualities of these data in order to evaluate healthcare interventions and policies. This will be a hands-on course requiring students to download and manipulate data. While the primary emphasis is not on mathematical theory, a certain amount of theoretical background may be presented for some topics.

HCPR 734. Economic Evaluation and Decision Analysis in Health. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: an introductory course in probability and statistics. Introductory economics is recommended but not required. Introduces doctoral students to the methods, theory and growing range of applications of decision analysis for health care technology assessment, health policy analysis, medical decision-making and health resource allocation.

HCPR 899. Directed Research. 1-9 Hours.
Semester course; 1-3 variable hours. 1-3 credits. Prerequisites: completion of required course work and comprehensive examination. Students are required to conduct and prepare a written dissertation under the guidance of a faculty committee. The dissertation is written in traditional academic style, consists of three papers and must be orally defended. Students must be continually enrolled in this course until the dissertation is successfully completed and approved. A minimum of nine dissertation credits must be taken. Graded S/U/F.

HISTORY (HIST)

HIST 101. Survey of European History. 3 Hours.
Semester courses; 3 lecture hours. 3, 3 credits. A survey of European civilization from the ancient world to the present, emphasizing the events, ideas and institutions that have shaped, influenced and defined Europe's place in the world. First semester: to 16th century. Second semester: 16th century to the present.

HIST 102. Survey of European History. 3 Hours.
Semester courses; 3 lecture hours. 3, 3 credits. A survey of European civilization from the ancient world to the present, emphasizing the events, ideas and institutions that have shaped, influenced and defined Europe's place in the world. First semester: to 16th century. Second semester: 16th century to the present.

HIST 103. Survey of American History. 3 Hours.
Semester courses; 3 lecture hours. 3, 3 credits. A survey of American civilization from prehistory to the present, emphasizing the events, ideas and institutions that have shaped, influenced and defined America's place in the world. First semester: to Reconstruction. Second semester: Reconstruction to present.

HIST 104. Survey of American History. 3 Hours.
Semester courses; 3 lecture hours. 3, 3 credits. A survey of American civilization from prehistory to the present, emphasizing the events, ideas and institutions that have shaped, influenced and defined America's place in the world. First semester: to Reconstruction. Second semester: Reconstruction to present.

HIST 105. Survey of African History. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of African civilizations from prehistory to the present, emphasizing the events, ideas and institutions that have shaped, influenced and defined Africa's place in the world. First semester: to 1800. Second semester: 1800 to the present. Crosslisted as: AFAM 105.

HIST 106. Survey of African History. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of African civilizations from prehistory to the present, emphasizing the events, ideas and institutions that have shaped, influenced and defined Africa's place in the world. First semester: to 1800. Second semester: 1800 to the present. Crosslisted as: AFAM 106.

HIST 107. Survey of East Asian Civilizations. 3 Hours.
Semester courses; 3 lecture hours. 3, 3 credits. A survey of East Asian civilizations (China and Japan) from prehistory to the present, emphasizing the events, ideas and institutions that shaped, influenced and defined East Asia's place in the world. First semester: to the 14th century. Second semester: from the 14th century to the present.

HIST 108. Survey of East Asian Civilizations. 3 Hours.
Semester courses; 3 lecture hours. 3, 3 credits. A survey of East Asian civilizations (China and Japan) from prehistory to the present, emphasizing the events, ideas and institutions that shaped, influenced and defined East Asia's place in the world. First semester: to the 14th century. Second semester: from the 14th century to the present.

HIST 109. Survey of Latin American History. 3 Hours.
Semester courses; 3 lecture hours. 3, 3 credits. A survey of Latin American civilization from its early civilizations to the present, emphasizing the events, ideas and institutions that have shaped, influenced and defined Latin America's place in the world. First semester: to 1824. Second semester: 1824 to the present.

HIST 110. Survey of Latin American History. 3 Hours.
Semester courses; 3 lecture hours. 3, 3 credits. A survey of Latin American civilization from its early civilizations to the present, emphasizing the events, ideas and institutions that have shaped, influenced and defined Latin America's place in the world. First semester: to 1824. Second semester: 1824 to the present.

HIST 191. Topics in History. 1-3 Hours.
Semester course; variable hours. 1-3 credits per semester. Maximum total of 6 credits. The study of a selected topic or topics in history. See the Schedule of Classes for specific topics to be offered each semester.

HIST 201. The Art of Historical Detection: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Introduces non-history majors to the methods of the discipline by undertaking a series of case studies in historical inquiry. Each case study will consist of a close examination of a single historical question, covering the general background to that question and exploring relevant primary and secondary sources. Students will then use this evidence to propose well-reasoned solutions to the question at hand.

HIST 300. Introduction to Historical Study. 3 Hours.
Semester course; 3 lecture hours. 3 credits. History majors must complete HIST 300 with at least a grade of C prior to enrolling in more than six credits of 300- or 400-level history courses. This introduction to the historical discipline is required of all history majors. It is designed to enhance basic research, writing and study skills in order to increase student appreciation of, and performance in, the advanced courses within the history major.

HIST 301. The Ancient Near East. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the ancient Near Eastern civilizations from the preliterary period to the end of Kassite rule in Babylonia (c. 1160 B.C.). Crosslisted as: RELS 315.

HIST 302. Ancient Egypt. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A general survey of the history and culture of ancient Egypt from the Predynastic Period through the age of the New Kingdom. In addition to the historical reconstruction, emphasis is placed on the art, literature and religion of each of the major periods.

HIST 303. Greek Civilization. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the unique cultural heritage of Greece and the historical patterns that rose from it, from the Heroic Age to the urban worlds after Alexander, 1400 B.C.-146 B.C.

HIST 304. Roman Civilization. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of Roman history as it derived from Roman cultural institutions, from the Etruscan period through the conflict of the pagan and Christian worlds and advent of the barbarians, 753 B.C.-A.D. 454.

HIST 310. The Early Middle Ages. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A topical, thematic, integrative and problems approach to the emergence of a distinctive European community during the period frequently alluded to as the "Dark Ages.

HIST 311. High and Later Middle Ages. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A detailed historical overview of developments in Western Europe from the end of the first millennium through the end of the 15th century. Crosslisted as: RELS 308.

HIST 312. Europe in the Early Modern Period, 1350-1650. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Describes the political, intellectual, religious and social developments in Europe from the Black Death through the wars of religion, including the Renaissance, the Reformation and the Voyages of Exploration.

HIST 313. Europe in Absolutism and Enlightenment, 1648-1815. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines the political, social and economic orders of Old Regime Europe in the context of their increasing contradictions; introduces the cultural and intellectual forces that helped challenge that regime; culminates in the French Revolution and Napoleon.

HIST 314. The Zenith of European Power, 1815-1914. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the period in which the nations of Europe reached their height of world power between the reconstruction of Europe after the Napoleonic Wars and the eve of World War I. Topics include the rise of nationalism, liberalism and socialism; the spread of capitalism and industrial society; the beginnings of mass politics; the new imperialism; the diplomatic revolution in the European state system before World War I.

HIST 315. The Age of Total War in Europe, 1914-1945. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the transformation of European society precipitated by World War I and World War II. Emphasis is placed on the origin, nature and repercussions of total war; the crisis of democracy and the rise of modern dictatorships; changes in political, economic and social institutions; and the decline of European power.

HIST 316. Postwar Europe, 1945 to the Present. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An examination of Europe's social, economic and political recovery after World War II and of the transformation of Europe from the center toward the periphery of world power.

HIST 317. History of France I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A history of France from Gallo-Roman times through the French Revolution and the Napoleonic era.

HIST 318. History of France II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A history of France from 1815 to the present.

HIST 319. History of Germany I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Covers major developments in Germany from the 30 Years War and rise of Prussia through the unification of the German nation-state in 1871.

HIST 320. History of Germany II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Covers major developments in Germany from 1871 through World War I, Weimar, Third Reich, World War II and reunification in 1990.

HIST 321. The Holocaust. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A multidisciplinary examination of the events leading to and culminating in the Nazi extermination of six million Jews; the historical settings of European Jewry and of German fascism; the role of traditional anti-Semitism; the psychology of aggressor and victim; the Holocaust in art and literature and the moral implications for today.

HIST 322. Nazi Germany. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The origin and nature of Hitler's Third Reich. A study of the failure of the Weimar Republic; genesis of the Nazi racial ideology and party structure; the Nazi political, social and cultural order after the seizure of power; Nazi foreign policy leading to war and genocide; and an analysis of the personality of Hitler.

HIST 324. History of Early Modern Britain. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Explores the development of British politics, society and culture from the Tudor Revolution in government and through the Reformation, English civil wars and Restoration.

HIST 325. History of Modern Britain. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Explores the development of British politics and society from the Restoration to the mid-20th century, including such topics as the Whig oligarchy, the Industrial Revolution, Victorianism, the impact of the world wars and the problems of Empire.

HIST 326. The British Empire. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines the origin, development and decline of British overseas expansion from the late 16th century through the mid-20th century, including colonial settlements in Ireland, North America, the Caribbean, Australia and South Africa; dependencies and protectorates in Africa and the Middle East; and the empire of India. Focuses on the political and legal structures that enabled the administration and subordination of such a large and fragmented area and assesses the extent to which empire shaped and complicated gender, class and racial relations both at home and throughout the British imperial world.

HIST 327. History of Russia I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Russian history to 1855, emphasizing the development of political and social institutions and Russia's unique position between Europe and Asia.

HIST 328. History of Russia II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Russian history from 1855 to the present, emphasizing the development of political and social institutions and Russia's unique position between Europe and Asia.

HIST 329. History of Spain and Portugal. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of the history of the Iberian peninsula from ancient times to the present, with an emphasis on the distinctive culture and attitude toward life that developed south of the Pyrenees.

HIST 330. History of Women in Europe I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of European women from antiquity to the Enlightenment. A major focus will be primary sources by and about women. Crosslisted as: GSWS 339.

HIST 331. History of Women in Europe II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of European women from the French Revolution to the present. A major focus will be primary sources by and about women. Crosslisted as: GSWS 340.

HIST 332. History in Film. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 6 credits with different topics. An examination of the uses and misuses of historical events and personalities in film. Lectures and readings are used to critically analyze films dealing with biographies, events and propaganda.

HIST 333. History of the Jewish People I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the Jewish people from the biblical period to the early modern period, including the Israelite conquest of Canaan, Judea in Hellenistic and Roman times, the Diaspora in Islam and in Europe, social and cultural trends, and Jewish settlement in the Ottoman Empire. Crosslisted as: RELS 318.

HIST 334. History of the Jewish People II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the Jewish people from the early modern to the present, including the impact of the Emancipation, the rise of the American Jewish community, the impact of modernism and growth of Reform, the beginnings and growth of Zionism, restoration in Palestine, the Holocaust, the creation of Israel, and the relations of Israel and world Jewry. Crosslisted as: RELS 319.

HIST 335. History of Christianity I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A historical and theological examination of Christianity from its origin to the early modern period, or the age of the Reformations. Emphasis is placed upon an understanding of leading events, ideas, movements and persons in their historical settings. Crosslisted as: RELS 327.

HIST 336. History of Christianity II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A historical and theological examination of Christianity from ca. 1500 to the present. Emphasis is placed upon an understanding of leading events, ideas, movements and persons in their historical settings.

HIST 340. The Middle East, 600-1600. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Explores two transformative historical events that took place in the Middle East between the sixth and 16th centuries: 1) the emergence of Islam and the development of the Islamic Empire and its social, cultural and political legacy in the Middle East (seventh to 10th centuries) and 2) the influx of outsiders to the region, such as the Turkish-speaking tribes, the crusaders and the Mongols, and the role these newcomers played in shaping the Middle East starting in the 10th century.

HIST 341. Modern Middle East. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Analysis of the history, problems and prospects of the nations and peoples of the Middle East with emphasis on developments since the Balfour Declaration of 1917.

HIST 342. Early Modern Ottoman Empire. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Explores the history of the Ottoman Empire from around mid-15th century until roughly the late-18th century. Examines the Ottoman Empire as a Euro-Mediterranean polity, exploring its social, cultural, economic and political history from a global perspective.

HIST 343. Modern Ottoman Empire. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Explores the transformations of the late-Ottoman state and society by organizing the material around several historical processes and frameworks, such as the phenomenon of the gunpowder empires, integration of the empire to the global market, the decline paradigm, impact of colonialism and imperialism, Tanzimat reforms, the shift from subjecthood to citizenship, modernity, transformation of religious identities, state and nation formation, nationalism, secularism, gender and war mobilization.

HIST 344. American Military History to 1900. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Investigates the emergence and evolution of the American military from 1600 to 1900, with a focus on nation building and nationalism, the relationship between the civil and military spheres, professionalization, the experiences of the armed forces, strategic and tactical evolution, and the relationships among war, technology and nature.

HIST 345. American Colonies, 1450-1776. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An examination of the development of the 13 original colonies; the establishment and growth of society, politics and the economy; and modification in the relationship between the provinces and Great Britain.

HIST 346. The American Revolutionary Era, 1763-1800. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An examination of the late-18th-century revolutions which molded the American political system -- the revolution of colonial Englishmen against Great Britain and the revolution of the nationalists against the government established by the American Revolution, which produced and firmly established the United States Constitution.

HIST 347. Antebellum America, 1800-1860. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Federalist era to 1860. A study of the events, forces and personalities that shaped Antebellum America and led to Southern secession and Civil War.

HIST 348. The American Civil War and Reconstruction. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the major events, forces, personalities and significance of the Civil War and Reconstruction eras.

HIST 349. The Emergence of Modern America, 1877-1914. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An examination of the major political, legal, social and economic trends in the United States at this time, focusing on the industrialization of the nation and the resulting effects it had on such diverse matters as urbanization, immigration, economic distribution and cultural affairs, culminating in the Progressive reform movement.

HIST 350. U.S. History, 1900-1945. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the political, social, economic and cultural history of the United States from 1900 to 1945, with emphasis on how the American people have responded to reform, war, prosperity, depression, international status and changing relationships within government and society.

HIST 351. U.S. History Since 1945. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the political, social, economic and cultural history of the United States in the 20th century, with emphasis on how the American people have responded to reform, war, prosperity, depression, international status and changing relationships within government and society.

HIST 352. History of the South I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A regional history of the Old South from the colonial period to 1861, placing particular emphasis upon the distinctive culture and problems of the South and its significance in the history of the United States.

HIST 353. History of the South II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A regional history of the New South from 1865 to the present, placing particular emphasis upon the distinctive culture and problems of the South and its significance in the history of the United States.

HIST 354. History of Native Americans in the South. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines the history of Native Americans in the American South and how colonial encounters with Europeans impacted life in indigenous towns, villages and farmsteads.

HIST 355. Native Americans in Modern America. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines some of the key historical and cultural issues in American Indian history during the 20th century.

HIST 356. History of Virginia I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Focuses on the central themes, events and personalities of the state's history from the pre-colonial period to 1865.

HIST 357. History of Virginia II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Focuses on the central themes, events and personalities of the state's history from 1865 to the present.

HIST 358. History of the American Frontier. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of the western movement in the United States from the time the first outposts were established to the end of the frontier in the 19th century. Particular attention to the influence of the frontier upon the American mind and ideals.

HIST 360. The Long Civil Rights Movement. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines race relations and changes to race relations, focusing on African-Americans in the United States' South but including related struggles for civil rights and equality from the late-1800s to the present.

HIST 361. Americans from Africa. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the history and culture of blacks in the United States, designed to analyze some of the most important aspects of black life and the attitudes of the dominant society within which blacks lived. The second semester emphasizes the changing status, expectations and ideologies of black Americans in the 20th century. First semester: to 1877. Second semester: since 1877. Crosslisted as: AFAM 361.

HIST 362. Americans from Africa. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the history and culture of blacks in the United States, designed to analyze some of the most important aspects of black life and the attitudes of the dominant society within which blacks lived. The second semester emphasizes the changing status, expectations and ideologies of black Americans in the 20th century. First semester: to 1877. Second semester: since 1877. Crosslisted as: AFAM 362.

HIST 363. American Religious History I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of religious movements, events and ideas in America from indigenous and colonial traditions to the Civil War, with attention to the diversity of religious expression and the relationship between church and state.

HIST 364. American Religious History II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of religious movements, events and ideas in America from the Civil War to the present, with attention to the diversity of religious expression and the relationship between church and state.

HIST 365. American Women's History I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Students will analyze historical changes in the social, cultural, political and economic position of women in America from the colonial period through the 1848 Seneca Falls Convention. Methods include reading, lecture and discussion. Topics include differences and similarities of women's experiences across lines of class, race and ethnicity, the struggle for suffrage and social reform, shifting gender roles and changing employment opportunities. Crosslisted as: GSWS 341.

HIST 366. American Women's History II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Through reading, lecture and discussion, students will analyze historical changes in the social, cultural, political and economic position of women in America from 1848 to the present. Topics include differences and similarities of women's experiences across lines of class, race and ethnicity; the struggle for suffrage and social reform; shifting gender roles; and changing employment opportunities.

HIST 370. History of Central America. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An exploration of the history of the region beginning with pre-Columbian civilizations and continuing to the present. Topics include the Spanish conquest, the liberal-conservative struggle, U.S. gunboat diplomacy, the Sandinista Revolution, civil wars in El Salvador and Guatemala and current challenges to democracy in the region.

HIST 371. History of Mexico. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of Mexican history, including topics such as the pre-Columbian civilizations, the Spanish conquest and the colonial order, as well as independence, the struggle for reform, revolution and the development of the modern state.

HIST 372. History of Brazil. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of Brazilian history including topics such as the pre-Columbian civilizations, Portuguese colonialism, the independent empire and the republic, and populism and the modern state.

HIST 373. History of the Andes to 1800. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A critical view of the historical process of the Andean region from the pre-Columbian period to independence from Spain. Focuses mainly on the core of the region, which currently comprises the territories of Bolivia, Ecuador and Peru. Special attention to the indigenous population of the Andes -- also known as "Indians," "Andeans" or "Amerindians" -- and their interactions with other ethnic groups (Europeans, Criollos, Mestizos, as well as Africans and their descendants) in the political, economic, social and cultural realms.

HIST 374. History of the Andes From 1800. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A critical view of the historical process of the Andean region from independence from Spain to the present. Focuses mainly on the core of the region, which currently comprises the territories of Bolivia, Ecuador and Peru. Special attention to the indigenous population of the Andes -- also known as "Indians," "Andeans" or "Amerindians" -- and their interactions with other ethnic groups (Europeans, Criollos, Mestizos, as well as Africans and their descendants) in the political, economic, social and cultural realms.

HIST 376. Caribbean History to 1838. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An exploration of changes in the structure of Caribbean society from the late 15th century to 1838, with emphasis on the development of plantation slavery, social stratification, race, slave resistance, the Haitian Revolution, African cultural patterns and abolition. Crosslisted as: AFAM 392.

HIST 377. Caribbean History Since 1838. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Covers major developments in the history of the Caribbean in the period after the British abolition of slavery in 1834, with a major focus on the social and economic aspects of change.

HIST 378. Atlantic Slavery. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines social and economic aspects of slavery in the Atlantic world, principally Africa, the Caribbean, the United States and Canada.

HIST 379. The History of Modern Japan. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course will offer a detailed examination of Japan's modern history, from the rise of Tokugawa rule in 1600 to the end of World War II. A general overview of Japan's traditional society will give way to a historical analysis of the major social, cultural, political and intellectual changes that occurred in Japan throughout this time period.

HIST 380. Africa and the Americas: Slavery, Gender and Race. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines various aspects of slavery in Africa and selected parts of the African diaspora, including the United States, Canada and the Caribbean, with special emphasis on the role played by race and gender. Topics will include African conditions of servility, the trans-Atlantic trade in enslaved Africans, and chattel slavery, demography, labor, law, discipline, abuse, resistance and status. Crosslisted as: AFAM 390/GSWS 390.

HIST 381. History of West Africa to 1800. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the transformation of West African societies from early times to 1800, with emphasis on the rise of states and empires, the introduction, spread and impact of Islam, the Atlantic slave trade and its effects, and colonialism. Crosslisted as: AFAM 387.

HIST 383. History of Southern Africa. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the history and culture of the peoples of southern Africa. Deals with the areas that presently are the Republic of South Africa, Lesotho, Swaziland, Botswana, Namibia and Zimbabwe. Emphasizes the interaction among the various communities and ethnolinguistic groups in southern Africa. Crosslisted as: AFAM 389.

HIST 384. Africa: Social, Cultural and Economic History. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of economic, social and cultural developments in Africa from the beginning of the 19th century to the present, with emphasis on agricultural and industrial development, trade, Africa's involvement in the world economy, changes in labor systems, racial dominance, African initiatives and resistance, religion and social evolution, and Africa in world affairs. Crosslisted as: AFAM 388.

HIST 385. The History of Modern Japan. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course will offer a detailed examination of Japan's modern history, from the rise of Tokugawa rule in 1600 to the end of World War II. A general overview of Japan's traditional society will give way to a historical analysis of the major social, cultural, political and intellectual changes that occurred in Japan throughout this time period.

HIST 386. History of Late Imperial China, 900-1800. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines the history of China from 900 to 1800 CE. A general overview of China's political economy is followed by a historical analysis of the major social, cultural, political, intellectual and economic changes that occurred in China between 900 and 1800 CE. In addition, students will be introduced to such concepts and issues as empire building, conquest dynasties, steppe and sedentary societies, sociocultural history and Western and Chinese historiography.

HIST 387. The History of Modern China, 1800 to the Present. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines China's modern history beginning at the height of the Qing Dynasty (1644-1912) in 1800. A general overview of China's traditional political economy is followed by a historical analysis of the major social, cultural, political, intellectual and economic changes that occurred in China from 1800 to the present. This course is divided into three sections: the first examines the factors leading to the collapse of China's last dynasty in 1912; the second focuses on the revolutionary changes taking place in China during the first half of the 20th century (from 1912 to 1949); and the final section looks at Communist China since 1949.

HIST 389. History in Film: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 6 credits with different topics. An examination of the uses and misuses of historical events and personalities in film. Lectures and readings are used to critically analyze films dealing with biographies, events and propaganda.

HIST 390. Historical Archaeology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ANTH/INTL 103 or ANTH 105/INTL 104, and any history course. A review of historical archaeology, recognizing its contemporary emphasis on the spread of European cultures across the globe beginning in the 15th century. Methods and findings of archaeological research from the United States, Europe and Africa will be covered with special emphasis on the study of documents and artifacts related to the emergence and present state of the modern world. Students will participate in field research. Crosslisted as: ANTH 394.

HIST 391. Topics in History. 1-3 Hours.
Semester course; 1, 2 or 3 lecture hours. Variable credit. May be repeated with different topics for a maximum of 9 credits. An in-depth study of a selected topic in history. See the Schedule of Classes for specific topics to be offered each semester.

HIST 392. Revolutions in Science I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of the history of science from the ancient Greeks to 1800, focusing on the development of scientific ideas, practices and institutions in Western society. Crosslisted as: SCTS 392.

HIST 393. Revolutions in Science II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of the history of science from 1800 to the present, focusing on the development of scientific ideas, practices and institutions in Western society. Crosslisted as: SCTS 393.

HIST 397. Genetics and Society: 1865 to the Present. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An investigation of the science and technology of heredity in its historical, cultural and political contexts, emphasizing the ways in which genetic theories have been applied in attempting to solve social and biological problems. Crosslisted as: SCTS 397.

HIST 398. History of Medicine and Public Health: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with different thematic content for a maximum of six credits. Studies in selected topics in the history of medicine, medical science or public health. Includes introduction to the interdisciplinary approaches practiced in the history of medicine as well as the historical content and relevant analytical skills needed to examine the specific course theme. Crosslisted as: SCTS 398.

HIST 399. Introduction to Science and Technology Studies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introduction to the study of science, technology and medicine from political, sociological and historical perspectives, focusing on case studies that illustrate the methods and theories used to examine the structure and behavior of the scientific community and the role of scientific knowledge in shaping public culture. Crosslisted as: GVPA 399/SCTS 300.

HIST 401. Studies in Ancient History: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated once, with a different topic, for credit. Prerequisite: 3 credits of HIST at the 300-level or permission of instructor. Courses taught under this heading provide advanced study and analysis of the theory and field of ancient history.

HIST 402. Studies in Medieval History: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated once, with a different topic, for credit. Prerequisite: 3 credits of HIST at the 300-level or permission of instructor. Courses taught under this heading provide advanced study and analysis of the theory and field of medieval history.

HIST 403. Studies in Early Modern European History: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Repeatable once, with a different topic, for credit. Prerequisite: 3 credits of HIST at the 300-level or permission of instructor. Courses taught under this heading provide advanced study and analysis of the theory and field of early modern European history.

HIST 404. Studies in Modern European History: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Repeatable once, with a different topic, for credit. Prerequisite: 3 credits of HIST at the 300-level or permission of instructor. Courses taught under this heading provide advanced study and analysis of the theory and field of modern European history.

HIST 406. Studies in Middle Eastern History: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated once, with a different topic, for credit. Prerequisite: 3 credits of HIST at the 300-level or permission of instructor. Courses taught under this heading provide advanced study and analysis of the theory and field of Middle Eastern history.

HIST 407. Studies in Early American History: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated once, with a different topic, for credit. Prerequisite: 3 credits of HIST at the 300-level or permission of instructor. Courses taught under this heading provide advanced study and analysis of the theory and field of early American history.

HIST 408. Studies in Modern American History: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated once, with a different topic, for credit. Prerequisite: 3 credits of HIST at the 300-level or permission of instructor. Courses taught under this heading provide advanced study and analysis of the theory and field of modern American history.

HIST 409. Studies in Latin American History: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated once, with a different topic, for credit. Prerequisite: 3 credits of HIST at the 300-level or permission of instructor. Courses taught under this heading provide advanced study and analysis of the theory and field of Latin American history.

HIST 410. Studies in African History: ____. 3 Hours.
Semester course; 3 lecture hours, 3 credits. May be repeated once, with a different topic, for credit. Prerequisite: 3 credits of HIST at the 300-level or permission of instructor. Courses taught under this heading provide advanced study and analysis of the theory and field of African history.

HIST 411. Studies in the African Diaspora: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated once, with a different topic, for credit. Prerequisite: 3 credits of HIST at the 300-level or permission of instructor. Courses taught under this heading provide advanced study and analysis of the theory and field of the African diaspora.

HIST 412. Studies in Asian History: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated once, with a different topic, for credit. Prerequisite: 3 credits of HIST at the 300-level or permission of instructor. Courses taught under this heading provide advanced study and analysis of the theory and field of Asian history.

HIST 413. Studies in Atlantic History: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated once, with a different topic, for credit. Prerequisite: 3 credits of HIST at the 300-level or permission of instructor. Courses taught under this heading provide advanced study and analysis of the theory and field of Atlantic history.

HIST 414. Studies in Indigenous History: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated once, with a different topic, for credit. Prerequisite: 3 credits of HIST at the 300-level or permission of instructor. Courses taught under this heading provide advanced study and analysis of the theory and field of indigenous history.

HIST 415. Studies in the History of Religion: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated once, with a different topic, for credit. Prerequisite: 3 credits of HIST at the 300-level or permission of instructor. Courses taught under this heading provide advanced study and analysis of the theory and field of religious history.

HIST 416. Studies in the History of Women, Gender and Sexuality: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: 3 credits of 300-level HIST or permission of instructor. Repeatable once, with a different topic, for credit. Courses taught under this heading provide advanced study and analysis of the theory and field of the history of women, gender and sexuality.

HIST 417. Studies in African American History: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated once, with a different topic, for credit. Prerequisite: 3 credits of HIST at the 300-level or permission of instructor. Courses taught under this heading provide advanced study and analysis of the theory and field of African American history.

HIST 420. Studies in Historical Method: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated once, with a different topic, for credit. Prerequisite: any 300-level HIST course. Focuses on a particular methodology used by historians as they investigate the past.

HIST 421. Studies in Comparative History: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated once, with a different topic, for credit. Prerequisite: any 300-level HIST course. Undertakes a topic that cuts across regions and cultures, making comparative judgments about human events.

HIST 485. Seminar in Historiography. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated for maximum of 6 credits with different topics. Introduction to questions in historiography, meaning, methodology and interpretation in the teaching and writing of history.

HIST 490. Seminar in History. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 9 credits. Prerequisite: HIST 300 with a minimum grade of C. Research and analysis of a selected historical topic in a seminar setting. See the Schedule of Classes for each semester's offerings.

HIST 492. Independent Study. 2-4 Hours.
Semester course; variable hours. 2-4 credits per semester. Maximum total of 6 credits. Open generally to students of only junior and senior standing who have acquired 12 credits in the departmental disciplines. Determination of the amount of credit and permission of instructor and department chair must be procured prior to registration of the course.

HIST 493. Internship. 2-4 Hours.
Semester course; 2-4 hours; 2-4 credits. May be repeated for a maximum total of 6 credits. Prerequisite: HIST 300 with a minimum grade of C. Enrollment generally open to students with senior standing. Students receive credit for work on historical projects with approved agencies. Determination of the amount of credit and permission of departmental internship coordinator must be procured prior to registration for the course.

HIST 511. Studies in American History. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. May be repeated with different topics for a maximum of 9 credits. An intensive study of a selected topic in history.

HIST 601. Historiography and Methodology. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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 618. Readings in Transatlantic History. 3 Hours.
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 transatlantic history through reading and class discussions. See the Schedule of Classes for specific topics to be offered each semester.

HIST 619. Readings in Ethnic and Social History. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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 638. Research in Transatlantic History. 3 Hours.
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 transatlantic 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. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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 651. Public History: Theory and Practice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An overview of the field of public history, intended to introduce students to the range of professional historical activities practiced outside the classroom. Explores methods and skills including archival work, documentary editing, historic preservation, museum studies and oral history. The course also involves a sustained consideration of the theoretical issues that arise from public history work, defined as history of, for, by and/or with the public.

HIST 652. Documentary Editing and Scholarly Publishing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An overview of the processes by which historical scholarship is disseminated by publication. Students will practice editing scholarly editions of historic documents and reviewing manuscripts for publication in academic media. Special consideration will be given to the digital humanities and new technology's relation to the traditional publishing trade.

HIST 653. American Material Culture. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Material culture is a term encompassing all things created or modified by people -- such as clothing, tools, furniture, works of art, buildings and even landscapes. This course introduces students to the field of material culture studies and challenges them to study the American past through examination of its artifacts and architecture. Students will explore a range of disciplinary approaches and time periods, as well as the role of politics in the preservation and exhibition of material culture.

HIST 654. Oral History: Theory and Practice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introduction to the practice and theories of oral history, a method employing interviews or sound recordings of people with personal knowledge of past events. Students will consider the benefits and limitations of the method as well as learn the general legal issues involved. Students will conduct their own interviews and practice the transcription of oral testimony.

HIST 691. Special Topics in History. 1-3 Hours.
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 692. Independent Study. 1-3 Hours.
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. 2-4 Hours.
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 Hours.
1-6 credits. May be repeated for a maximum of 6 credits.

HOMELAND SECURITY AND EMERGENCY PREPAREDNESS (HSEP)

HSEP 101. Homeland Security and Emergency Preparedness. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introduction to the public- and private-sector dimensions of the broad range of theoretical and practical aspects of homeland security and emergency preparedness, including: origins of natural and terrorist-caused disasters; local, state and federal emergency management planning and operations; health infrastructure capabilities; public communication strategies; business community concerns; ethical, legal and constitutional questions; as well as the social and psychological dimensions of disasters.

HSEP 301. Terrorism. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: HSEP 101, POLI 103 and INTL 105/POLI 105, or permission of instructor. A survey of the modern problem of terrorism with an emphasis on the political nature of terrorist acts. Examines the history of terrorism, domestically within the U.S. and internationally, the role of religion, the structures and operations of terrorist organizations, as well as counterterrorism policies and policy-making. Crosslisted as: POLI 367.

HSEP 302. Emergency Planning and Incident Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: HSEP 101, POLI 103 and INTL 105/POLI 105, or permission of instructor. An introduction to the basic tasks of emergency preparedness and disaster mitigation, including planning, response and recovery. Special emphasis will be placed on command arrangements, coordination and budgetary issues among emergency responders (law enforcement, firefighters and health care system officials), and within and between federal, state and local governments.

HSEP 310. Risk and Vulnerability Assessment. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: STAT 210, CRJS 367/HSEP 301/POLI 367 and CRJS 368/HSEP 302, or permission of instructor. An introduction to analytical techniques and methodologies for threat and vulnerability assessment of various types of public and private infrastructure. An all-hazard approach is employed, considering natural disaster, system failure and terrorist attack (conventional or weapons of mass destruction). Special attention will be focused on critical infrastructure protection as well as cyberterrorism.

HSEP 311. Strategic Planning for Homeland Security and Emergency Preparedness. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CRJS 367/HSEP 301/POLI 367 and CRJS 368/HSEP 302, or permission of instructor. An examination of the strategic planning for emergency preparedness, operations and recovery for all hazards, as well as terrorist-prevention security measures. The course will focus on public goods/free rider issues, setting organizational priorities, governmental budgeting choices, legal aspects of government regulation of infrastructure and business community security concerns.

HSEP 320. The Intelligence Community and the Intelligence Process. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: HSEP 301/POLI 367 and HSEP 302, or permission of instructor. An examination of the concepts of and challenges for state, local and federal policy making and organization for homeland security and emergency preparedness. The intelligence process — the collection, analysis, sharing and dissemination of information within and between local, state and federal governmental agencies — is a special focus.

HSEP 330. Legal and Constitutional Issues in Homeland Security and Emergency Preparedness. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: HSEP 301/POLI 367 and HSEP 302, or permission of instructor. An analysis of the legal and civil liberties changes and challenges brought on by terrorist attacks. Topics addressed may include surveillance issues, federal legislation passed in the aftermath of the terrorist attacks, the rights of foreign nationals, the rights of U.S. citizens, the governmental infrastructure for decisions concerning legal rights and the difficulties of prosecuting terrorist suspects, such as jurisdictional issues, rules of evidence and prosecution strategies.

HSEP 360. Critical Infrastructure Protection and Resiliency. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: HSEP 310. An advanced study of homeland security critical infrastructure protection and resiliency from an all-hazards perspective. Develops an understanding of the policy, strategy and practical application of critical infrastructure protection and resiliency issues. Special emphasis on understanding the strategic context presented by the 21st-century risk environment, DHS critical infrastructure sectors, and the challenges and opportunities.

HSEP 391. Topics in Homeland Security and Emergency Preparedness. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Maximum total of six credits in all departmental topics courses may be applied to the major. Prerequisites: CRJS 367/HSEP 301/POLI 367 and CRJS 368/HSEP 302. An intensive focus on a specialized field of interest to the study of homeland security and emergency preparedness. See the Schedule of Classes for specific topics to be offered each semester.

HSEP 490. Senior Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: HSEP 310, HSEP 311, HSEP 320/CRJS 375 and HSEP 330/CRJS 330. A capstone course examining the major issues related to homeland security and emergency preparedness. Students will be required to produce a research project related to a role-playing in-class simulation of an emergency situation that will include exercises in red-teaming.

HSEP 491. Advanced Topics in Homeland Security and Emergency Preparedness. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CRJS 367/HSEP 301/POLI 367 and CRJS 368/HSEP 302. An intensive focus on a specialized field of interest to the study of homeland security and emergency preparedness within a seminar setting. See the Schedule of Classes for specific topics to be offered each semester. Maximum total of six credits in all departmental topics courses may be applied to the major.

HSEP 492. Independent Study. 1-4 Hours.
Semester course; 1-4 credits. Maximum total of six credits in all independent study courses may be applied to the major. Prerequisites: junior or senior standing with 12 credits in HSEP courses. Permission of instructor or program director required, with determination of course credit value prior to registration. An independent study that allows students to perform research under the direction of qualified instructor in a subject or field of major interest.

HSEP 501. Institutional Challenges of Security Preparedness. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A detailed examination of the post-9/11 institutional transformation within the U.S. Both the theoretical and practical aspects of the new environment of homeland security and emergency preparedness are examined in the context of local, state and federal government, as well as the private and nonprofit sectors. The dilemmas of coordination, collaboration, competition and decision-making across and within governmental levels and between government and other sectors are explored.

HSEP 502. Survey of Terrorism. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introduction to the theoretical and practical aspects of terrorism and counter-terrorism. Provides a broad overview of the general use of terrorism as a political tool and the idiosyncratic strategies and tactics used by specific terrorist groups. Focuses upon the relationships between terrorism and religion, technology, globalization and organizational design (network organizations). The counter-terrorism policies of various nations are examined in terms of strategic purpose, implementation and success.

HSEP 601. Emergency Management: Response Planning and Incident Command. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An advanced analytical examination of emergency management, including mitigation (designing programs to reduce the risk to vulnerable targets/infrastructure), preparedness (response planning and training, particularly interagency and intergovernmental agreements on joint operations and burden sharing), response (actual operations during and after a terrorist attack or natural disaster) and recovery (maintaining services in the immediate aftermath of a disaster and the long term). Through discussions of theory and numerous case studies, students will be able to identify and investigate the strengths and weaknesses of the current practice of emergency management in the U.S.

HSEP 602. Government, Industry and Community Strategic Planning. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An examination of the guiding principles of strategic planning and the manner in which strategic plans can be used to better identify resource requirements and a prioritized acquisition process. Analyzes the strategic planning goal of designing a coordinated and unified effort that is all inclusive of the multiple agencies (governmental and nonprofit), distinct communities and private industries that have a role in and are impacted by natural disasters or terrorist incidents.

HSEP 603. Risk Assessment. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introduction to the assessment and management of risk. Focuses on analytical techniques that assess risk; the primary application will be threats to critical infrastructure. Students will learn to conduct a risk and vulnerability analysis of a specific target, ciy or region using various assessment techniques and to manage that risk by assessing the efficacy of both prevention and response measures. The techniques covered will be both quantitative and qualitative.

HSEP 610. Law Enforcement Policy and Judicial Precedent. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An examination of local, state and federal law enforcement agencies' evolving policies on crisis and consequence management, as well as court decisions guiding these policies and interpreting their implementation. Students will engage in case-study analysis while learning the fundamentals of policy development. Course content will include analysis and discussion of relevant statutes and court cases, and the issues, processes and procedures associated with the development and implementation of judicial policies that attempt to balance civil rights and homeland security, as well as legal aspects of natural disasters and public health crises.

HSEP 620. Private Sector Issues in Security and Preparedness. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of the private sector's dilemmas and responsibilities in homeland security and emergency preparedness. Class will focus on issues such as the crictical emergency management functions for private industry (resumption, recovery, restoration, continuity); the question of "how much security is enough"; and the central dilemma of private sector-public sector security and preparedness: the overwhelming majority of critical infrastructure is privately owned, yet it is the government's responsibility to prepare, protect and reconstitute it. Information sharing, communications and regulatory issues are examined.

HSEP 650. Public Health Preparedness. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An examination of the role of the public health sector in preparing for and responding to natural disasters, emerging infectious diseases, catastrophic terrorism and bioterrorism. The class focuses on coordination and cooperation of federal, state and local government and the public-, private- and nonprofit-sector components of the public health infrastructure. Topics include epidemiological and mental health issues related to disasters, command/communication concerns, national stockpile management, surge planning, all-hazard planning and exercise design.

HSEP 690. Capstone Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: 27 credits in HSEP courses or permission of instructor. A capstone and assessment course. Readings, writing assignments and the large research project are designed to allow students to use the sum of their knowledge and analytical skills to examine homeland security and emergency preparedness in a broad and comprehensive way. Students will engage in research linked to a role-playing simulation/exercise that will be held when the class meets in the last week of the semester.

HSEP 691. Special Topics in Homeland Security and Emergency Preparedness. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with different topics. Enrollment requires graduate status. Periodic seminar in contemporary homeland security and emergency preparedness topics. Topics to be determined.

HSEP 692. Independent Study. 1-3 Hours.
Semester course; variable hours. 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.

HONORS (HONR)

HONR 150. Flourishing. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Restricted to freshmen in The Honors College. Transitioning from high school to college is a major developmental task. The challenges include independence from adult supervision, new friendships, exposure to a unique culture of academic pressure, relative freedom with access to leisure time activities that include both positive and negative elements. Anxiety/depression, problems with substance use and mental illness often make their presence known in this period. It can be a time of high stress and tension but also a time for unprecedented opportunity to discover strength and resilience that sets students on a positive trajectory on the stage of life. Both professors and students have discovered that self-doubt, tension and stress not only impede knowledge acquisition but also the capacity to flourish, i.e. to actualize one's innate capacity for resilience and growth. This course examines the state of college student mental health and wellness on a personal and systems level. It provides an opportunity for students to re-evaluate their beliefs, values and assumptions, and to do so in the context of learning about the science behind health and wellness. Key findings from the fields of positive psychology and the study of mental illness will inform students' understanding of the biopsychosocial underpinnings of well-being.

HONR 160. Introduction to Community Engagement. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Restricted to freshmen in The Honors College. Contemporary communities are diverse and interconnected. To impact positive social changes, leaders in these communities must understand critical theories of community engagement. This course surveys critical theories and models of community engagement, including but not limited to theories of citizenship, social movements, civic leadership, social justice, civil discourse and social capital. Students will use an interdisciplinary lens to analyze principles and practices of community engagement. The course also serves as an introduction to community engagement within the VCU Honors College.

HONR 190. Freshman Seminar. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Restricted to freshmen in The Honors College. This course develops a learning paradigm for students appropriate to university education. Students are expected to gain a willingness to take intellectual risks, to engage in their own learning actively and to take responsibility for their own education. A thorough orientation to the library and other university resources is included. The students will hone critical-thinking skills while examining selected topics from a perspective that emphasizes critical interpretation rather than mastery of information. Students will engage in collaborative projects on specified topics. Attendance at certain Honors College events is required.

HONR 198. Freshman Honors. 1-4 Hours.
Semester course; 3 lecture hours. Variable credit. Maximum total of 8 credits. May be repeated once under different topic. Prerequisite: permission of the dean of The Honors College. An interdisciplinary course that will provide an intensive study of selected topics.

HONR 200. Rhetoric. 3 Hours.
Semester course; 3 lecture hours. 3 credits. In-depth study of principles of rhetoric and argumentation in both written and oral formats. Emphasis is on research-based expository writing and debate, with skills development in technological applications for information retrieval. Students may not receive credit for both HONR 200 and UNIV 200.

HONR 250. Expository Writing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. In-depth study of principles of expository writing focusing on purpose and audience. Particular emphasis on critically engaging with texts and writing about original ideas informed by the thinking of others. Develops a number of writing strategies and skills including narration, description and figuration as well as the art of persuasion.

HONR 298. Sophomore Honors. 1-4 Hours.
Semester course; 3 lecture hours. Variable credit. Maximum total of 8 credits. May be repeated once under different topic. Prerequisite: permission of the dean of The Honors College. Appropriate prerequisite or corequisites may be demanded. An interdisciplinary course that will provide an intensive study of selected topics.

HONR 300. Qatar Honors Experiential Learning Project. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: junior or senior standing and approval of Honors College dean. Restricted to honors students. Experiential learning is a project-based and student-led experience utilizing hands-on learning, academic research and personal reflection to increase knowledge, develop skills, clarify values and make worthwhile contributions to communities, organizations or groups. This course provides honors students with opportunities to collaborate with local, regional and/or international communities and organizations to engage in meaningful projects and initiatives that enhance academic enrichment, foster personal growth and practice social responsibility.

HONR 398. Honors Topics. 1-4 Hours.
Semester course; 3 lecture hours. Variable credit. May be repeated with different topics. Prerequisite: permission of the dean of The Honors College. Appropriate prerequisite or corequisites may be demanded. An in-depth study of selected topics. May be cross listed with departmental courses. See the Schedule of Classes for specific topics to be offered each semester.

HONR 399. Honors Module. 1.5 Hour.
Five-week course; 3 lecture hours. 1.5 credits per module. Prerequisite: permission of the dean of The Honors College. Intensive studies of topics from a wide spectrum of disciplines are undertaken. Each module is a self-contained unit. See the Schedule of Classes for specific topics to be offered each semester.

HONR 492. Honors Independent Study. 0.5-4 Hours.
Semester course; variable hours. Variable credits. Maximum of 4 credits per semester. Maximum total of 9 credits over all semesters. Prerequisites: junior or senior standing, and approval of Honors College dean and instructor/tutor. Intensive study under supervision of a faculty member in an area not covered in depth or contained in the regular curriculum.

HUMAN AND MOLECULAR GENETICS (HGEN)

HGEN 501. Introduction to Human Genetics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to qualified seniors and graduate students. Basic knowledge of genetics is recommended. Provides a comprehensive examination of the fundamentals of human genetics. Explores topics including Mendelian and non-Mendelian inheritance, pedigree analysis, cytogenetics, aneuploid syndromes, cancer, gene structure and function, epigenetics, gene expression, biochemical genetics, and inborn errors of metabolism. Crosslisted as: BIOL 530.

HGEN 502. Advanced Human Genetics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: HGEN 501 or equivalent. Enrollment restricted to graduate students. A comprehensive study of the principles of specific areas in human genetics. Explores topics including quantitative genetics, genetic epidemiology, gene mapping, animal models, the characterization of complex disease, diagnostic testing and genetic counseling.

HGEN 510. Classic Papers in Human Genetics. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Enrollment restricted to graduate students in the School of Medicine. This course surveys the seminal discoveries in the discipline of human genetics and introduces students to reading, understanding, discussing, critiquing and presenting original journal articles.

HGEN 511. Human Cytogenetics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: HGEN 501. A discussion of recent advances in human cytogenetics. Topics covered will include chromosome banding techniques and ultrastructure, meiosis, numerical and 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. Population Genetics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: STAT/BIOS 543. Theoretical and empirical analyses of how demographic and evolutionary processes influence neutral and adaptive genetic variation within populations. Crosslisted as: BIOL 516.

HGEN 517. Introduction to R Programming for Statistical Genetics. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Open only to graduate students or by permission of course director. This course is to provide and introduction to statistical programming in R. Lectures will provide the fundamentals for efficient handling and exploration of common data set structures in genetic and biomedical sciences.

HGEN 525. Practice of Genetic Counseling. 3 Hours.
Continuous courses; 3 lecture hours. 3-3 credits. Enrollment restricted to genetic counseling master's students. Provides context for practice of genetic counseling through literature review and practical techniques. Places specific emphasis on pregnancy and childhood evaluation, interviewing techniques, social and ethical issues, including fieldwork in prenatal, general genetics and specialty clinics.

HGEN 526. Practice of Genetic Counseling. 3 Hours.
Continuous courses; 3 lecture hours. 3-3 credits. Enrollment restricted to genetic counseling master's students. Provides context for practice of genetic counseling through literature review and practical techniques. Places specific emphasis on pregnancy and childhood evaluation, interviewing techniques, social and ethical issues, including fieldwork in prenatal, general genetics and specialty clinics.

HGEN 527. Medical Genetics. 3 Hours.
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisite: HGEN 525-526 or permission of instructor. Enrollment restricted to genetic counseling master's students. Provides medical information and principles of human genetic disease with specific emphasis on the molecular basis of Mendelian disorders, disorders of sexual development, assessment of dysmorphic features, and the genetics of common diseases. Emphasizes the use of all available resource materials in genetics.

HGEN 528. Medical Genetics. 3 Hours.
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisite: HGEN 525-526 or permission of instructor. Enrollment restricted to genetic counseling master's students. Provides medical information and principles of human genetic disease with specific emphasis on the molecular basis of Mendelian disorders, disorders of sexual development, assessment of dysmorphic features, and the genetics of common diseases. Emphasizes the use of all available resource materials in genetics.

HGEN 600. Clinical Genetics. 3 Hours.
Semester course; 1 lecture and 4 laboratory hours. 3 credits. Enrollment restricted to genetic counseling master's students. Practical experience in the genetic counseling clinic and on ward rounds. Includes collection and analysis of family histories, genetic counseling, and introduction to genetic nosology.

HGEN 601. Research in Genetic Counseling. 2 Hours.
Semester course; 1.5 lecture and .5 thesis hours. 2 credits. Enrollment restricted to genetic counseling graduate students only. Students must have chosen their research project adviser, with whom they will meet throughout the semester, prior to enrolling. Provides a comprehensive examination of the fundamentals of research relevant for the scientific advancement of the genetic counseling field. Explores topics including developing a research question; conducting literature reviews; designing a research project; working with the institutional review board; and collecting, analyzing and interpreting data. Students will develop and deliver a research proposal orally and in writing.

HGEN 602. Genetic Models of Disease. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Understanding the molecular basis of human disease states is a major focus for biomedical research. This course will train students to investigate molecular-genetic mechanisms of disease using four genetic model organisms: the nematode C. elegans, the fruit fly Drosophila melanogaster, the teleost zebrafish Danio rerio and the mouse Mus musculus, which serve as important laboratory models for human diseases and facilitate the elucidation of the underlying molecular mechanisms.

HGEN 603. Mathematical and Statistical Genetics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOS 543 and BIOS 544; CCTR 702 and 703; or equivalents or permission from the course director. Provides an introduction to the rudiments of 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 605. Experimental Methods in Human Genetics. 1-3 Hours.
Semester course; 2-6 laboratory hours. 1-3 credits. Restricted to students in the M.S. or Ph.D. programs in human genetics. Provides hands-on experience with the experimental methods that are used to carry out research in specific areas of human genetics prior to beginning thesis/dissertation research. Graded S/U/F.

HGEN 606. Introduction to Clinical Genetics. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: open only to graduate students in human genetics programs or by permission of instructor. Provides an overview of medical genetics and counseling practice for non-genetic counseling students, including orientation to the translational side of research genetics and contemporary practice of clinical genetics. Graded S/U/F.

HGEN 610. Current Literature in Human Molecular Genetics. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: open only to graduate students. Provides directed experience in critiquing, understanding and presenting current literature on a focused topic in molecular genetics. Graded as S/U/F.

HGEN 614. Pathogenesis of Human Genetic Disease. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOC 503 or BIOC 530-533 and BIOC 504, equivalent, or permission of instructor. Surveys the mechanisms and varieties of human gene mutations resulting in human genetic disease and emphasizes different investigational disorders using current scientific literature.

HGEN 615. Techniques in Genetic Counseling. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to students in the M.S. in Genetic Counseling program or by permission of the instructor. Provides theory and context for interviewing as well as counseling skills required for genetic counseling practice. Literature and practical techniques utilized to acquire skills. There is significant reliance on live in-class role play scenarios to exercise and demonstrate emerging skills. Additional deconstruction of taped master genetic counselor role plays aids in the understanding and evaluation of theory and skill to be acquired. Emphasis is on understanding and developing the verbal and non-verbal skills required for effective genetic counseling practice.

HGEN 617. Genetic Analysis of Complex Traits. 3 Hours.
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 619. Quantitative Genetics. 3 Hours.
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 methods and computer algorithms for genetic data analysis.

HGEN 620. Principles of Human Behavioral Genetics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The theory of genetic and nongenetic transmission considered in relation to the design, analysis, and interpretation of studies to identify the principal genetic and environmental causes of behavioral variation. Included will be analysis of intelligence, personality, social attitudes, and psychiatric disorders.

HGEN 622. Cancer Genetic Counseling. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: HGEN 501-502 or permission of instructor. Provides a background in as well as the most current information relevant to cancer genetics and cancer genetic counseling. Includes instruction in basic science and genetic and psychosocial aspects of cancer, with an emphasis on familial and hereditary cancers.

HGEN 631. Advanced Dental Genetics. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Enrollment is limited to students in the DDS program. A 1 credit hour course on topics in human genetics with application to clinical dentistry.

HGEN 690. Genetics Research Seminar. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Selected topics in genetics presented by students and staff.

HGEN 691. Special Topics in Genetics. 1-4 Hours.
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 the research training.

HGEN 692. Special Topics. 1-4 Hours.
Semester course; 1-4 variable hours. 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 the research training. Graded as S/U/F.

HGEN 697. Directed Research in Genetics. 1-15 Hours.
1-15 credits. Research leading to the M.S. or Ph.D. degree and elective research projects for other students.

HUMAN-CENTERED DESIGN (HCDN)

HCDN 351. Introduction to Human-centered Design. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. This course explores the human-centered design paradigm from a broad perspective. Students are exposed to human-centered design thinking and experiential client activities. Topics include human-centered design principles, methodologies, user research, data collection and assessment, inspiration, ideation, and implementation phases, and critical- and creative-thinking models.

HCDN 352. Human-centered Design Methods. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: HCDN 351. This course explores human-centered design methods and an experiential client interaction. Students will be challenged to develop, utilize and assess several ways of knowing and thinking about how to effectively contextualize, formulate, conduct, analyze and disseminate the results derived from particular engagements with human-centered design and their processes in the context of research and design.

HCDN 353. Human-centered Design Through Service Learning. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: HCDN 352. This course allows students to engage in an experiential nonprofit client scenario working through human-centered design methods that solve a community need specific to social innovation. Lecture is coupled with 20 hours of service-learning client engagement.

HCDN 451. Interaction Design and Prototyping. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: HCDN 353. Investigates the practice of interaction design using an experiential project-oriented approach. Develops expertise in design, development and critique of solutions for digital platforms and consumer products. Examines issues such as interaction theory, requirements and specifications, design language, prototyping, evaluation, and project presentation.

HCDN 452. Professional Practices. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: HCDN 353. An overview of professional industry practices, concepts, self-marketing strategies, educational and career options in product innovation and venture creation is presented. Preparing written materials, documenting client work and building a professional portfolio for presentation to potential employers are stressed.

HCDN 491. Special Topics in Human-centered Design. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Study of current and emerging topics in the field of human-centered design. Topics may vary from semester to semester.

HCDN 492. Independent Study in Human-centered Design. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Students pursuing a da Vinci Center certificate may repeat for a maximum total of 3 credits. Enrollment restricted to students with junior standing and permission of adviser and da Vinci Center director prior to course registration. Intensive study or research under supervision of a faculty member in an area not covered in depth or contained in the regular curriculum.

HCDN 493. Internship in Human-centered Design. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. May be repeated for a maximum of 3 credits. Enrollment restricted to students who have permission of the certificate director. Supervised pragmatic work experiences. Training is provided under the direction and supervision of qualified professional practitioners.

HUMANITIES AND SCIENCES (HUMS)

HUMS 100. Intensified Problem Solving in Chemistry 100. 2 Hours.
Semester course; 4 workshop hours. 2 credits. Prerequisite: Students must be eligible to take MATH 131 or higher. Corequisite: CHEM 100. Problem-solving sessions will engage students in cooperative learning in open discussions of the elementary principles of chemistry. Students work on chemistry problems in small groups in which each student participates in the presentation of problem solutions to the class. Students receive mock quizzes and exams and will be given assistance on homework problems assigned in their chemistry lecture. This course is for students who do not meet the criteria for enrollment in CHEM 101. These credits may not be used to satisfy any chemistry course requirements in the College of Humanities and Sciences.

HUMS 101. Intensified Problem Solving in Chemistry 101. 2 Hours.
Semester course; 4 workshop hours. 2 credits. Prerequisite: CHEM 100 with a grade of C or higher or a satisfactory score on the Chemistry Placement Test. Students must be eligible to take MATH 151 or higher. Corequisite: CHEM 101. Problem-solving sessions will encompass the fundamental principles and theories of chemistry. Students will form and work in small study groups and must participate in open discussions of the concepts of chemistry. Each student participates in the presentation of problem solutions to the class. Students will receive mock quizzes and exams and will be given assistance on homework problems assigned in the general chemistry lecture. These credits may not be used to satisfy any chemistry course requirements in the College of Humanities and Sciences.

HUMS 102. Intensified Problem Solving in Chemistry 102. 2 Hours.
Semester course; 3 workshop hours. 2 credits. Prerequisite: CHEM 101 with a grade of C or higher, MATH 151 or higher. Corequisite: CHEM 102. Problem-solving sessions will encompass the fundamental principles and theories of chemistry. Students will form and work in small study groups where they engage in cooperative learning and must participate in open discussions of the concepts of chemistry. Each student participates in the presentation of problem solutions to the class. Students will receive mock quizzes and exams and will be given assistance on homework problems assigned in the general chemistry lecture. These credits may not be used to satisfy any chemistry course requirements in the College of Humanities and Sciences.

HUMS 202. Choices in a Consumer Society. 1 Hour.
Semester course. 1 credit. Corequisite: UNIV 112. Provides a framework for understanding the nature of choices made in a consumer society, with an emphasis on the financial consequences of those choices. Students will gain the practical knowledge needed to make informed personal financial decisions as they address immediate, short-term and long-term consumer choices. Administered primarily as a self-paced, computer-aided instructional course.

HUMS 250. Reading Film. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 111 or equivalent. Develops students' visual literacy by exploring and analyzing the various elements of film (cinematography, lighting, editing, art direction, acting and sound, among others). Examples will be drawn from both U.S. and world cinema and from all eras of filmmaking.

HUMS 291. Special Topics in the Humanities and Sciences. 1-4 Hours.
Semester course; 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. Graded as pass/fail or normal letter grading at the option of the instructor.

HUMS 300. Great Questions of the Social Sciences. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The social sciences explore human aspects of the world in fields of study that include anthropology, criminology, economics, education, geography, law, political science, psychology and sociology. This course explores fundamental questions of social science and examines their historical and contemporary relevance.

HUMS 391. Special Topics in the Humanities and Sciences. 1-4 Hours.
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. Graded as pass/fail or normal letter grading at the option of the instructor.

HUMS 591. Special Topics. 1-4 Hours.
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.

HUMANITIES AND SCIENCES - INTERDISCIPLINARY (HUSI)

HUSI 190. College Seminar. 1 Hour.
1 lecture hour. 1 credit. May be repeated once for credit. Open only to students who participate in these programs. A seminar designed for first-year programs coordinated through the office of the dean of the College of Humanities and Sciences. Designed to help students integrate general education courses.

HUSI 491. College Topics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with different topics for maximum of 6 credits. Open primarily to seniors; others with permission of instructor. A discussion of complex issues that are of enduring value or of critical interest to society. The goals of the course are to (1) bring general principles from disciplinary or a variety of disciplinary contexts to bear on specific problems; (2) exercise critical thinking; (3) understand and integrate diverse perspectives; and (4) explore models of decision-making, underlying assumptions and implications. See the Schedule of Classes for specific topics to be offered each semester.

INFORMATION SYSTEMS (INFO)

INFO 160. Digital Literacy: Computer Concepts, Internet, Digital Devices. 1 Hour.
Semester course; 1 credit. Overview of basic computer concepts, the Internet, new technologies and digital security. Topics include but are not limited to computing devices -- hardware and software -- skills for using and evaluating Internet content and security with digital devices. This course provides the foundation in digital technologies to prepare students for other business courses and application software courses in the INFO16X series. Administered as a self-paced course with all online content. Graded as pass/fail at 80 percent pass level with on-campus assessment. Purchase of online training/assessment package required.

INFO 161. Digital Literacy: Word Processing Skills. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Presents academic- and professional-level word processing skills. Topics include but are not limited to document preparation and modification, tables and graphic enhancements, collaboration, formatting for research papers, newsletters, forms, and linking to other applications. The course will help students prepare documents to support professional tasks and other VCU course work. Administered as a self-paced course. Graded as Pass/Fail at 80 percent pass level with on-campus assessment. Purchase of online training/assessment package required.

INFO 162. Digital Literacy: Spreadsheets Skills I. 1 Hour.
Semester course; 1 credit. Introduces students to academic and professional spreadsheet skills. Topics include but are not limited to the entering of text, numbers and formulas; formatting; moving; copying; recalculation; retrieving; charting; saving; and printing with introductory coverage of data manipulation. The course will help students prepare analyses, tables and charts to assist with professional tasks and other VCU course work. Administered as a self-paced course. Graded as pass/fail at 80 percent pass level with on-campus assessment. Purchase of online training/assessment package required.

INFO 163. Introduction to Web Page Design and Application Software. 1 Hour.
Semester course; 1 credit. Introduces students to Web page design and construction using application software. Topics include Web page creation and modification, hypertext links, tables, graphics, and website organization. Graded as pass/fail. Administered as a self-paced, computer-aided instructional course.

INFO 165. Digital Literacy: Spreadsheet Skills II. 1 Hour.
Semester course, 1 credit. Presents intermediate-level academic and professional spreadsheet skills. Topics include but are not limited to advanced formulas, statistical and financial functions, multiple worksheet/workbook management, macros and pivot tables. This course is designed for students wanting to advance their previous spreadsheet skills. Administered as a self-paced course with all online content. Graded as pass/fail at 80 percent pass level with on-campus assessment. Purchase of online training/assessment package required.

INFO 166. Digital Literacy: Database Skills. 1 Hour.
Semester course; 1 credit. Introduces students to academic and professional database skills. Topics include but are not limited to creating and editing tables and forms, sorting and filtering data, and generating reports. Administered as a self-paced, online course. Graded as pass/fail at 80 percent pass level with on-campus assessment. Purchase of online training/assessment package required.

INFO 167. Introduction to Internet Researching. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Course emphasizes Internet search tools and research skills development while expanding students understanding of the World Wide Web and its resources. Students will learn to explore and evaluate the various types of search sites, including the VCU Library Internet resources and learn skills for developing researching strategies. Using a microcomputer-based Web browser such as Internet Explorer or Netscape, students will learn about advanced browser features that will aid them in their search efforts. This course provides the necessary foundation to help students better find and use Web resources for documents and papers that other VCU course work may require.

INFO 168. Digital Literacy: Presentation Skills. 1 Hour.
Semester course; 1 credit. Introduces students to academic and professional presentation skills. Topics include but are not limited to creating and editing presentations, creating and modifying images/graphics, and use of video/audio media tools. The course will help students prepare presentations for professional tasks and other VCU course work. Administered as a self-paced course. Graded as pass/fail at 80 percent pass level with on-campus assessment. Purchase of online training/assessment package required.

INFO 169. Multimedia Presentations. 1 Hour.
Short course; 1 lecture hour. 5 weeks. 1 credit. Familiarizes students with the fundamental use of multimedia to enhance presentations. Topics include adding animation, creating templates, linking to other resources as well as audio and video. The course will help students to prepare more effective and professional presentations.

INFO 202. Introduction to E-business Technologies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 160 or passing score on the Knowledge Equivalency Test (see: www.business.vcu.edu/infosys/ket.html). Introduces students to the technologies used in e-business. Students will be introduced to current or emerging Web languages, e-business software development environments, Web application servers and other packages used in creating and running Web applications.

INFO 250. Introduction to Programming. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: INFO 160 and MGMT 171. Introduces students to writing, testing and debugging Java programs using simple logic and algorithms. Basic Java applets and the graphic user interface are covered. Cannot be used as an elective in the information systems major.

INFO 291. Topics in Information Systems. 1-3 Hours.
Variable hours. Variable credit. Maximum of 3 credits per topic. Prerequisite: permission of instructor. An in-depth study of selected business topics. Graded as pass/fail at the option of the department.

INFO 300. Information Technology Infrastructure. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Pre- or co-requisite: INFO 202, CMSC 245 or CMSC 255. Principles of computer hardware and software architecture, network communications technologies and security. Introduction to data structures.

INFO 320. Business Intelligence and Data Mining. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 301. Restricted to students who have completed at least 54 credit hours (junior standing). Modeling business-related problems using information systems tools and quantitative techniques. Focus is on extraction, translation and loading of relevant business and external data, quantitative analysis, and presentation of findings. Typical problem situations involve suggested productivity improvements, revenue enhancement opportunities and marketing.

INFO 323. Ethical, Social and Legal Issues in Information Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment is restricted to students with junior standing. In-depth coverage of professional, ethical, legal, security and social issues and responsibilities in information systems. Topics include principles of ethics and ethical codes of conduct in the computing professions; contracts, law and regulations specific to information systems and cyberspace; and social issues such as individual and state secrecy, privacy and transparency. Students may not receive credit toward graduation for more than one of INFO 323, SCMA 323 or MGMT 323.

INFO 350. Intermediate Programming. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: INFO 202, INFO 250, CMSC 245 or CMSC 255; and MATH 211, both with a minimum grade of C. Object-oriented programming and algorithmic design are introduced using C# and the .NET Framework. Emphasizes building business applications using the .NET Framework Class Library and the components, events and message handling therein. Intermediate Web application development is also covered. Students cannot receive credit for both CMSC 256 and INFO 350.

INFO 360. Business Information Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 160. This course is restricted to students who have completed at least 54 credit hours (junior standing). Provides an understanding of the importance of computer-based information in the success of the firm. Emphasis is on the role of information systems within each of the functional areas of business. Major concepts include data management, decision support and management information systems.

INFO 361. Systems Analysis and Design. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course is restricted to students who have completed at least 54 credit hours (junior standing). Examines the concepts, tools and techniques used to develop and support computer-based information systems. Systems planning, analysis, design and implementation are covered. Behavioral and model building aspects of systems development are emphasized throughout.

INFO 364. Database Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: INFO 202, INFO 250, CMSC 245 or CMSC 255; and MATH 211, both with a minimum grade of C. Enrollment is restricted to students who have completed at least 54 credit hours (junior standing). Designed to prepare students for development of systems involving databases and database management.

INFO 370. Fundamentals of Data Communications. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: INFO 202, INFO 250, CMSC 245 or CMSC 255; and MATH 211, both with a minimum grade of C. Enrollment is restricted to students who have completed at least 54 credit hours (junior standing). Computer networks and data communications. Provides an understanding of the underlying concepts of computer networking. Emphasis is placed on terminology, techniques and issues in networking systems.

INFO 450. Advanced Programming. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 350 with a minimum grade of C. Enrollment is restricted to students who have completed at least 54 credit hours (junior standing). The course covers advanced programming concepts. Topics include pointers, advanced GUI components and the building of multithreaded applications containing reusable components based upon design patterns and advanced data structures. Students cannot receive credit for both CMSC 245/246 and INFO 450.

INFO 451. Advanced Technology for E-business. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: grades of C or better in INFO 350 and 364, and junior standing. Focuses on the technical aspects of developing e-business systems using Web services and Web server controls to build visually interactive and highly responsive Web applications. Students will learn how various XML APIs (processing, messaging and distributed registries) are used under the umbrella of Web services to support the sharing of data and processes for e-business applications. The course will integrate the students' prior knowledge of client-side GUI development with server-side controls, components and behaviors in a multitiered environment that includes database connectivity.

INFO 461. Information Systems Planning and Project Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 361. Concentrated study of planning methods and techniques required for defining, planning, integrating and implementing information technology projects consistent with the organizational strategic plan and mission.

INFO 463. Business Process Engineering. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 361. This course is restricted to students who have completed at least 54 credit hours (junior standing). A survey of legacy system re-engineering technologies in which the student becomes familiar with a variety of tools used in practice and has the opportunity to develop applications using these tools under supervision. Selection of technologies is determined each semester.

INFO 465. Projects in Information Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: INFO 350, 364, 370 and 461. The student's behavioral and technical skills developed in listed prerequisite courses are challenged by participating in a team systems development project. Appropriate computer-assisted software engineering tools are used throughout the project, from requirement specification to implementation and testing.

INFO 468. Information Engineering. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: INFO 361 and INFO 364. This course is restricted to students who have completed at least 54 credit hours (junior standing). A study of information engineering as a model-based, data-centric approach to integrating organizational strategic planning with enterprise information systems development. Involves readings, group discussion and case studies.

INFO 472. Infrastructure Services. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: INFO 370 and junior standing. Concepts and principles related to administering and securing information and communication technologies. Topics include management of infrastructure, hosts, applications and network security.

INFO 474. Advanced Networking and Security. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: INFO 370 and junior standing. Detailed coverage of the TCP/IP protocol suite and its application to internetworking. Emphasis is placed on security, vulnerabilities and controls.

INFO 491. Topics in Information Systems. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Maximum of 3 credits per course; maximum total of 6 credits for all topics courses. Enrollment restricted to students with junior standing. An in-depth study of a selected business topic, to be announced in advance.

INFO 492. Independent Study in Information Systems. 1-3 Hours.
Semester course; 1-3 credits. Maximum total of 3 credits. Prerequisites: junior or senior standing as a major in a business curriculum and approval of adviser and department chair prior to course registration. Intensive study under supervision of a faculty member in an area not covered in-depth or contained in the regular curriculum.

INFO 493. Internship in Information Systems. 3 Hours.
Semester course; 3 field experience hours. 3 credits. Enrollment restricted to students with senior standing and permission of department chair prior to or during advance registration of the semester of credit. Involves students in a meaningful work experience, typically 20 hours per week, in a setting appropriate to the information systems major.

INFO 609. Data-centric Re-engineering Analysis/Planning. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Teaches methods of monetizing or otherwise valuing intangible data practice-improvement opportunities. Students will participate in a semester-long residency in organizations. Student teams will work closely with CIOs. Each team will evaluate operational effectiveness and/or innovation opportunities and recommend specific approaches and estimated benefits. Participating CIOs will receive a professional business case -- including concrete examples -- for implementing data-centric practices in their organizations.

INFO 610. Analysis and Design of Database Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 364. Designed to prepare students for the development of information systems using databases and database management techniques.

INFO 611. Data Re-engineering. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 610. Teaches the process of reengineering data from current to desired structures. Covers a range of methods, tools and techniques for reverse engineering existing schemas and data structure definitions used as the basis for designing more suitable data structures. Appropriate case tools provide students with practical experience.

INFO 614. Data Mining. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 302 or permission of the instructor. A data mining process has the goal 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 616. Data Warehousing. 3 Hours.
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 and data mining. Crosslisted as: CISS 616.

INFO 620. Data Communications. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 370. Computer network design, communication line control, and communication hardware and software.

INFO 622. Internet Security Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Studies the principles of network security and secure operating systems. Included are topics relating to the use of intrusion detection, intrusion prevention and other related tools.

INFO 630. Systems Development. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: INFO 361 and 364. Covers business process and data requirements modeling for information systems, using advanced methods and techniques. Students will gain hands-on experience developing specifications and a functional prototype application with current CASE and development tools.

INFO 632. Business Process Engineering. 3 Hours.
Semester course; 3 lecture hours. 3 credits. 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 tool-sets are extensively used to provide practical experience.

INFO 640. Information Systems Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 360. 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 brain-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 641. Strategic Information Systems Planning. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 640 or INFO 661. Focuses on developing, implementing and evaluating strategic plans for corporate information systems. Assesses the role of information systems as a competitive tool. Methods and frameworks for strategic analysis are introduced. Mechanisms for establishing an information systems strategy are presented. Emphasis placed on understanding change management issues in IS planning for organizations.

INFO 642. Decision Support and Intelligent Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: INFO 610 and 630. Focuses on the design and deployment of decision technology of two broad types: decision support systems, which are meant to be employed in an advisory capacity by their human users, and intelligent systems, which are generally designed as autonomous decision agents and so intended to displace human functionaries.

INFO 643. Information Technology Project Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 640 or 661 or permission from the director of graduate studies in the School of Business. Provides a clear understanding of project management techniques. Covers aspects of planning, organizing, controlling and implementing IT projects. IT project management processes, project scheduling and links with information systems strategy and change management are explored.

INFO 644. Principles of Computer and Information Systems Security. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 640 or INFO 661. Explores issues related to protecting information resources of a firm. Various tools and techniques useful for assessing CISS security concerns in organizations are introduced. Principles and models for CISS security and security management are presented and selected computer and CISS security topics are introduced. Material is presented and discussed from a management frame of reference. Crosslisted as: CISS 644.

INFO 646. Security Policy Formulation and Implementation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Course covers aspects of policy formulation and implementation. A security policy is considered as a vehicle for executing good strategy. The course analyzes current problems with security strategy formulation and compliance. The content and context of security policies is evaluated to ensure effectiveness.

INFO 654. Systems Interface Design. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 640 or 661. Analyzes factors important in designing the interface for business information systems. Includes designing and developing systems for the Internet. Requires students to work in teams to produce prototype interactive systems.

INFO 658. Securing the Internet of Things. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 661 or INFO 640. Overviews the emerging field of the Internet of Things with emphasis on how information infrastructure and networks will change the exchange of goods and services in a socially connected world. Specific topics include technological (including hardware/software) infrastructures, types of IoT applications, key IoT policy issues and future trends, IoT security, and privacy challenges in a socially connected world.

INFO 660. Introduction to Management Information Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides an understanding of the importance and role of information systems in modern business processes, analysis and decision making. Presents principles of information technology and systems methodologies for the design and development of operational, managerial and strategic business information systems. A project management focus will provide the framework for the course.

INFO 661. Information Systems for Managers. 3 Hours.
Semester course; 3 lecture hours. 3 credits. 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. Information Systems for Business Intelligence. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides students with techniques and practices for modern decision-making in support of business/corporate performance. Includes hands-on experience with various information analysis, business intelligence and decision support techniques and tools with applications to various business-problem scenarios, such as portfolio analysis, project selection, market research and supply-chain optimization.

INFO 690. Research Seminar in Information Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: Approval of proposed work is required by graduate studies office in the School of Business. This course is designed to provide research experience for candidates not following the INFO 798-799 program.

INFO 691. Topics in Information Systems. 1-3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: Approval of proposed work is required by graduate studies office in the School of Business. 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. 1-3 Hours.
Semester course; 3 lecture hours. 1, 2 or 3 credits. Prerequisite: Approval of proposed work is required by graduate studies office in the School of Business. 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.

INFO 700. Survey of Information Systems Research. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course is designed to provide incoming Ph.D. students with an introduction to information systems research. Students will survey various research streams in the field of information systems by familiarizing themselves with the research undertaken by faculty in the IS department. During the semester, students will learn about the various research areas in light of theories that support research and the primary research methods used in these areas. In addition, students will review literature to identify critical research issues in a specific topic area chosen for research and propose solutions to address those issues.

INFO 701. Qualitative Research in Information Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment requires permission of instructor. The course is designed to cover qualitative research published in the information systems discipline and an array of qualitative research methods, including but not limited to grounded theory, positivist case studies, interpretive case studies, hermeneutics, ethnography, action research and interviewing methods. Students will be exposed to the published literature of qualitative research in the IS discipline, as well as to the principles that distinguish qualitative research from other types of IS research. The research methods and techniques will be discussed using published examples of such research. Including a project, the course will help students conduct their own qualitative research.

INFO 702. Design Science Research and Methods in Information Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment requires permission of instructor. The course is designed to explore the theories and methods that are used in the various phases of design science research. Students will be exposed to the principles that distinguish design science research from other types of information Systems research. The research methods and techniques used in the various phases of design science research will be discussed using examples from IS analysis and design, database, IS security, decision support and intelligent systems, knowledge management, or other subfields.

INFO 710. Database Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Explores advanced concepts related to management of modern organizations' data resources. Focuses on data administration and the technical aspects of database systems. Some of the database research issues covered include: data quality, design, security, metadata, XML databases and data warehousing. Prepares students for further research into aspects of database systems.

INFO 720. Analysis and Design of Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Covers the philosophical and theoretical foundations of information systems development methodologies and their evolution. Provides an intellectual foundation for students wishing to write a doctoral dissertation in this subject matter. Students will be required to read and analyze articles considered fundamental to the current understanding of the subject.

INFO 730. Information Systems Strategy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides the basis for further Ph.D.-level work in information systems strategy. Covers the theoretical foundations of the subject area. In particular the economic, phychological, sociological and cultural aspects are considered. This focus helps students to identify different research orientations and helps develop an informed opinion on critical research areas.

INFO 740. Decision Support and Intelligent Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides the basis for further Ph.D.-level work in decision support and intelligent systems. Explores the theoretical and technical aspects of the subject area. It helps students identify different research orientations with respect to the notion of intelligent systems and build an informed opinion on critical research areas. Explores issues around classes of decision predicates and decision situations. The course also helps students understand technical innovations in decision technologies as they relate to the study of decision support and intelligent systems.

INFO 750. Information Systems Security. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides the basis for further Ph.D.-level work in information systems security. Covers the theoretical aspects of the subject area. It helps students identify different research orientations with respect to IS security and build an informed opinion on critical research areas. Explores issues around what IS security is (ontology) and how to acquire the relevant knowledge (epistemology). The course also helps students understand methods of social science research as they relate to IS security.

INFO 760. Knowledge Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Explores advanced concepts related to knowledge management and knowledge discovery in modern organizations. Material for the course is drawn from research papers and doctoral dissertations. Requires a high level of student participation, particularly in their critical reviews and presentation of relevant research materials.

INFO 790. Doctoral Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Open only to Ph.D. students in business. Analyzes and critiques general theories, practices and functions in a specialized area of information systems research.

INFO 798. Thesis in Information Systems. 3 Hours.
Year course; 6 credits. Graduate students will work under supervision in outlining a graduate thesis and in carrying out the thesis.

INFO 799. Thesis in Information Systems. 3 Hours.
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 Hours.
1-12 credits. Limited to Ph.D. in business candidates.

INNOVATION IN PRODUCT DESIGN AND DEVELOPMENT (INNO)

INNO 200. Introduction to Innovation and Venture Creation. 1 Hour.
Semester course; 1 lecture hour. 1 credit. A speaker series focused on the discussion of pertinent topics related to product innovation and venture creation. Students will be exposed to numerous topics through guest speakers supplemented by readings and class discussion. Topics include conceptualization, patents, capitalization, venture formation, commercialization, market assessment, project management and product life cycle management.

INNO 221. Introduction to Arts and Design Principles. 3 Hours.
Semester course; 1 lecture and 2 studio hours. 3 credits. Restricted to non-arts students enrolled in the Certificate in Product Innovation program. Introduces arts and design principles to students from non-arts disciplines.

INNO 223. Introduction to Business Principles. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Open only to non-business majors in the Certificate in Product Innovation program. Introduces business fundamentals to students from non-business disciplines. Particular focus will be concepts and issues in contemporary business.

INNO 225. Introduction to Engineering and Technology Principles. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Open only to non-engineering majors in Certificate in Product Innovation program. Introduces engineering and technology fundamentals to students from non-engineering disciplines. Particular focus is the engineering problem-solving process as applied to open-ended problems. Students will be introduced to the different types of engineering, examine engineering and technology issues and apply the engineering problem-solving process.

INNO 351. Creativity for Innovation and Entrepreneurship. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Students are introduced to the role of creativity in innovation and entrepreneurship. A multidisciplinary orientation and approach are emphasized.

INNO 352. Making Innovation Happen. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Students are introduced to the role of innovation in today's society. A multidisciplinary orientation and approach are emphasized.

INNO 353. Making Entrepreneurship Happen. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Students are introduced to the role of entrepreneurship in today's society. A multidisciplinary orientation and approach are emphasized.

INNO 450. Realizing Innovation and Entrepreneurship. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Students will learn how innovation and entrepreneurship are manifested in today's society. A multidisciplinary orientation and approach are emphasized.

INNO 460. Product Innovation: da Vinci Project. 3 Hours.
Semester course; 3 credits. Prerequisite: permission of instructor. Students from the School of the Arts, School of Engineering and School of Business work together on a semester-long product innovation project with a corporate sponsor under faculty supervision. Topics and activities may include project management, team building, concept generation and testing, market analysis, visualization, and prototyping.

INNO 491. Special Topics in Product Innovation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of six credits. Enrollment restricted to students with permission of adviser and da Vinci Center director. Study of current and emerging topics in the field of product innovation. Topics may vary from semester to semester.

INNO 492. Independent Study in Product Innovation. 1-3 Hours.
Semester course; 1-3 independent study hours. 1-3 credits. May be repeated for a maximum total of six credits by students pursuing a da Vinci Center certificate. Enrollment restricted to students with junior standing and permission of adviser and da Vinci Center director. Intensive study or research under supervision of a faculty member in an area not covered in depth or contained in the regular curriculum.

INNO 501. Arts Principles for Product Innovation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: Open only to students enrolled in the Master of Product Innovation program or with approval of instructor. Introduces studio-based arts instruction to individuals with a background in business, engineering or other non-arts discipline. Lectures and assignments expose students to a broad range of skills and vocabulary, enabling them to comprehend, analyze and communicate visually. Working individually and in teams, the core experience will be formed through iterative making, via direct, hands-on material experience.

INNO 502. Business Principles for Product Innovation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: Open only to students enrolled in the Master of Product Innovation program or with approval of instructor. Introduces business principles and concepts to non-business students. Topics cover the functions and activities organizations engage in to conduct commerce, including planning, marketing, accounting, operations, finance and human resource management. Project management, as used for developing innovative ideas and commercializing new goods and services, is the organizing structure used for integration of concepts.

INNO 503. Technology Principles for Product Innovation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: Open only to students enrolled in the Master of Product Innovation program or with approval of instructor. Introduces technology and technological principles to students with non-engineering-related degrees. A particular focus is learning and applying a technology problem-solving process to different types of open-ended problems. The process includes the steps of needs identification, information gathering, idea generation, evaluation and selection.

INNO 590. da Vinci Project. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: Open only to students enrolled in the Master of Product Innovation program. Students will engage in an interdisciplinary product innovation project with a corporate sponsor under faculty supervision. Topics and activities will hone product innovation skills, including project management, team building, concept generation and testing, market analysis, visualization, and prototyping.

INNO 600. Integrative Design Studio. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: Open only to students enrolled in the Master of Product Innovation program. Integrates the theory and practice of product innovation across the arts, business and engineering disciplines. Students are exposed to and apply a broad set of skills and tools to aid in understanding, envisioning and communicating product innovation. Working in interdisciplinary teams, students will hone teamworking skills and collectively address contemporary issues associated with product innovation, such as sustainability.

INNO 651. Master's Project in Product Innovation I. 6 Hours.
Semester course; 2 lecture and 4 laboratory hours. 6 credits. Prerequisites: two of INNO 501, 502 and 503; and INNO 590 and 600. This capstone experience requires that an interdisciplinary team engage in various facets of a real product development initiative. The project may be company-sponsored or an approved student-originated effort. Applying arts, business and engineering skill sets gained from previous course work, students will identify a potential opportunity and conceive viable product concepts to be pursued across the three project stages of concept generation, concept development and refinement and concept finalization. The semester will culminate with each team producing a set of prototypes and initial business cases for preferable concepts, with at least one viable concept supported by a viable business case an expected class deliverable. Graded as S/U/F.

INNO 652. Master's Project in Product Innovation II. 6 Hours.
Semester course; 2 lecture and 4 laboratory hours. 6 credits. Prerequisite: INNO 651. This is the second course of the capstone experience. An interdisciplinary team will continue engaging in the facets of a company-sponsored or student-originated product development initiative begun in INNO 651. Applying arts, business and engineering skill sets gained from previous course work, students will further develop viable concepts and culminate the capstone experience with the proposal of at least one well-detailed, functional product prototype accompanied by a formal business plan. Students will participate in three project stages: prototype and business case incubation, working prototype and business plan development, and commercialization. Graded as S/U/F.

INNO 691. Topics in Product Innovation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Study of current and emerging topics in the field of product innovation. Topics may vary by semester. See the Schedule of Classes for offerings each semester.

INNO 697. Guided Study in Product Innovation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: Approval of proposed work is required by the Master of Product Innovation program. Students in the M.P.I. program wishing to do research on problems in the area of product innovation will submit a detailed outline of their problem. They will structure a research study, undertake this study and prepare a written report on the problem.

INTERDISCIPLINARY BIOMEDICAL SCIENCES (IBMS)

IBMS 600. Laboratory Safety. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Describes health hazards commonly found in biomedical laboratories and their appropriate safety precautions, government regulations and emergency responses. Includes hazards of working with micro-organisms, experimental animals, and chemical, electrical and fire hazards. Graded as S/U/F.

IBMS 610. Laboratory Opportunities. 0.5 Hours.
Semester course; 0.5 credits. A concentrated presentation of the programs and research opportunities available to doctoral students in the School of Medicine. Graded as S/U/F.

IBMS 620. Laboratory/Clinical Rotations. 2 Hours.
Semester course; 2 credits. Students conduct laboratory and/or clinical rotations to gain direct exposure to individual SOM projects. Graded S/U/F.

IBMS 630. Critical Thinking. 1 Hour.
Semester course; 1 credit. Paper presentations and discussions of important topics in biomedical science.

IBMS 635. Cellular Signalling. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOC 503/504 with minimum grade of B, or permission of instructor. An interdisciplinary introduction to molecular mechanisms important in eukaryotic inter- and intracellular signaling. Topics covered: common signaling mechanisms (heterotrimeric G proteins and G-protein-coupled receptors, small G proteins, tyrosine kinases and MAP kinases, and ion channels), membranes, lipids and ions (calcium signaling, phosphoinositols and lipid signaling through GPCRs), immune and metabolic kinase cascades (AMP-activated kinase, NFκB and Jak/Stat pathways), and programmed cell death.

IBMS 680. Proposal Preparation. 1 Hour.
Semester course; 1 credit. Preparation of an NIH-style grant proposal to serve as the oral component of the Ph.D. qualifying examination. Graded S/U/F.

IBMS 690. Basic Health Sciences Research Seminar. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Faculty and/or visiting lecturers present current research in basic health sciences. Students attend 12 seminars per semester in any of the basic health science or clinical departments in the School of Medicine and submit a one-paragraph (approximately 100-word) summary description of the seminar. Graded S/U/F.

IBMS 691. Special Topics in Interdisciplinary Biomedical Sciences. 0.5-4 Hours.
Semester course; variable hours. 0.5-4 credits. Lectures, seminars, tutorial sessions, Web-based courses and/or library research assignments in selected areas not available in other graduate-level courses or as a concentrated emphasis on a particular topic. Graded as S/U/F.

IBMS 692. Special Topics in Interdisciplinary Biomedical Sciences. 0.5-4 Hours.
Semester course; 0.5-4 variable hours. 0.5-4 credits. Lectures, seminars, tutorial sessions, Web-based courses and/or library assignments in selected areas not available in other graduate-level courses or as a concentrated emphasis on a particular topic.

INTERDISCIPLINARY DEVELOPMENTAL DISABILITY STUDIES (IDDS)

IDDS 600. Interdisciplinary Studies in Developmental Disabilities: Teamwork in Serving Persons with Developmental Disabilities. 3 Hours.
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 teamwork in action.

IDDS 601. Resilience: Models, Research and Applications. 3 Hours.
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 602. Leadership in Developmental Disabilities. 2 Hours.
Semester course; 2 lecture hours. 2 credits. A team-taught seminar in leadership development with particular emphasis on issues related to children with developmental disabilities.

IDDS 603. Clinical and Community Services for Children with Neurodevelopmental Disabilities. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Team-taught by faculty from the Leadership Education for Neurodevelopmental Disorders (LEND) program using problem-based learning. Students will learn the interdisciplinary approach to services for children with neurodevelopmental disabilities with an emphasis on evidence-based practices, the medical home and sources of community support.

IDDS 604. Interdisciplinary Studies in Developmental Disabilities: LEND Seminar I. 4 Hours.
Semester course; 3 lecture/seminar hours; 1 online hour. 4 credits. Enrollment restricted to students who have applied to and been accepted as a trainee or fellow in the Va-LEND program. Provides information and activities on models of teamwork, group decision-making, interdisciplinary team process, communication strategies and leadership skills. Focus is on how teamwork and leadership influence services for children with developmental disabilities and their families.

IDDS 605. Interdisciplinary Studies in Developmental Disabilities: LEND Seminar II. 4 Hours.
Semester course; 3 lecture/seminar hours; 1 online hour. 4 credits. Enrollment restricted to students who have applied to and been accepted as a trainee or fellow in the Va-LEND program. Students will learn the interdisciplinary approach to services for children with neurodevelopmental disabilities with an emphasis on research and evidence-based practices, pertinent legislation, the medical home and sources of community support.

IDDS 672. Practicum in Disability Leadership. 1-4 Hours.
Semester course; 1-4 lecture hours. 1-4 credits. May be taken for a total of 4 credits. Study and integration of interdisciplinary practice in clinical or off-campus settings. Supervised by interdisciplinary faculty. Includes interdisciplinary clinical practice, family mentorship experience, disability policy activities, leadership project and professional development activities specific to leadership education for developmental disabilities. Trainees will have an opportunity to function as both team members and team leaders in addressing the needs of children with disabilities or other special health care needs and their families.

IDDS 691. Special Topics in Developmental Disabilities. 1-3 Hours.
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 interdisciplinary content and issues in the field of developmental disabilities and examines the practice approaches of multiple disciplines.

IDDS 692. Directed Study in Developmental Disabilities. 1-4 Hours.
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 independent study in a specific area of interdisciplinary practice in developmental disabilities developed under the supervision of a member of the graduate faculty.

INTERDISCIPLINARY SCIENCE (INSC)

INSC 201. Energy!. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 131, 141, 151, 200, or higher; or MGMT 171, 212, or 301; or STAT 208, 210, 212, or higher; or satisfactory score on the VCU Mathematics Placement Test within the one-year period immediately preceding the beginning of the course. A study of global energy demands, how they are being met, environmental consequences and alternative energy sources.

INSC 300. Experiencing Science. 3 Hours.
Semester course; 5 studio hours. 3 credits. Prerequisites: 4 credits in biology, 3 credits in physical science, 3 credits in mathematics, and STAT 208, 210, 212, or 312. Study of the methods and processes used by scientists in investigations. Guided, active replication of great discoveries in major scientific disciplines in physical science, life science and earth science.

INSC 301. Investigatory Mathematics and Science. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: 4 credits in biology, 4 credits in physical science, 3 credits in mathematics and STAT 208 or STAT 210. Students investigate real-world science problems, formulate model solutions to the problems, produce project reports and present their solutions to class. Problems selected from areas including water quality, epidemics and spread of diseases, heat loss and gain, genetics and drugs in the body.

INSC 310. Content of Elementary Science. 3 Hours.
Semester course; 4 lecture/laboratory hours. 3 credits. Prerequisite: 11 credits of science courses. Designed for preservice elementary school teachers. Develops mastery of select topics in the physical, earth and life science strands appropriate to the K-6 level. Topics will be presented in the context of hands-on activities designed for the classroom, using techniques such as guided inquiry and the learning cycle.

INSC 490. Capstone Research Experience in Interdisciplinary Science. 1 Hour.
Semester course; 1 credit. Prerequisite: UNIV 200 or HONR 200. Restricted to seniors in the science major with at least 85 credit hours taken toward the degree. Intensive study of a contemporary scientific problem engaging more than one scientific discipline. Emphasis on understanding scientific research and science writing. Course taught online.

INTERIOR DESIGN (IDES)

IDES 103. Introductory Studio Course. 2 Hours.
Continuous course; 1 lecture and 2 laboratory hours. 2-2 credits. This course is an introduction to the complex and multifaceted field of interior design as an applied art and as a business for non-interior design majors. Basic design elements, principles and practices, historical and related architectural background material will be reviewed.

IDES 104. Introductory Studio Course. 2 Hours.
Continuous course; 1 lecture and 2 laboratory hours. 2-2 credits. This course is an introduction to the complex and multifaceted field of interior design as an applied art and as a business for non-interior design majors. Basic design elements, principles and practices, historical and related architectural background material will be reviewed.

IDES 201. Introductory Interior Design Studio I. 4 Hours.
Semester course; 2 lecture/seminar and 6 studio hours. 4 credits. Prerequisites: all Art Foundation courses. Corequisites: IDES 211 and 231. Interior design majors only; other School of the Arts majors by approval. Introduction to identification and applications of fundamental interior design issues through applied projects. Emphasis includes developing design ideas, understanding design philosophies, design principles and elements, human factors, defining and solving problems creatively, analyzing spatial and functional requirements, applying design processes, creating an aesthetic space, and preparing a presentation as related to interior design.

IDES 202. Introductory Interior Design Studio II. 4 Hours.
Semester course; 2 lecture/seminar and 6 studio hours. 4 credits. Prerequisites: IDES 201, 211 and 231. Corequisites: IDES 212, 252 and 311. Interior design majors only; other School of the Arts majors by approval. Expands upon the interior design issues introduced in IDES 201 through their application in small scale interiors projects of increasing size and complexity. Emphasizes the further development of methods and processes for design development, understanding of basic design principles and elements, and ways of analyzing design requirements through written, oral, graphic and three-dimensional documentation.

IDES 211. Interior Graphics I. 3 Hours.
Semester course; 1 lecture and 6 studio hours. 3 credits. Prerequisites: all Art Foundation courses. Corequisites: IDES 201 and 231. Interior design majors only; other School of the Arts majors by approval. Introduction to manual graphic communication techniques in interior design including drafting, sketching, rendering, perspective drawing, presentation formats and model-making for professional graphic presentations.

IDES 212. Interior Graphics II. 3 Hours.
Semester course; 1 lecture and 6 studio hours. 3 credits. Prerequisites: all Art Foundation courses, IDES 201, 211 and 231. Corequisites: IDES 202, 252 and 311. Interior design majors only; other School of the Arts majors by approval. Laptop computer required. Introduction to computer graphic communication language and techniques in interior design drafting, rendering, perspective drawing, presentation formats and 3-D imaging for professional graphic presentations.

IDES 231. Fundamentals of Interior Design. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: all Art Foundation courses. Required of all incoming interior design majors. Open to interior design majors and home fashion merchandising majors only. Interior design majors are required to enroll concurrently in IDES 201 and 211. Introduction to the theories, methods and processes of interior design. Facilitates the transition of skills and knowledge from the Art Foundation Program to specific interior design applications and focuses on analysis and evaluation of interior environments as a support and supplement to the studio experience.

IDES 241. Physical and Social Behavior. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: IDES 231. Theories of behavioral and social aspects of interior design. Study of how people interpret, evaluate and act in the built environment. Social, cultural and economic factors are included.

IDES 251. Historic Environments: Ancient Through 19th Century. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTH 103 and 104. Study of the major paradigms, theories and styles of the built environment (interior design, furniture and architecture) from antiquity to the late 19th century. Contemporary analysis of cultural conditions and the manner in which designers and architects respond to those conditions.

IDES 252. Historic Environments: 20th-21st Centuries. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTH 103 and 104. Study of the major paradigms, theories and styles of architecture, interior environments and furniture from the beginnings of modernism to the present day. Contemporary analysis of cultural conditions and the manner in which designers and architects respond to those conditions.

IDES 301. Interior Design Studio I. 4 Hours.
Semester course; 2 lecture/seminar and 6 studio hours. 4 credits. Prerequisites: UNIV 200 or HONR 200 and successful completion of the interior design sophomore portfolio review. Corequisites: IDES 312, 321 and 323. Interior design majors only. Laptop computer required. Discussion and application of design philosophies, theories and creative design strategies at the intermediate level. Emphasis includes: research, survey and analysis, design processes, spatial and functional analysis, design elements and principles, human factors, creative problem-solving, code requirements, selection of interior components, and preparation of a presentation.

IDES 302. Interior Design Studio II. 4 Hours.
Semester course; 2 lecture/seminar and 6 studio hours. 4 credits. Prerequisite: IDES 301. Corequisite: IDES 431. Interior design majors only. Laptop computer required. Continued discussion and application of design philosophies, theories and creative design strategies at the intermediate level. Emphasis includes: research, survey and analysis, design processes, spatial and functional analysis, design elements and principles, human factors, creative problem-solving, code requirements, selection of interior components, and preparation of a presentation.

IDES 311. Advanced Interior Graphics I. 3 Hours.
Semester course; 1 lecture and 6 studio hours. 3 credits. Prerequisites: IDES 201, 211 and 231. Corequisites: IDES 202, 212 and 252. Interior design majors only. Laptop computer required. Advanced manual and computer graphic communication techniques in interior design including drafting, sketching, rendering, perspective drawing, presentation formats and model-making for professional graphic presentations. Computer graphic techniques including software such as AutoCAD, Adobe Photoshop, Adobe Illustrator and Dreamweaver.

IDES 312. Advanced Interior Graphics II. 3 Hours.
Semester course; 1 lecture and 6 studio hours. 3 credits. Prerequisite: IDES 311. Interior design majors only. Laptop computer required. Advanced computer graphic communication techniques in interior design including drafting, rendering, perspective drawing, presentation formats and 3-D imaging for professional graphic presentations.

IDES 321. Interior Materials and Textiles. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Interior design and home fashion merchandising students only. Investigation, selection and practical application of materials and textiles in interior environments.

IDES 322. Color in Interior Environments. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: all Art Foundation Program studio courses and IDES 231 or comparable experience by approval. Interior design and School of the Arts majors only. Advanced study of color and its impact on interior spaces; theory and practical applications.

IDES 323. Light and Color in Interior Environments. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: successful completion of the interior design sophomore portfolio review. Corequisites: IDES 301 and 312. Interior design and School of the Arts majors only. The study of illumination and color and their impact on people in interior spaces; theory and practical applications.

IDES 324. Furniture Design. 3 Hours.
Semester course; 1 lecture and 6 studio hours. 3 credits. Prerequisite: successful completion of the interior design sophomore portfolio review or permission of instructor. Interior design, crafts, sculpture and theater design majors only. Advanced study of furniture design and custom millwork as related to the design of interior environments. Original student designs are developed through the study of structure and materials.

IDES 330. The Business of Design. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course introduces basic global economics and general design business concepts such as the free enterprise system, legal forms of business and financial considerations. It also surveys business and management practices such as planning, decision-making, communication, global ethics, marketing, human resources, finance and entrepreneurial skills needed to open a design business. Crosslisted as: FASH 330/GDES 330.

IDES 370. Design History: 20th and 21st Centuries. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ARTF 105-106. Study of the major theories and styles on communication arts, fashion and interior environments of the 20th and 21st centuries. Contemporary analysis of cultural conditions and the manner in which designers respond to those conditions. Crosslisted as: FASH 370/GDES 370.

IDES 391. Topics in Interior Design. 1-4 Hours.
Semester course; 1-4 studio or lecture hours. 1-4 credits. May be repeated for a maximum of 8 credits. Prerequisite: permission of the instructor. A study of a topical issue in interior design. See the Schedule of Classes for specific topics to be offered each semester.

IDES 400. Senior Interior Design Studio I. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. Prerequisite: IDES 302. Corequisite: IDES 441. Interior design majors only. Laptop computer required. Study of construction documents on the computer as related to the design of interior environments and as applied to a studio project.

IDES 401. Senior Interior Design Studio II. 4 Hours.
Semester course; 2 lecture/seminar and 6 studio hours. 4 credits. Prerequisites: IDES 400 and 441. Corequisite: IDES 442. Interior design majors only. Department-approved senior interior design project. Advanced design experience of student's choice of an interior environment of complex scope and scale to meet the needs of specific clients and prepare students for the practice of the profession. The project addresses issues of design of the 21st century and integrates all aspects of the curriculum.

IDES 421. Construction Documents. 3 Hours.
Semester course; 1 lecture and 6 studio hours. 3 credits. Prerequisites: all Art Foundation Program studio courses and IDES 201, 202, 231, 212, 312 and concurrent enrollment in IDES 301, 302, 303, 304 or 401. Interior design majors only. Laptop computer required. Study of construction documents on the computer as related to the design of interior environments.

IDES 422. Building Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: IDES 301 and 323. Corequisite: IDES 302. Interior design majors only. Contemporary theories and techniques in the design of buildings as related to interior design, small structural considerations, HVAC, acoustics, plumbing and the attributes of materials.

IDES 431. ID Business Practices. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: IDES 201 and IDES 231. Interior design majors only. Writing intensive. Advanced study of the interior design profession as related to professional and business practices including: responsibilities, services, ethics, business and project management, and marketing.

IDES 441. Senior Design Seminar I. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: IDES 302. Corequisite: IDES 400. Interior design majors only. Discussions of current design theories, issues and concerns of the built environment, future studies and the global community as applied to senior studio.

IDES 442. Senior Design Seminar II. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisites: IDES 400 and 441. Corequisite: IDES 401. Interior design majors only. Continued discussions of current design theories, issues and concerns about the built environment, futures studies and the global community as applied to senior studio.

IDES 491. Topics in Interior Design. 1-4 Hours.
Semester course; 1-4 credits. May be repeated for a maximum of 8 credits. Prerequisite: permission of the instructor. An in-depth study of a topical issue in interior design. See the Schedule of Classes for specific topics to be offered each semester.

IDES 492. Independent Study in Interior Design. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May be repeated for maximum of six credits. Prerequisite: junior or senior standing as a major in interior design. Learning experiences should be designed with the supervising faculty member in the form of a contract between student and instructor. This course is limited to those students who have demonstrated an exceptional level of ability and intense commitment to their discipline.

IDES 493. Interior Design Internship. 3 Hours.
Semester course; 3 credits. Prerequisite: IDES 431. Interior design majors only. Provides supervised practical work experiences that are coordinated with professional interior designers in the field. Formal arrangements must be made and approved by coordinator or department chair.

IDES 500. Art and Design Methods Workshop. 3 Hours.
Semester course; 1 lecture and 4 studio hours. 3 credits. May be repeated for a total of 12 credits. Open only to first-professional track graduate students in interior environments. Provides accelerated instruction in art and design methods for the student with no art background by fully immersing the student in a rigorous studio environment. Focuses on the development of 2-D and 3-D art and design skills including 2-D design methods, 3-D design methods, color theory, and drawing and presentation methods.

IDES 501. Introductory Graduate Design Studio I. 6 Hours.
Semester course; 2 lecture and 8 studio hours. 6 credits. Corequisite: IDES 511. Open to professional entry-level track graduate students in interior environments only. Provides accelerated studio and graphics instruction for designing interior environments for the entering professional entry-level track student that does not have previous experience in interior design. Introduces theories, methods and processes of interior design, facilitates specific interior design applications and focuses on analysis and evaluation of interior environments. Course work is highly sequenced and accelerates in complexity as the semester progresses and combines the development of technical skills with conceptual thinking and design development processes. Course emphasizes interior design development through studio projects and the development of the skills and practices of interior design.

IDES 502. Introductory Graduate Design Studio II. 6 Hours.
Semester course; 2 lecture and 8 studio hours. 6 credits. Corequisite: IDES 512. Open to professional entry-level track graduate students in interior environments only. Provides accelerated studio and graphics instruction for designing interior environments for the entering professional entry-level track student that does not have previous experience in interior design. Introduces theories, methods and processes of interior design, facilitates specific interior design applications and focuses on analysis and evaluation of interior environments. Course work is highly sequenced and accelerates in complexity as the semester progresses and combines the development of technical skills with conceptual thinking and design development processes. Course emphasizes interior design development through studio projects and the development of the skills and practices of interior design.

IDES 511. Introductory Graduate Graphics I. 3 Hours.
Semester courses; 1 lecture and 4 studio hours. 3 credits. Corequisite: IDES 501 for IDES 511, IDES 502 for 512. Open to professional entry-level track graduate students in interior environments only. Provides accelerated manual and computer graphics instruction for designing interior environments for the entering professional entry-level track student who does not have previous experience in interior design graphics. Course work is highly sequenced and accelerates in complexity as the semester progresses.

IDES 512. Introductory Graduate Graphics II. 3 Hours.
Semester courses; 1 lecture and 4 studio hours. 3 credits. Corequisite: IDES 501 for IDES 511, IDES 502 for 512. Open to professional entry-level track graduate students in interior environments only. Provides accelerated manual and computer graphics instruction for designing interior environments for the entering professional entry-level track student who does not have previous experience in interior design graphics. Course work is highly sequenced and accelerates in complexity as the semester progresses.

IDES 521. Advanced Material Studies for Interior Environments. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Open only to first-professional track graduate students in interior environments. Investigation, selection and practical application of materials and textiles in interior environments.

IDES 522. Environmental Factors for Interior Environments. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Open to first-professional track students only. Contemporary theories and techniques in the design of buildings as related to interior design, small structural considerations, HVAC, acoustics, plumbing and the attributes of building materials.

IDES 591. Topics in Interior Design. 3 Hours.
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. Graduate Interior Environments Studio. 6 Hours.
Semester course; 12 studio hours. 6 credits. May be repeated twice. Open to graduate students in interior environments; graduate students from other School of the Arts graduate programs may enroll with the consent of the instructor. Prerequisites: IDES 501, 502, 511, 512 for professional entry-level students; none for post-professional students. Provides advanced studio for designing in specialized areas of interior environments. Topics will vary each semester.

IDES 611. Advanced Graphics for Interior Environments I. 2 Hours.
Semester course; 4 studio hours. 2 credits. Open only to first-professional track graduate students in interior environments. Provides advanced graphics instruction for designing interior environments for the first-professional track student. Course work is highly sequenced and accelerates in complexity as the semester progresses and focuses on the development of technical drawing, rendering and presentation skills for the interior designer.

IDES 612. Advanced Graphics for Interior Environments II. 2 Hours.
Semester course; 4 studio hours. 2 credits. Open only to first-professional track graduate students in interior environments. Provides advanced graphics instruction for designing interior environments for the first-professional track student using the computer. Course work is highly sequenced and accelerates in complexity as the semester progresses and focuses on the development of computer-based skills and programs such as AutoCAD, 3-D Viz and Form Z.

IDES 623. Advanced Design Studies. 3,6 Hours.
Semester course; 3 or 6 lecture/seminar hours. 3 or 6 credits. May be repeated. Prerequisites: IDES 501, 502, 511, 512 for professional entry-level students; none for post-professional students. Interior design majors only. Supervised investigation and presentation of selected problems and issues in interior design.

IDES 624. Advanced Furniture Design. 2 Hours.
Semester course; 4 studio hours. 2 credits. For first-professional track students only. Advanced study of furniture design and custom millwork as related to the design of interior environments. Original student designs are developed through the study of structure and materials.

IDES 626. Advanced Light and Color for Interior Environments. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Open only to first-professional track graduate students in interior environments. The study of illumination and its impact on people in interior spaces; theory and practical applications.

IDES 631. Ethics and Business Procedures for Interior Environments. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Open only to first-professional track graduate students in interior environments. Advanced study of the interior design profession as related to professional and business practices including: responsibilities, services, ethics, business and project management, and marketing.

IDES 635. Teaching Practicum in Interior Environments. 3 Hours.
Semester course; 1 lecture and 6 laboratory hours. 3 credits. Prerequisite: Completion of one graduate studio. Familiarizes students with different types of teaching methods and practices in interior design curriculums. Observation, instruction and practice in the design, organization, and conduct of courses in interior design. Explores multiple teaching strategies, student development, learning styles and evaluation techniques.

IDES 651. History and Theory of Interior Environments I. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Open only to first-professional students. Study of the major paradigms, theories and styles of the built environment (interior design, furniture and architecture) from antiquity to the late-19th century.

IDES 652. History and Theory of Interior Environments II. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Study of the major paradigms, theories and styles of architecture, interior environments and furniture from the beginnings of modernism to the present day.

IDES 690. Graduate Seminar in Interior Environments. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A detailed selected investigation of theoretical, historical, aesthetic and social areas of concern to the interior designer. Scholarly research, critical analysis and discussion are expected. The course requires investigative work using resources such as library and archive materials, journals, Internet sources, surveys, oral histories, interviews, case study design, and field documentation and evaluation.

IDES 692. Independent Study in Interior Environments. 1-6 Hours.
Semester course; 1-6 lecture hours. 1-6 credits. May be repeated for a maximum of 6 credits. Interior environments majors only. Prerequisite: approval from department chair. An in-depth study of a selected interior design topic.

IDES 693. Interior Design Internship. 3,6 Hours.
Semester course; 6, 8 or 12 studio hours. 3, 4 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. Graded P/F.

IDES 699. Creative Project - Thesis. 1-6 Hours.
Semester course; 2, 6 or 12 studio hours. 1, 3 or 6 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.

IDES 800. Research Methods. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: graduate status and permission of chair. Explores the foundation and procedures of architectural and design research. Evidence-based design, alternate research methodologies and their philosophical and epistemological limitations.

IDES 801. Theories of Art and Design. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: graduate status and permission of chair. Development of art, architectural and design theories from antiquity to present. Emphasis is on the writings of contemporary leading theorists and historians. Students will apply these theories to contemporary current solutions as related to the creation of a healing environment; or students may explore the history of medicine or healing as expressed in the fine and applied arts.

IDES 811. Interdisciplinary Health Care Design Workshop I. 3 Hours.
One-week workshop. 3 credits. Prerequisites: graduate status and permission of chair. Contemporary issues in health care professions, health care design and environmental stewardship. Course consists of a one-week workshop that offers lectures from leading experts on a selected issue and an interdisciplinary design problem. Students receive reading assignments to be completed prior to the workshop. After the workshop, during exam week, students meet to present their solution to the design problem to the class and invited guest critics. Students also complete an original research paper on the design problem.

IDES 812. Interdisciplinary Health Care Design Workshop II. 3 Hours.
One-week workshop. 3 credits. Prerequisites: IDES 811, graduate status and permission of chair. Contemporary issues in health care professions, health care design and environmental stewardship. Course consists of a one-week workshop that offers lectures from leading experts on a selected issue and an interdisciplinary design problem. Students receive reading assignments to be completed prior to the workshop. After the workshop, during exam week, students meet to present their solution to the design problem to the class and invited guest critics. Students also complete an original research paper on the design problem.

IDES 820. Selected Topics in Health Care Design I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: graduate status and permission of chair. Selected topics in health, health care design and health care administration.

IDES 821. Selected Topics in Health Care Design II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: IDES 820 and graduate status. Continued exploration of selected topics in health, health care design and health care administration.

IDES 899. Dissertation. 3-12 Hours.
Variable hours. 3-12 credits. May be repeated for credit. Prerequisite: ABD status. Research and work leading to the completion of the dissertation thesis or dissertation project. Graded S/U/F.

INTERNATIONAL PROGRAM IN ADDICTION STUDIES (IPAS)

IPAS 600. The Biological Basis of Addiction. 4 Hours.
11-week online course; 4 credits. Open only to students in the International Program in Addiction Studies (Master of Science in Addiction Studies), graduate certificate program in addiction studies or with permission of the IPAS program director. Designed to provide an overview of the neuropharmacology of drugs of abuse and dependence, including basic principles of drug action as well as comprehensive coverage of the major classes of drugs (opioids, stimulants, nicotine, alcohol, sedatives, cannabis, hallucinogens). Students will study mechanisms of action, effects, pharmacokinetics as well as tolerance and dependence for each of these drugs/drug classes. The reasons for addiction including biological, genetic, cultural and other determinants will be discussed. Laboratory-based methods used in addiction research will be covered.

IPAS 601. Treatment of Addiction: Psychosocial Interventions. 4 Hours.
11-week online course; 4 credits. Open only to students in the International Program in Addiction Studies (Master of Science in Addiction Studies), graduate certificate program in addiction studies or with permission of the IPAS program director. Designed to explore the scientific basis and treatment of substance misuse from a psychological perspective germane to the management of drug, alcohol and nicotine dependence. Students will have the opportunity to evaluate the principles of different theoretical approaches underlying psychological assessment and evidence-based practice. Students will develop a critical awareness of the current literature related to psychological theories of addiction. Students will examine the use and comparative efficacy of different psychological therapies in clinical practice including brief interventions, cognitive behavioral therapy and motivational interviewing/MET. Other interventions (case management, group work, self-help, integrated treatment for co-occurring disorders, etc.) will also be examined along with the evidence base for relapse prevention, contingency management and therapeutic communities. Students will also have the opportunity to explore psychological approaches used with specialist populations such as young people and adolescents.

IPAS 602. Public Health Issues and Approaches to Addictions. 4 Hours.
11-week online course; 4 credits. Open only to students in the International Program in Addiction Studies (Master of Science in Addiction Studies), graduate certificate program in addiction studies or with permission of the IPAS program director. Provides an introduction to basic concepts and research methods in public health and epidemiology as they relate to the study of addictions, as well as an in-depth consideration of the personal, social, economic and cultural burdens/costs associated with drug and alcohol abuse and dependence. Individual and community-based risk and protective factors related to addictions, as well as primary and secondary prevention efforts aimed at reducing the addictions-related public health burden, also are a focus. An online lecture format featuring presentations by leading researchers and policy-makers in the field of addictions will be used, along with readings, online discussions and writing assignments, to (1) gain a greater understanding of the enormous costs of addictions at every level of society and (2) introduce students to some of the current thinking and programs related to the primary and secondary prevention of addictions.

IPAS 603. Addiction Policy. 4 Hours.
11-week online course; 4 credits. Open only to students in the International Program in Addiction Studies (Master of Science in Addiction Studies), graduate certificate program in addiction studies or with permission of the IPAS program director. Designed to provide students of differing backgrounds an understanding of the process by which international addiction health policy is formed and reformed around the use and misuse of both licit and illicit drugs. The course will look at the epidemiology of addiction around the world and the relationship between the burden of addiction and the corresponding effects of national and international drug policies.

IPAS 604. Treatment of Addiction: Pharmacotherapies. 4 Hours.
11-week online course; 4 credits. Open only to students in the International Program in Addiction Studies (Master of Science in Addiction Studies), graduate certificate program in addiction studies or with permission of the IPAS program director. Designed to provide an overview of the pharmacological management of alcohol and drug addiction. Covers the management of withdrawal from alcohol, sedatives, opioids, cannabis and stimulants, as well as long-term management of dependence on opioids, tobacco and alcohol. Additional topics include international perspectives on management of dependence, management of dependence during pregnancy and the process of medication development.

IPAS 605. Treatment of Addiction: Critical Issues. 4 Hours.
11-week online course; 4 credits. Open only to students in the International Program in Addiction Studies (Master of Science in Addiction Studies), graduate certificate program in addiction studies or with permission of the IPAS program director. Designed to enable students to gain advanced understanding of the critical issues involved in the identification, recruitment, assessment, diagnosis and classification of individuals who misuse substances. Local, national and international barriers to treatment (stigma, culture, religion, politics, legal issues, civil commitment, cost, attitudes and beliefs) will be considered. Students will explore and critically examine treatment options in special settings (for instance, prisons, criminal justice and employment) and in special populations (for instance, addicted health care professionals, co-morbid patients, pregnancy).

IPAS 606. Research Methodology in Addictions. 6 Hours.
11-week online course; 6 credits. Open only to students in the International Program in Addiction Studies (Master of Science in Addiction Studies). Designed to enable students to develop knowledge and understanding of the different methodological processes underpinning research in the addictions. The research principles involved in hypothesis testing and estimation procedures will be covered as well as the generic skills necessary to analyze data and interpret statistical findings. Basic epidemiological study designs, policy analysis and inferential statistical methods pertinent to the addictions field will be explored.

IPAS 692. Research Project in Addictions. 6 Hours.
12-week intensive online course; 6 lecture hours. 6 credits. Open only to students in the International Program in Addiction Studies (Master of Science in Addiction Studies). Students will be required to complete a research project under the supervision of IPAS faculty. The submitted written text will be a minimum of 10,000 words in length and must demonstrate a critical knowledge of the chosen topic area. The ability to apply scientific scrutiny to a topic related to aspects of drug and alcohol etiology, treatment, prevention, public health or policy as identified by the program team will be required. The research project may involve original data collection, secondary analysis of previously collected data sets or other quantitative or qualitative research methods. The necessary defining feature is that the research project should demonstrate an appropriate level of academic rigor and understanding of the scientific implications of the findings of the project. Students will need to demonstrate competence in the integration and analysis of data to further the translation of this knowledge into more effective policies and practices, in keeping with the stated aims of the program. Graded S/U/F.

INTERNATIONAL STUDIES (INTL)

INTL 101. Human Societies and Globalization. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An interdisciplinary inquiry into how societies around the world are organized and how they are interrelated on social, economic, political and cultural dimensions. The course is organized around themes that are important to prominent globalization processes -- topics such as human rights, global inequalities, cultural globalization, global crime, globalization and religion, the global mass media, and environmental issues. Students also explore the implications of rapid social change for international issues and interpersonal interaction.

INTL 102. Introduction to Political Economy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Seminar on the development of critical thought and economic analysis of policy issues. Focus is on how policy choices affect society and the individual, the economic methodology that guides policy choices, and the institutional and political environments within which policy is derived. Issues cover a broad range of topics including environmental issues, tax policy, inflation expectations, unemployment, foreign trade and the effectiveness of fiscal and monetary policies. Crosslisted as: ECON 101.

INTL 103. Introduction to Anthropology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A general survey of anthropology with emphasis on learning about and from global cultures, and on the four fields of anthropology. Crosslisted as: ANTH 103.

INTL 104. Introduction to Archaeology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of archaeological sites, methods and theories from around the world, from the earliest human cultures, to the rise and spread of civilizations, to the modern era. Crosslisted as: ANTH 105.

INTL 105. International Relations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introductory analysis of interstate relations and world affairs. Attention focuses on theories of international politics, military capabilities and their application, international organizations, global economic trends, domestic sources of state behavior and other selected issues as appropriate. Crosslisted as: POLI 105.

INTL 151. Global Communications. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Explores how communication media and globalization drive each other and how they both impact the nation-state as well as international institutions. Examines how technology, the global economy and international media corporations influence culture, politics, business, law and other institutions in countries around the world. Explores the relationship between media systems and governments and how both are affected by technology and globalization. Crosslisted as: MASC 151.

INTL 200. Introduction to African Societies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course introduces the student to the African continent, its peoples and cultures. It covers such general characteristics as the physical and geographical features, climate, topography, traditional economies, languages, religions, social systems and other cultural features that are traditional to its people. Crosslisted as: AFAM 200/ANTH 200.

INTL 201. Introduction to the Middle East and North Africa. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An interdisciplinary introduction to the region of the Middle East and North Africa, its peoples and cultures. Covers the geography, climate, economy, language, religious and social systems, as well as other social systems and cultural features that are traditional to the peoples of the region.

INTL 202. Indentities in a Global Community. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introduction to intercultural communication. Designed to help students develop an understanding of cultures, to appreciate the opportunities and challenges that each culture presents to people and to learn how individuals have dealt with those opportunities and challenges.

INTL 203. Cultural Texts and Contexts: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Through the analysis and interpretation of literary, cinematic and other cultural texts, this course explores the ways cultural and national identities have been shaped, imagined and contested in various regions of the world. While responding to the readings and films as artistic manifestations or social documents, students will also become familiar with the aesthetic, political and social contexts in which the works were and are produced. See the Schedule of Classes for specific topics to be offered each semester. Crosslisted as: WRLD 203.

INTL 204. Language and Groups in the United States. 3,4 Hours.
Semester course; 3-4 lecture hours. 3-4 credits. Taught in English. This course introduces students to the sociocultural experience and formation of identity of non-English-speaking peoples in the United States. Students explore the dynamic between English and a specific heritage language and its interaction with artistic, cultural and social issues through fiction and nonfiction texts, films and multimedia pertaining to specific language groups, such as: Latinos, Italian-Americans, German-Americans or Native Americans. See the Schedule of Classes for specific topics to be offered each semester. Crosslisted as: FRLG 204.

INTL 211. Contemporary World Literature. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 112 or both ENGL 295 and HONR 200. A study of selected literature published in the past 25 years and chosen from a number of different nations and cultures. Crosslisted as: ENGL 211.

INTL 303. World Regions. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An examination of the various regions of the earth, including land forms, climate, resources, peoples, agriculture and urban conditions. Regions to be selected each semester from Anglo-America, Latin America, western Europe, Eastern Europe, the former USSR, Middle East and North Africa, Africa (south of the Sahara), Indian subcontinent, China, Japan, Southeast Asia, and Oceania. May be taken only once for credit. Crosslisted as: URSP 303.

INTL 306. Introduction to Judaism. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A general survey of the dynamics and characteristic patterns of Jewish civilization encompassing history, practices and beliefs. Crosslisted as: RELS 306.

INTL 307. Black Religion. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An analysis of the role of religion in the lives of blacks with an emphasis on African religions and philosophies, the black church in America, and the roles of the various faiths, sects and cults. Crosslisted as: AFAM 307/RELS 307.

INTL 309. Global Women's Health. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Explores issues in women's health from a national and international perspective with an emphasis on the experiences of women in the African diaspora. Theories in medical anthropology are employed to examine key themes. Crosslisted as: AFAM 309/ANTH 309/GSWS 309.

INTL 311. Religions of the World. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An investigation of the historical, cultural and theological foundations and development of major world religions including Hinduism, Buddhism, Confucianism, Taoism and Shinto. Crosslisted as: RELS 311.

INTL 312. Religions of the World. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An investigation of the historical, cultural and theological foundations and development of major world religions including Zoroastrianism, Judaism, Christianity and Islam. Crosslisted as: RELS 312.

INTL 314. Man and Environment. 3 Hours.
Semester course. 3 lecture hours. 3 credits. A comparative study of the ecology and natural history of human populations, including the environments as determining factors in the evolution of human institutions and technology, resources management, and population crises; cultural traditions as mechanisms of population control; basic theory of population biology. Crosslisted as: ENVS 314.

INTL 315. Economic Development. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ECON 203 with a minimum grade of B and ECON 211; or ECON 210 and ECON 211. An introduction to the process of economic development. Surveys development theory and experiences of underdeveloped countries of Africa, Asia, Latin America and the Caribbean and of developed countries. Explores obstacles to development and policies and tools for stimulating economic development. Crosslisted as: AFAM 315/ECON 315.

INTL 317. Islam. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the emergence of Islam in Arabia in the seventh century and its subsequent developments, including a look at the Qur'an (the holy book), the Prophetic traditions, the concept of God, and mysticism (sufism) and law (shari'ah) and an overview of ritual practices, fundamental beliefs, theological principles and current issues in Islam and international relationship. Crosslisted as: RELS 317.

INTL 320. International Marketing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MKTG 301. This course is restricted to students who have completed at least 54 credit hours (junior standing). Designed to help students develop an understanding of international marketing policies and the differences among foreign marketing environments. Students compare and contrast domestic and international marketing and examine recent changes in the international marketing environment. Crosslisted as: MKTG 320.

INTL 327. Introduction to Intercultural Communication. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introduction to the basic concepts, principles and skills for improving verbal and nonverbal communication with persons from different cultures. Using a cultural general approach, topics discussed include the concept of culture, barriers to intercultural communication, verbal communication process and nonverbal communication aspects. Appropriate for business and non-business majors. Crosslisted as: MGMT 329.

INTL 328. Russian Society in Transition. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 101 or permission of the instructor. An analysis of Russian culture and social institutions as they are today and in historical perspective. Throughout the course interrelationships among politics, the economy and social life are examined, with particular emphasis on the ideological implications of Russian/Soviet architecture, art and mass media; on environmental issues and health; on social problems and the legal systems; and on gender, the work world and family interaction.

INTL 329. International Economics. 3 Hours.
3 lecture hours. 3 credits. Prerequisites: ECON 203 with a minimum grade of B and ECON 211; or ECON 210 and ECON 211. An analysis of economic and political influences on exports and imports, balance of payments, foreign investment, exchange rates and international monetary systems. Crosslisted as: ECON 329.

INTL 330. Global Societies: Trends and Issues. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: INTL/POLI 105 or POLI 201 or SOCY 101. An analysis of factors that are promoting the globalization of social, economic and political relations, and an inquiry into implications of these developments for individuals, localities, nations and the world community. The course will highlight the impact of culture and ethnicity, historical and emerging patterns of international business activity and their societal significance, divergent strategies for economic and social development in the world's regions, and the effects of population growth and environmental problems on public life within and among nations. Crosslisted as: SOCY 330.

INTL 331. Survey of Latin American Literature. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SPAN 300; SPAN 305 or 307 or 311; corequisite: SPAN 301. Conducted in Spanish. An introduction to major authors and trends up to the present. Crosslisted as: SPAN 331.

INTL 333. Geography of Africa. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the land forms, climate, peoples, livelihoods, settlement patterns and cultural groupings of sub-Saharan Africa. Crosslisted as: AFAM 333/URSP 333.

INTL 334. Regional Geography of ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the land forms, climate, resources, peoples, agricultural and urban conditions in a specific region such as North America, Europe, Latin America, the Middle East and India, the USSR and Eastern Europe. See the Schedule of Classes for specific region to be studied each semester. Crosslisted as: URSP 334.

INTL 340. World Cities Outside of North America. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An examination of urban habitats in a variety of geographical regions with emphasis on their differences and their common experiences. Crosslisted as: URSP 340.

INTL 341. Global Ethics and the World's Religions. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A critical survey of ethical concepts and issues in the thought and practice of major religious traditions. Comparison of ethical perspectives on selected themes and attention to cooperative efforts toward a global ethic. Crosslisted as: RELS 340.

INTL 345. Great Cities of the World. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated under different topics for a total of 6 credits. Enrollment restricted to students with sophomore standing or with permission of instructor. An interdisciplinary course with a focus on the origin, expansion and significance of one or more cities, the specifics of its/their culture and the role of language. Particular emphasis will be placed on relating the physical, social and economic aspects of the city's growth and development to the cultural expression of urbanism. Crosslisted as: FRLG 345/URSP 350.

INTL 348. South American Ethnography. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ANTH/INTL 103 and UNIV 200 or HONR 200 with a minimum grade of C. General ethnographic survey of both highland and lowland indigenous cultures of South America and cultural changes as a result of European contact. Crosslisted as: ANTH 348.

INTL 349. Rethinking a Continent: Latin America. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ANTH/INTL 103 and UNIV 200 or HONR 200 with a minimum grade of C. This course surveys contemporary cultures of Latin America. It addresses historical sociocultural developments from an anthropological perspective and introduces concepts from social justice studies, development anthropology and applied anthropology. Crosslisted as: ANTH 349.

INTL 350. Rethinking a Continent: Europe. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ANTH/INTL 103 and UNIV 200 or HONR 200 with a minimum grade of C. A survey of historical sociocultural developments from an anthropological perspective with an emphasis on integrative and disintegrative forces that have shaped cultures and identities in Europe. Introduces concepts from sociocultural anthropology, social justice studies and applied anthropology. Crosslisted as: ANTH 350.

INTL 351. Governments and Politics of the Middle East. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A comparative analysis of political systems in the Middle East including the study of contemporary aspects of traditionalism, the political nature of transition, the instruments of political modernization, and evolution and revolution in the political process of Middle Eastern states. The course will explore the primary bases of cleavage and conflict and the principal forces that shape the policies and political dynamics of the region. Crosslisted as: POLI 351.

INTL 352. European Governments and Politics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A comparative study of the political systems of selected western and eastern European countries. Crosslisted as: POLI 352.

INTL 353. Latin American Governments and Politics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of politics characteristic of Latin American systems, including democratic reformism, military authoritarianism and revolutionary socialism. The course also examines the contemporary problems of fledgling democracies as they cope with economic and debt crises and various opposition challenges. Crosslisted as: POLI 353.

INTL 354. Russian and Post-Soviet Politics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the origins, institutions, processes and disintegration of the Soviet political system and the ongoing reform efforts during the post-Soviet period. Special emphasis is placed on the politics of the transition to a democratic political system and a market economy. Other topics include nationality issues, social problems and foreign policy. Crosslisted as: POLI 354.

INTL 355. Asian Governments and Politics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A comparative analysis of the politics and governments of major Asian states, with a focus on Japan, China and India. Crosslisted as: POLI 355.

INTL 356. Government and Politics of Africa. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course will introduce students to the basic outlines of government and politics in Africa. The course will consider such topics as colonialism, elitism, and nationalism and modernization strategies. Using the comparative approach, the course will primarily focus on West, East and Central Africa. Crosslisted as: POLI 356/AFAM 356.

INTL 357. Politics of Southern Africa. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An examination of racial and political developments in the southern tip of Africa. While South Africa will be the primary focus of analysis, other countries in the region such as Zimbabwe, Angola and Mozambique will be studied. Crosslisted as: POLI 357/AFAM 357.

INTL 358. Concepts of Comparative Government. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Comparative study of politics and governments. Introduces concepts and theories used in the study of political systems. Topics include democratization and democratic governance, the role of the state, one-party and military regimes, revolution, and economic and political development. Crosslisted as: POLI 358.

INTL 360. World Classics of Spirituality. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A critical reading of selected works from among the spiritual classics of Judaism, Christianity, Islam, Hinduism, Taoism and other religious traditions. Crosslisted as: RELS 350.

INTL 361. Issues in World Politics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An exploration of several significant issues in world politics. Topics may include peacekeeping and collective security, international economic competitiveness, global environmental politics as well as selected others. Topics will vary with current events and trends in the international arena. Crosslisted as: POLI 361.

INTL 362. International Organizations and Institutions. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the background development structure and operations of organizations and institutions such as the United Nations, the European Community and the Organization of American States. Crosslisted as: POLI 362.

INTL 363. U.S. Foreign Policy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An analytical survey of processes and practices in the formulation of U.S. foreign policy, including an introduction to the goals, problems of implementation and current challenges faced by policy makers. Crosslisted as: POLI 363.

INTL 364. Vietnam. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An analysis of the complete record of the conflict in Vietnam. The primary focus will be on the period of U.S. involvement. The course will examine closely how and why the U.S. became involved in Vietnam and what impact the Vietnam War has had on political institutions and behavior. In particular, the course will examine what impact the period of U.S. involvement has had upon U.S. foreign policy. The course also will consider additional topics including public opinion and the war, the relationship between the president and Congress in light of the war, and contemporary U.S. politics as a backlash against the political movements of the 1960s. Crosslisted as: POLI 364.

INTL 365. International Political Economy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of both theoretical and current policy issues in international political economy. Theories to be covered include liberalism, mercantilism, Marxism, regionalism, world systems theory and others. Policy issues include differing styles of capitalism in the industrialized world, the political economy of development, the politics of international corporate alliances and others. Crosslisted as: POLI 365.

INTL 366. African Literature. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. A survey of the literature of Africa with particular emphases on fiction and on West Africa. Some attention also will be given to orature. Crosslisted as: AFAM 363/ENGL 363.

INTL 367. Caribbean Literature. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. A survey of West Indian writings. Attention will be given to African, European and Amerindian influences, as well as to the emergence of a West Indian literary tradition. Crosslisted as: AFAM 365/ENGL 365.

INTL 368. Women and Global Politics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of women and global politics, providing both a feminist re-examination of traditional international-relations theories and a comparative analysis of the political, legal and economic status of the world's women. The impact of women on global political institutions such as the United Nations will be addressed as well as other feminist and grass roots means of taking political action. Crosslisted as: GSWS 366/POLI 366.

INTL 370. Studies in the Music of the African Continent and Diaspora. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 6 credits. Prerequisite: MHIS 243 or MHIS/AFAM 250. An in-depth examination of selected topics and issues in African-derived musical and cultural traditions. See the Schedule of Classes for specific topics to be offered each semester. Crosslisted as: AFAM 350/MHIS 350.

INTL 372. Global Women's Spirituality. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Explores the spiritual writings of women in various cultures and religious traditions. Crosslisted as: GSWS 372/RELS 372.

INTL 381. Modern Identities: Nation Building. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Critically explores how nation building and national identities have developed over the past two centuries among peoples across the globe. Class discussions will examine theoretical perceptions of these processes and focus on how they shaped and shape realities in different times and places. Crosslisted as: ANTH 381.

INTL 390. Historic and Ethnic Textiles. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FASH 290 or IDES 446 or permission of instructor. An examination of the history of textile design and production around the world. Crosslisted as: FASH 390.

INTL 391. Topics in Foreign Literature in English Translation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with different topics for a maximum of 12 credits. An in-depth study of selected topics in foreign literature. This course will not satisfy foreign language requirements. No knowledge of a foreign language is required. All work is done in English. Crosslisted as: FLET 391.

INTL 398. Directed Study Abroad. 8 Hours.
Semester course; variable hours. 0-8 credits per semester. May be repeated for a maximum of 8 credits with approval of student's major department. Permission of academic adviser required. A course involving travel and/or residence in a foreign country as features of the student's work on a pre-arranged project. Intended primarily for students participating in student exchange programs.

INTL 409. Modern Islamic Thought and Global Trends. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: INTL/RELS 312 or INTL/RELS 317; UNIV 200 or HONR 200. Introduces students to the integral relationship of Islam to major events of global concern and contextualizes these events into the wider modern and postmodern developments of Islamic thought and its intellectual and ideological self-interrogation. This course will provide students with the opportunity to study both the background of modern Islamic thought and selected contemporary events. Crosslisted as: RELS 409.

INTL 410. The Chinese Tradition in Philosophy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the development of Confucianism, of alternative ways of thought prior to the fall of the Han Dynasty and of neo-Confucianism. The systems of thought are examined in the light of their social, political and religious impact on China, Korea and Japan. Crosslisted as: PHIL 410/RELS 410.

INTL 412. Zen Buddhism. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 200 or HONR 200. A study of Zen Buddhism, including backgrounds in Indian philosophy and practice, development in China and Korea, and present-day Zen theory and practice in Japan and in Western countries. Crosslisted as: PHIL 412/RELS 412.

INTL 413. Comparative Financial Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FIRE 311. This course is restricted to students who have completed at least 54 credit hours (junior standing). An analysis of the structure and functioning of financial systems in different parts of the world. Emphasis is on the evolution of such systems in relation to the U.S. financial system. Different regions of the world may be studied in different semesters. Crosslisted as: FIRE 413.

INTL 415. Economic Anthropology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides an overview of the anthropological approach to the "economic" in social life. Analyzes the role played by systems of reciprocity and exchange in ethnographic contexts. Concepts employed by anthropologists in the study of traditional subsistence economies are used to examine modern industrialized societies. Crosslisted as: ANTH 415.

INTL 416. International Financial Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FIRE 311. This course is restricted to students who have completed at least 54 credit hours (junior standing). Financial management of business in an international environment. Emphasis on tools and techniques to prepare financial managers of multinational firms to effectively respond to the challenges of the international environment. Crosslisted as: FIRE 316.

INTL 418. International Management. 3 Hours.
3 lecture hours. 3 credits. Prerequisite: junior standing. The study of the environment of international business, ethics and social responsibility in international settings, culture and its effect on behavior and management practice, and the strategies and management practices of firms engaged in international activities. Aims to provide students with the knowledge, skills and sensitivities needed to be effective managers in the international business environment. Crosslisted as: MGMT 418.

INTL 419. Doing Business in Europe. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: junior standing and permission of instructor. Designed primarily as a core integrative course for students enrolled in the Certificate in International Management Studies, but other students are welcome. The course has three goals: a) integration of foreign languages, European studies and international management; b) infusion of other business areas relevant to doing business in Europe (such as international marketing, finance law and economics); and c) the development of cultural sensitivity and social responsibility. The course will be organized as a series of seminars with faculty and other speakers from the above disciplines. Crosslisted as: MGMT 419.

INTL 420. Women of Africa. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ANTH/INTL 103 or AFAM 103. This course looks at the traditional roles of women in African societies and examines how women have coped in different environments. It focuses on the institutionalized aspects of similarities and differences in women's lives in pastoral and horticultural societies and those with mixed economies, and will contrast these with women's roles in large state societies of Africa and in the modern urbanized context. Crosslisted as: AFAM 420/ANTH 420.

INTL 421. Civilization of Latin America II. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Course can be repeated with different topics up to a total of 6 credits. Prerequisites: completion of 9 credits of Spanish at the 300 level including SPAN 300 or 301. This course explores the cultural diversity of Latin America and the social and political forces behind cultural change. Topics will focus on a specific interdisciplinary theme, such as urban life, the politics of identity and on a specific area of Latin America. See the Schedule of Classes for the specific topic to be offered each semester. Crosslisted as: SPAN 421.

INTL 425. Religion, Magic and Witchcraft. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ANTH/INTL 103 and UNIV 200 or HONR 200 with a minimum grade of C. A survey of the nature and variety of beliefs outside of the major streams of religious thought. Among topics considered are myth, totemism, taboo and sorcery. Emphasis on understanding supernatural beliefs and practices in relation to culture and society. Crosslisted as: RELS 425/ANTH 425.

INTL 441. Islamic Mysticism: the Sufis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: INTL/RELS 312 or INTL/RELS 317; UNIV 200 or HONR 200. Introduces students to the major Sufi masters and their works. It covers ideological and practical development of Islamic mysticism as compared to the developments within Islam itself. Crosslisted as: RELS 441.

INTL 446. International Human Resource Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 331, INTL/MGMT 418 or ECON/INTL 329. Covers the application of human resource management activities in an international context. Highlights similarities and differences with domestic methods; current practices in the selection, development, compensation and maintenance of parent-country, host-country and third-country nationals; and the impact of regulatory and cultural differences between countries. Crosslisted as: MGMT 446.

INTL 448. Digital Marketing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MKTG 301 and MKTG 330. This course is restricted to students who have completed at least 54 credit hours (junior standing). Examines Internet marketing as a necessary ingredient to successful worldwide marketing strategy. Students analyze markets using Web-based techniques for market evaluation, competitive analysis, market comparison and selection. Discussion includes comparison of e-business versus traditional business perspectives on marketing strategies and tactics. Crosslisted as: MKTG 448.

INTL 449. Religion, Globalization and Social Justice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: RELS 340/INTL 341, WLRD 210 or WRLD 220; UNIV 200 or HONR 200. Explores the role religions are playing in the work of building a socially just and environmentally sustainable world community. Crosslisted as: RELS 450.

INTL 450. Francophone Literatures and Cultures. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Course can be repeated with different topics up to a total of 6 credits. Prerequisite: FREN 301; FREN 305 or 307; FREN 320 or 321 or 330 or 331. Conducted in French. Introduces students to the literatures and cultures of the Francophone world. Provides an overview of the Francophone world and an in-depth study of literary works written in French from Africa, the Caribbean, North America, Asia and Europe. Also explores the impact of Colonial history on Francophone literatures and cultures. See the Schedule of Classes for the specific topic to be offered each semester. Crosslisted as: FREN 450.

INTL 451. Religion, Racism and Social Justice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: RELS 340/INTL 341, WLRD 210 or WRLD 220; UNIV 200 or HONR 200. Explores the complex history and contemporary relationships between religion, racism and social justice. Crosslisted as: RELS 451/AFAM 451.

INTL 452. The Politics of Developing Areas. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Analysis of the processes of political and economic development. Includes a study of various challenges facing developing countries, such as economic inequalities, environmental degradation, mass political participation, military coups, revolution and civil war. Crosslisted as: POLI 359.

INTL 453. Western Religions, Women and Social Justice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: UNIV 200 or HONR 200; and RELS 108, GSWS 201 or WRLD 210. Explores the experience and portrayal of women in the three Abrahamic traditions: Judaism, Islam and Christianity. Study focuses on how these religions and their texts bear upon the social, economic, political and spiritual lives of women. Special attention is given to the impact of globalization and religious fundamentalism on women. Crosslisted as: RELS 453/GSWS 453.

INTL 454. Cross-cultural Communication. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. A study of the dynamics of cross-cultural communication that applies linguistic tools to understanding cultural issues and solving communication problems. Crosslisted as: ENGL 454/ANTH 450.

INTL 455. Anthropology of Development and Globalization. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: INTL 101. May be taken for a maximum of nine credit hours in three different world areas. Consists of a global study of the developing Third World with particular emphasis on rural populations, subsistence farmers, indigenous groups and small entrepreneurs. Focuses on development and globalization while providing insights into the peasantry as a class, women in peasant societies, changes in peasant societies and the peasantry as a player in the policies of the modern state. Crosslisted as: ANTH 455.

INTL 456. Catholic Ethics and Social Justice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: RELS 280 or 380, or RELS/INTL 312, or RELS 340/INTL 341; UNIV 200 or HONR 200. An exploration of the Catholic church's major theological, ethical, constitutional and strategic concerns, and an analysis of Catholic social teaching and its relation to current social issues such as abortion, peace and conflict, poverty, and human rights. Crosslisted as: RELS 455.

INTL 457. Comparative Perspectives on Cultures and Societies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ANTH/INTL 103; UNIV 200 or HONR 200. Examination of the theoretical, methodological and ethical problems that arise from anthropological comparisons of cultures. Crosslisted as: ANTH 457.

INTL 468. Comparative National Security Policy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of national security policies and policy-making in a diverse set of nation-states. Emphasis is placed on comparing how threat perception, historical context, ideology, political structure and leadership impact national security policies of both powerful and weak nation-states. Crosslisted as: POLI 368.

INTL 480. China in Transition. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Traces how China is making the transition from a planned to market economy, and what implications this transition has on the political, social and urban landscape. Class discussions are grounded on a basic understanding of China's modern history and regional geography. Crosslisted as: POLI 360.

INTL 490. Seminar in International Issues. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Course can be repeated with different topics up to a total of 6 credits. Prerequisite: senior standing in international studies major with a minimum of 85 credits earned toward the degree. An individualized research project focusing on international issues and undertaken in a seminar setting.

INTL 491. Topics in International Studies. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Course can be repeated with different topics up to a total of 6 credits. An in-depth study of a particular topic in international studies. See the Schedule of Classes for specific topics to be offered each semester.

INTL 492. Independent Study. 1-3 Hours.
Semester course; variable hours. 1-3 credits. Maximum total of 4 credits in all independent study courses. Generally open to students of junior and senior standing who have acquired at least 12 credits in international studies courses. Determination of amount of credit and permission of instructor and director must be obtained before registration of the course.

INTL 493. International Studies Internship. 1-6 Hours.
Semester course; 50 clock hours in a local, national or international internship placement per credit. Variable credit. 1-6 credits with a maximum of 6 credits. Prerequisites: junior or senior standing, and approval of selection committee or program director. The internship is designed to present opportunities for qualified students to acquire exposure to internationally oriented public and private organizations and agencies. The course includes a rigorous evaluation of the internship experience based on learning objectives stipulated in a contract between the student, faculty adviser and a field supervisor.

INTL 499. Senior Seminar. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisites: completion of 18 INTL credits at the 300- or 400-level; senior standing. Pre- or corequisite: INTL 490, 492, or 493. Focuses on self-assessment, compilation of a portfolio and curriculum vitae, career and graduate school preparation and on the lifelong application of skills and knowledge acquired in the program. Students will critically assess their experience in the international and area studies program.

INTL 500. Globalization and Transformation: Concepts and Realities. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines how globalization significantly affects cultural processes at both local and national levels. Transformations of cultural understandings and practices under such circumstances will be explored. Virtual course components will bring causes, processes and consequences of the transformations of Western, Eastern and developing countries into focus. Crosslisted as: SOCY 515.

INTL 514. International Perspectives on Community Health in Developing Countries. 3 Hours.
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 undergraduate (junior or senior level) and graduate students. Explores 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. Crosslisted as: NURS 514.

INTL 591. Topics in International Studies. 1-3 Hours.
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.

INTERPROFESSIONAL EDUCATION AND COLLABORATIVE CARE (IPEC)

IPEC 501. Foundations of Interprofessional Practice. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Open to students enrolled in a professional health science degree program. An introductory study of the concept of interprofessional collaborative practice, this course includes units on health care systems, teams and teamwork, and professional roles and responsibilities. Students actively work within interprofessional student teams to apply course content during specific learning activities that build a foundation of the knowledge, skills and attitudes necessary for effective interprofessional practice in contemporary health care.

IPEC 502. Interprofessional Quality Improvement and Patient Safety. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: IPEC 501. Course restricted to students enrolled in the schools of Medicine, Nursing and Pharmacy. A study of interprofessional quality improvement and patient safety, this course includes units on quality in the workplace, error in the health care system and improving health care. Students actively work within interprofessional student teams to apply course content to specific learning activities for interprofessional quality improvement and patient safety practice.

IPEC 510. Interprofessional Communication and the Care Coordinator I. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Enrollment requires acceptance into the Care Coordination Certificate program. Defines the various roles of the care coordinator. Identifies all health care providers on the interprofessional team and what their responsibilities are to patient and family care. Focuses on development of effective interprofessional communication and leadership strategies by introducing concepts of teamwork. Explores strategies for conflict negotiation and patient engagement. Facilitates the sharing of individual perspectives and patient care experiences.

IPEC 511. U.S. Health Care and Care Coordination. 2 Hours.
Semester course; 2 lecture hours, delivered online. 2 credits. Enrollment requires acceptance into the Care Coordination Certificate program. Explores the overall infrastructure of the health care system and care delivery models. Introduces concepts of regulation. Examines how the effect of different settings and levels of care impact care transitions. Explores effective use of the electronic health record. Identifies the patient-centered care model as integral to improving outcomes. Describes the best ways to share information across health care settings during care transitions.

IPEC 512. Health Care Payment Models and Care Coordination. 3 Hours.
Semester course; 3 lecture hours, delivered online. 3 credits. Prerequisite: IPEC 511. Examines aspects of health care financing that affect the type of services the care coordinator can provide. Provides an overview of key points related to insurance coverage, including managed care, Medicare and Medicaid. Reinforces the utilization review process and compliance. Discusses an overview of current U.S. health policy with a special focus on vulnerable patients and the importance of population health management.

IPEC 513. Ethical and Legal Considerations in Care Coordination. 2 Hours.
Semester course; 2 lecture hours, delivered online. 2 credits. Prerequisite: IPEC 512; corequisite: IPEC 515. Focuses on applying ethical decision-making frameworks to analyze ethical dilemmas that occur with patient care and between members of the interprofessional team. Examines care coordinator role conflict between patient advocacy versus health system advocacy. Provides a framework for identifying potential liabilities while working in the care coordinator role. Examines issues surrounding access to care and social justice. Explores legal responsibilities of the care coordinator.

IPEC 514. Hospital-based Care Coordination. 3 Hours.
Semester course; 3 lecture hours, delivered online. 3 credits. Prerequisite: IPEC 513. Explores care coordination in the hospital setting with a focus on discharge planning, medication reconciliation and effective care transitions out of the hospital. Addresses how to identify those patients who have high risk for excess utilization of hospital resources due to limited financial means, lack of insurance, chronic illness, and/or catastrophic injury. Addresses national recommendations for effective care coordination strategies to improve patient outcomes.

IPEC 515. Interprofessional Communication and the Care Coordinator II. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: IPEC 510. Reinforces roles and responsibilities of health care providers on the interprofessional team during care coordination and prepares students to assume a professional role. Applies effective interprofessional communication and leadership strategies by reinforcing concepts of teamwork. Explores strategies for conflict negotiation and patient engagement. Facilitates the sharing of individual perspectives and patient care experiences.

IPEC 516. Community-based Care Coordination. 3 Hours.
Semester course; 3 lecture hours, delivered online. 3 credits. Prerequisites: IPEC 514 and IPEC 515. Emphasizes the value of maintaining a primary care provider and connecting the patient with appropriate community resources. Emphasis will be on the patient-centered medical home model of health care delivery, which provides an environment conducive to direct coordination of a patient's primary care with a special focus on effective care transitions. Discusses concepts of advanced care planning, medication management and patient engagement from the outpatient perspective. Identifies how to differentiate high-risk patient populations and provide effective transitions of care within community settings. Introduces concepts of population health and the role of the family in care of the patient.

IPEC 525. Mindfulness Practices for Health Care Professionals: Clinical Applications. 1 Hour.
Semester course; 16 hours (lecture/seminar). 1 credit. Open to health care professional students in good standing (e.g. students in the schools of Dentistry, Nursing, Medicine, Pharmacy, Allied Health Professions or Social Work or in the programs of dental hygiene or clinical psychology). This course will allow a qualified health care professional student the opportunity to participate in a variety of mindfulness practices and learn their applications to clinical practice.

IPEC 528. Global Health. 1 Hour.
Semester course; 1 lecture hour. 1 credit. This course is designed for professional students in medicine, pharmacy and physical therapy traveling to the Dominican Republic, Honduras or Peru with the Humanitarian Outreach Medical Brigade Relief Effort. With a focus on clinical and research endeavors in Central and South American countries, this course provides a foundation in interprofessional teamwork and international health care for health professions students. Themes of cultural competency, determinants of health, clinical skills and ethical issues are interwoven throughout the course. Graded as Pass/Fail.

IPEC 561. IPE Virtual Geriatric Case. 2 Hours.
Semester course; 2 lecture hours, delivered online. 2 credits. Using a web-based interface, health professional students from multiple disciplines will collaborate to identify health care needs and plan care for an older adult patient. Contemporary theoretical concepts and evidence-based recommendations are integrated within a complex, unfolding case that crosses all settings and services of care: ambulatory, inpatient, post-acute, community-based and palliative/end-of-life. Patient- and family-centered care concepts are also emphasized throughout each module. Students who participate in this preceptor-supervised virtual case will make decisions based on their discipline-specific geriatric-gerontological competencies, reinforce understandings about the scope of practice for other health professions and expand working capacity for interprofessionalism and team-based care. Graded Pass/Fail.

IPEC 562. IPE Quality Improvement Project Practicum. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: IPEC 502 or HADM 609 or approval by course director. Enrollment restricted to students in the schools of Allied Health Professions, Medicine, Nursing and Pharmacy. This capstone course will provide interprofessional teams of students the opportunity to apply quality improvement processes and patient safety theories, models, methods, and tools in a health care setting to execute a quality improvement project in an organizational setting. Graded as Pass/Fail.

ITALIAN (ITAL)

ITAL 101. Elementary Italian. 4 Hours.
Continuous courses; 5 lecture/recitation hours. 4-4 credits. Prerequisite: completion of ITAL 101 to enroll in ITAL 102. Elementary grammar, reading and oral drill.

ITAL 102. Elementary Italian. 4 Hours.
Continuous courses; 5 lecture/recitation hours. 4-4 credits. Prerequisite: completion of ITAL 101 to enroll in ITAL 102. Elementary grammar, reading and oral drill.

ITAL 201. Intermediate Italian. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ITAL 102. Continuation of the essentials of grammar with emphasis on achieving proficiency in aural comprehension, speaking, reading and writing skills.

ITAL 202. Intermediate Italian Readings. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ITAL 201. Designed to increase the student's proficiency in Italian through the study of selected cultural and literary texts.

ITAL 205. Intermediate Conversation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ITAL 201. Designed to increase the student's proficiency in the spoken language through audio-oral exercises, dialogues and free conversation.

ITAL 300. Advanced Composition and Conversation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ITAL 202 or 205. Development of advanced written and oral skills through both systematic review of Italian grammar with emphasis on the elements of style and vocabulary building, and conversational activities based on a variety of situations. Conducted in Italian.

ITAL 320. Italian Cinema: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with different topics for maximum of 6 credits. Prerequisite: ITAL 300. Conducted in Italian. Traces Italian cinema from Neorealism to contemporary cinema, exploring genres such as comedy and Westerns as well as landmark works by the most important directors. See the Schedule of Classes for specific topic to be offered each semester.

ITAL 330. Themes in Italian Literature: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with different topics for maximum of 6 credits. Prerequisite: ITAL 300. Conducted in Italian. An in-depth study of selected topics in Italian texts. See the Schedule of Classes for specific topic to be offered each semester.

ITAL 391. Topics in Italian. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May be repeated with different topics for a maximum of 6 credits. Pre- or corequisite: ITAL 320 or ITAL 330. Conducted in Italian. An in-depth study of selected topics in Italian. See the Schedule of Classes for specific topics to be offered each semester.

KINETIC IMAGING (KINE)

KINE 208. Introduction to Media Arts Technologies. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Enrollment requires successful completion of Art Foundation Program and permission of department chair. Covers basic techniques and software necessary for contemporary video, animation and sound art practice.

KINE 233. Media Arts Survey. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A historical overview of contemporary media art to include experimental animation, video art, sound art, the Internet and other technology-based art movements.

KINE 234. Animation I. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. An introduction to the techniques and principles of animation as frame-by-frame sequential media, covering preproduction methods particular to animation, and a survey of historical techniques with an emphasis in viewing and responding to animated work.

KINE 235. Animation II. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisites: KINE 208 and KINE 234. Students will build on skills learned in KINE 234. Topics covered include principles of animation and timing, intermediate digital skills, narrative and experimental structures in animation.

KINE 236. Video I. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: KINE 208. A survey of video as a creative medium, including but not limited to narrative, abstract and experimental approaches. This course will also cover basic video production and editing.

KINE 237. Sound Communications I. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: KINE 208. The basic theory and production of media-based sound.

KINE 291. Special Topics. 1-4 Hours.
Semester course; 1-4 variable hours. 1-4 credits. May be repeated for a maximum of eight credits. Various topics of special interest will be offered on a changing basis.

KINE 308. Web Technologies for Media Artists. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: KINE 208. This course investigates current and potential uses of online media. Students create content and/or disseminate their work using Internet technology; this includes inquiry into online media, social media tools and emerging web technologies.

KINE 335. Motion Graphics. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: KINE 235. Students will study the creation of moving graphic elements as an extension of animation and video art. The history and development of motion graphics in art, broadcast and effects studios will be examined. Students will engage in innovative development of motion graphics using current digital technology combined with experimental techniques.

KINE 336. Video II. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: KINE 236. Focuses on developing a unique artistic voice with an emphasis on video content and how various visual techniques can be used to express concept, mood, narrative and individual truth. This course will also cover advanced production and editing.

KINE 337. Sound Communication II. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. May be repeated for a maximum of 9 credits. Prerequisite: KINE 237. Continues the focus and specialization of sound design introduced in the prerequisite course, supporting video and animation production as well as developing an awareness of sound art. Conventional and experimental approaches to sound design are covered, along with the use of both standard audio equipment and more specialized technology. Varies in focus from semester to semester, covering such topics as performance and improvisation, field recording and sampling, sound installation, and soundtrack composition.

KINE 338. 3-D Computer Animation I. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: KINE 208. A comprehensive introduction to the use of the computer for modeling, rendering and animating three-dimensional objects and environments.

KINE 357. Critical Issues in the Media. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 200 or HONR 200. Topics, theory and genre affecting media and time-based mediums are explored through critical discourse, readings, screenings and lectures.

KINE 392. Research/Individual Study. 1-4 Hours.
Semester course; 1-2 lecture and 3-6 studio hours. 1-4 credits. May be repeated for a total of 8 credits. Enrollment requires permission of instructor, approval of faculty adviser and chair. The structuring, research, execution and presentation of an independent project in visual communications under the direction of a faculty adviser. The student will be encouraged to become a self-generating problem-seeker and -solver with the ability to carry out self-stated goals.

KINE 403. Senior Studio. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: senior status. To be taken in the last semester of the senior year. Critical analysis and development of the student's exit portfolio with emphasis on strengthening focus and concept inherent in the body of work.

KINE 434. Animation III. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. May be repeated for a maximum of 9 credits. Prerequisite: KINE 235. Students will work with advanced analogue and digital experimental animation techniques. Developing creative problem-solving strategies, students will be introduced to animation as a fine art practice, to animation on and off the screen, and in an installation and performance context.

KINE 436. Video III. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. May be repeated for a maximum of 9 credits. Prerequisite: KINE 336. An advanced course in video art that varies in topic and approach from semester to semester.

KINE 438. 3-D Computer Animation II. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. May be repeated for a maximum of 6 credits. Prerequisite: KINE 338. Advanced study of three-dimensional computer animation, exploring a variety of aesthetic and conceptual applications of the technology.

KINE 457. Socially Engaged Media. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. May be repeated for a maximum of 6 credits. Prerequisite: KINE 357. A studio multimedia course involving the creation of diverse artworks in a social, political and public context. Students engage in weekly projects, both independent and collaborative, along with presentations, discussions and ongoing blog entries.

KINE 458. Virtual Interactive Worlds. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Maybe repeated for a maximum of 6 credits. Prerequisite: KINE 338 or permission of instructor. A transdisciplinary course exploring alternative game strategies, virtual environment aesthetics, interactivity and mixed-reality in a team project setting.

KINE 464. Animation IV. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. May be repeated for a maximum of 9 credits. Prerequisite: KINE 434. An advanced course in animation studies. Students will produce a self-directed project, with progress reviewed in class critiques through the semester, culminating in a final animation-based project.

KINE 491. Studio Topics. 1-4 Hours.
Semester course; variable credit (1 lecture and 2 studio hours per credit). 1-4 credits. May be repeated for a total of 12 credits. Topical studio focusing on research and experimentation in specialized visual communication media.

KINE 492. Internship. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May be repeated for a maximum of 6 credits. Prerequisite: permission of the chair. Open to kinetic imaging majors only. Creative learning experiences in the professional realm under the direction and supervision of qualified practitioners.

KINE 500. Graduate Studio. 8 Hours.
Semester course; 16 lab/studio hours. 8 credits. May be repeated for a total of 16 credits. Prerequisite: admission to the kinetic imaging track of the MFA in Fine Arts program or permission of graduate adviser. Emphasis on individual creative production focusing on video, animation and sound, with periodic exposure of student's work and ideas to the critical attention of the teaching faculty of the Department of Kinetic Imaging. Degree requirement for first-year graduate students in department.

KINE 510. Foundations in Media. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: admission to the kinetic imaging track of the MFA in Fine Arts program or permission of graduate adviser. A seminar focusing on a historical overview of media arts, including video art, experimental animation, sound art, performance, installation and critical theory. Designed to equalize the base of knowledge among graduate students from various backgrounds and levels of familiarity with issues in contemporary media.

KINE 591. Topics in Contemporary Media. 3 Hours.
Semester course; 3 lab/studio hours. 3 credits. May be repeated for a maximum of 12 credits. Prerequisite: admission to the kinetic imaging track of the MFA in Fine Arts program or permission of graduate adviser. Explores selected topics of current interests or needs relative to digital media. See the Schedule of Classes for specific topic to be offered each semester.

KINE 600. Graduate Studio. 8 Hours.
Semester course; 16 lab/studio hours. 8 credits. May be repeated for a total of 16 credits. Prerequisite: KINE 500. Emphasis on individual creative production focusing on video, animation and sound, with periodic exposure of student's work and ideas to the critical attention of the teaching faculty of the Department of Kinetic Imaging. Degree requirement for second-year graduate students in the department.

KINE 690. Graduate Seminar. 4 Hours.
Semester course; 4 lecture hours. 4 credits. May be repeated for a total of 12 credits. Prerequisite: admission to the kinetic imaging track of the MFA in Fine Arts program or permission of graduate adviser. Weekly seminar for the purpose of exploring recent developments in media and conducting critiques in which students can discuss the ideas and attitudes manifest in their work. Degree requirement for graduate students in the Department of Kinetic Imaging.

KINE 691. Independent Study. 1-4 Hours.
Semester course; variable hours. 1-4 credits. May be repeated for a maximum of 12 credits. Prerequisite: permission of instructor and kinetic imaging area head. Students will pursue advanced, individually directed study under the guidance of a faculty adviser. Includes project research, creative execution and presentation.

KINE 692. Graduate Seminar. 4 Hours.
Semester course; 4 lecture hours. 4 credits. May be repeated for a total of 12 credits. Prerequisite: admission to the kinetic imaging track of the M.F.A. in Fine Arts program or permission of a kinetic imaging graduate adviser. Weekly seminar for the purpose of exploring artistic developments and critical issues in media. Provides students with critical evaluation of their work in relation to contemporary practice while focusing on their final thesis exhibition. Degree requirement for graduate students in the Department of Kinetic Imaging.

KINE 695. Advanced Sound. 3 Hours.
Semester course; 3 lab/studio hours. 3 credits. May be repeated for a total of 12 credits. Prerequisite: experience with mulitchannel sound software such as Pro Tools. Focuses on sound as a medium and its connection to animation and video. Designed as an advanced studio course where students develop their own aesthetic in sound and explore creative possibilities. Expands on recording and mixing techniques with a particular focus on 5.1 surround sound mixing for video, animation and sound art.

LANGUAGE AND CULTURAL COMPETENCE (LGCC)

LGCC 101. Introduction to Language and Culture for Professionals I: ____. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. May be repeated for credit with a different language. Designed for anyone concerned about the effectiveness of communicating with diverse linguistic communities. The communication focus includes an introduction to basic structures and target terminology used in the professions. This course cannot be used to fulfill requirements of general education in the college or the foreign language major or minor.

LGCC 102. Introduction to Language and Culture for Professionals II: ____. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. May be repeated for credit with a different language. Prerequisite: LGCC 101 or the equivalent. Designed for anyone concerned about the effectiveness of communicating with diverse linguistic communities. The communication focus includes continued practice with basic structures and target terminology used in the professions. This course cannot be used to fulfill requirements of general education in the college or the foreign language major or minor.

LGCC 197. Basic Cultural Competence Training. 1-3 Hours.
Semester course; 1-3 hours. 1-3 credits. Designed for anyone concerned about the effectiveness of people working and living in multicultural societies. Bridges theory and practice through a series of hands-on exercises, simulations, stories and real-world examples to optimize the learners' skill development necessary for effective intercultural communication. Graded as pass/fail.

LGCC 201. Intermediate Language and Culture for Professionals I: ____. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Prerequisite: LGCC 102 or the equivalent. Designed for anyone concerned about the effectiveness of communicating at an intermediate level with diverse linguistic communities. Delves further into grammatical structures, cultural concepts and target terminology used in the professions. This course cannot be used to fulfill requirements of general education in the college or the foreign language major or minor.

LGCC 202. Intermediate Language and Culture for Professionals II: ____. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Prerequisite: LGCC 201 or the equivalent. Designed for students concerned about the effectiveness of communicating at an advanced intermediate level with diverse linguistic communities. Offers continued instruction in cultural concepts, basic structures and target terminology used in the professions. This course cannot be used to fulfill requirements of general education in the college or the foreign language major or minor.

LGCC 297. Cultural Competence for Health Care Professionals. 1-3 Hours.
Semester course; 1-3 hours. 1-3 credits. Designed for health care, social work, public health and related providers who work with the growing number of immigrants, refugees and minorities in the U.S. Focus is on the basics of intercultural-communication competence for health care settings to help health care providers build deeper knowledge and understanding of patients/clients' cultural values and beliefs and how they may influence clients' attitudes and behaviors. Graded as pass/fail.

LGCC 405. Spanish Language and Culture for Health Care Providers I. 2 Hours.
Continuous courses; 2 lecture hours. 2-2-2 credits. Prerequisite: permission of instructor. Completion of LGCC 405 to enroll in LGCC 406. Completion of LGCC 406 to enroll in LGCC 407. Open only to students enrolled in health care programs such as nursing, medicine, allied health, pharmacy, dentistry, or health care practitioners. A survey of the changing demographics of patients in health care and the language and cultural skills required to provide adequate health care services. The communication focus includes basic structures and medical terminology used during assessments and phrases commonly used during physical examinations. These courses cannot be used to fulfill requirements for the Spanish major or minor, nor can they fulfill the general education language requirement.

LGCC 406. Spanish Language and Culture for Health Care Providers II. 2 Hours.
Continuous courses; 2 lecture hours. 2-2-2 credits. Prerequisite: permission of instructor. Completion of LGCC 405 to enroll in LGCC 406. Completion of LGCC 406 to enroll in LGCC 407. Open only to students enrolled in health care programs such as nursing, medicine, allied health, pharmacy, dentistry, or health care practitioners. A survey of the changing demographics of patients in health care and the language and cultural skills required to provide adequate health care services. The communication focus includes basic structures and medical terminology used during assessments and phrases commonly used during physical examinations. These courses cannot be used to fulfill requirements for the Spanish major or minor, nor can they fulfill the general education language requirement.

LGCC 407. Spanish Language and Culture for Health Care Providers III. 2 Hours.
Continuous courses; 2 lecture hours. 2-2-2 credits. Prerequisite: permission of instructor. Completion of LGCC 405 to enroll in LGCC 406. Completion of LGCC 406 to enroll in LGCC 407. Open only to students enrolled in health care programs such as nursing, medicine, allied health, pharmacy, dentistry, or health care practitioners. A survey of the changing demographics of patients in health care and the language and cultural skills required to provide adequate health care services. The communication focus includes basic structures and medical terminology used during assessments and phrases commonly used during physical examinations. These courses cannot be used to fulfill requirements for the Spanish major or minor, nor can they fulfill the general education language requirement.

LANGUAGE SKILLS (LASK)

LASK 103. Introduction to Languages. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A course designed to help students understand how languages function through a survey and contrastive analysis of language systems, with attention to the sociocultural, psychological and historical aspects of languages. Completion of this course does not qualify a student to take the 200 level of a language without passing a language placement test. Crosslisted as: LING 103.

LASK 203. Classical Elements in the English Language. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Development of English vocabulary through a study of Greek and Latin elements in English: derivatives, roots and loan words. Some emphasis on the special vocabularies of the sciences.

LATIN (LATN)

LATN 101. Elementary Latin. 4 Hours.
Continuous courses; 4 lecture hours. 4-4 credits. Prerequisite: completion of LATN 101 to enroll in LATN 102. First semester: a study of the Latin language with emphasis on the Latin elements found in English. Latin vocabulary. Second semester: introduction to Latin authors and related aspects of Roman civilization.

LATN 102. Elementary Latin. 4 Hours.
Continuous courses; 4 lecture hours. 4-4 credits. Prerequisite: completion of LATN 101 to enroll in LATN 102. First semester: a study of the Latin language with emphasis on the Latin elements found in English. Latin vocabulary. Second semester: introduction to Latin authors and related aspects of Roman civilization.

LATN 201. Readings in Latin Literature. 3 Hours.
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisites: LATN 102. Completion of LATN 201 to enroll in LATN 202. Brief grammar review with a parallel study of political and literary trends and developments as found in several of the major Latin writers. First semester: prose, with emphasis on Cicero, Pliny the Younger and Sallust. Second semester: poetry, with selected readings from Catullus, Tibullus, Ovid and Vergil.

LATN 202. Readings in Latin Literature. 3 Hours.
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisites: LATN 102. Completion of LATN 201 to enroll in LATN 202. Brief grammar review with a parallel study of political and literary trends and developments as found in several of the major Latin writers. First semester: prose, with emphasis on Cicero, Pliny the Younger and Sallust. Second semester: poetry, with selected readings from Catullus, Tibullus, Ovid and Vergil.

LATN 330. Themes in Latin Literature: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with different topics for maximum of 6 credits. Prerequisites: LATN 202. An in-depth study of selected topics such as science and medicine, law, or satire in works by authors such as Caesar, Cicero, Horace, Catullus, Ovid, Virgil, Marcus Aurelius and Lucretius. See the Schedule of Classes for specific topic to be offered each semester. Texts are in the original language.

LATN 331. Representative Authors in Latin Literature: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with different topics for maximum of 6 credits. Prerequisites: LATN 202. Selected readings by authors from the Archaic Period, the Classical Age, Silver Age and Patristic Latin with a focus on their impact on the political and social agendas of the day and on us today. See the Schedule of Classes for specific topic to be offered each semester. Texts are in the original language.

LEAD (LDRS)

LDRS 200. Profiles in Leadership. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Restricted to students in the Emerging Leaders Program or an approved program-in-residence. This seminar will introduce students to leadership by exploring a variety of historical and contemporary leaders and discussing the impact of their leadership on the world. Students will also discuss the ways in which their own leadership development can contribute to their success both in the classroom and in their communities.

LDRS 201. Leadership Identity. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Course restricted to students enrolled in VCU LEAD. This seminar will expose students to foundational principles of the leadership phenomenon, explore the role of the leader in the leadership process and promote self-understanding and leadership efficacy. Students will learn the ways in which leadership identity is developed and will discover and reflect upon their own leadership identity.

LDRS 202. Leadership Context. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: LDRS 201. This seminar will provide an overview of the different contexts in which leadership occurs. Students will examine leadership pathways that are available through the VCU LEAD program and choose a pathway for in-depth exploration.

LDRS 301. Leadership Engagement. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisites: LDRS 202 and UNIV 270. This seminar will focus intensely on the student's experience in the leadership practicum as both a leader and a follower. Students will analyze the ways in which leadership theory and principles learned in the classroom applied to their experience and how their preparation and self-efficacy as a leader contributed to their success.

LDRS 302. Culminating Leadership Seminar. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: LDRS 301. This culminating seminar integrates all aspects of the VCU LEAD program. Students will examine the different contexts in which they experienced leadership from the perspective of both leader and follower. The student will clearly illustrate their expertise, capability and self-efficacy as a leader through a folio of their experience.

LDRS 491. Special Topics in Leadership. 1-3 Hours.
Semester course; 1-3 variable hours. 1-3 credits. Enrollment requires admission to VCU LEAD and permission of instructor. An in-depth study of a selected topic related to leadership. See the Schedule of Classes for specific topics to be offered each semester. If several topics of different content are offered, students may elect to take more than one.

LDRS 492. Independent Study in Leadership. 1-3 Hours.
Semester course; 1-3 variable hours. 1-3 credits. Enrollment requires admission to VCU LEAD and permission of instructor. Intensive study supervision of a faculty member in an area not covered in-depth or contained in other VCU LEAD (LDRS) courses and/or independent investigation and research of leadership problems through readings, data collection and analysis. Written interim and final reports required.

LIFE SCIENCES (LFSC)

LFSC 251. Phage Discovery I. 2 Hours.
Semester course; 4 laboratory hours. 2 credits. Corequisite: BIOL 151 or 152. An exploratory laboratory where students will purify phage from soil, visualize phage using electron microscopy and isolate genomic material for nucleic acid sequencing. Registration by override only. Crosslisted as: BNFO 251.

LFSC 252. Phage Discovery II. 2 Hours.
Semester course; 4 laboratory hours. 2 credits. Corequisite: BIOL 151 or 152. An exploratory laboratory where students will learn about the genomes of viruses infecting bacteria. Students will be given the genome sequence of a novel virus, which will be the basis for a series of computer-based analyses to understand the biology of the virus and to compare it with other viruses that infect the same host. Registration by override only. Crosslisted as: BNFO 252.

LFSC 301. Integrative Life Sciences Research. 3 Hours.
Semester course; 2 lecture and 1 recitation hours. 3 credits. Pre- or corequisite: UNIV 200 or HONR 200. Students will leave this course knowing enough about science and the process of science to feel confident in critically evaluating scientific information and/or embarking on their own process of discovery with a faculty mentor. They will gain an appreciation of the interdisciplinary and complex nature of life sciences and will hone their critical thinking about how science interacts with and informs society.

LFSC 307. Community Solutions: Multiple Perspectives. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PSYC 101. Explores possibilities for addressing social concerns of the Richmond community by understanding the complex nature of social issues as essential to their successful amelioration via perspectives of life and social sciences. Toward this end, expertise from the social sciences, the life sciences and the community are integrated. Includes a service-learning experience (a 20-hour volunteer requirement). Crosslisted as: PSYC 307.

LFSC 401. Faith and Life Sciences. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 200 or HONR 200. Open to students of any school or program. Explores the complex relationships between faith traditions and the life sciences. Topics include epistemology, impact of life sciences on ideas of fate and responsibility, limits of science and technology, and scientific and religious perspectives on human origins, consciousness, aggression, forgiveness, health, illness and death. Crosslisted as: RELS 401.

LFSC 510. Biological Complexity. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisites: physics and calculus, or permission of instructor. Open only to graduate students and qualified seniors. 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. Crosslisted as: BIOL 545.

LFSC 520. Bioinformatic Technologies. 2 Hours.
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. Crosslisted as: BIOL 548.

LFSC 591. Special Topics in Integrative Life Sciences. 1-4 Hours.
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. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: LFSC 510/ BIOL 545 or equivalent, or permission of 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 630. Integrative Life Sciences Research. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Restricted to integrative life sciences doctoral students. An introduction to integrative research in the life sciences from the molecular to ecosystem level. The course will include presentations on ongoing interdisciplinary and systems-oriented life sciences research by faculty members and discussion and analysis of classic interdisciplinary research projects.

LFSC 690. Research Seminar in Integrative Life Sciences. 1 Hour.
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. 1-4 Hours.
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. 1-15 Hours.
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.

LINGUISTICS (LING)

LING 103. Introduction to Languages. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A course designed to help students understand how languages function through a survey and contrastive analysis of language systems, with attention to the sociocultural, psychological and historical aspects of languages. Completion of this course does not qualify a student to take the 200 level of a language without passing a language placement test. Crosslisted as: LASK 103.

LING 390. Introduction to Linguistics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. An introduction to methods of language analysis, emphasizing the study of sounds and sound patterns, and units of meaning and their arrangements. Crosslisted as: ENGL 390/ANTH 390.

LING 392. Language, Culture and Cognition. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ANTH 220 or 230. Introduces theoretical and methodological foundations for the study of language from sociocultural perspectives. The perspectives include linguistic, philosophical, psychological, sociological and anthropological contributions to the understanding of verbal and nonverbal communication as a social activity embedded in cultural contexts. No prior training in linguistics is presupposed. Crosslisted as: ANTH 328/ENGL 392/FRLG 328.

LING 401. Comparative Structures. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Course can be repeated with different topics up to a total of 6 credits. Prerequisites: SPAN 301; SPAN 305 or 307 or 311; SPAN 320 or 321 or 330 or 331. Conducted in Spanish. A comparison of English and Spanish, with emphasis on pronunciation and problems encountered in the teaching of Spanish. See the Schedule of Classes for the specific topic to be offered each semester. Crosslisted as: SPAN 401.

LING 402. Language Issues in the Spanish-speaking World. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Course can be repeated with different topics up to a total of 6 credits. Prerequisites: SPAN 301; SPAN 305 or 307 or 311; SPAN 320 or 321 or 330 or 331. Conducted in Spanish. Through a variety of topics this course explores the links between language and human behavior as exemplified by language phenomena in the Spanish-speaking world. Topics will be drawn mainly from sociolinguistics, language and culture, and education and applied linguistics. See the Schedule of Classes for the specific topic to be offered each semester. Crosslisted as: SPAN 402.

LING 450. Modern Grammar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. Study of modern English grammar and usage with some attention to linguistic theory. Recommended for teachers at all levels. May not be used to satisfy the literature requirement of the College of Humanities and Sciences. For English majors, these courses (limit of six credits) may be counted as part of graduate or undergraduate degree, but not both. Crosslisted as: ENGL 450.

LING 451. History of the English Language. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. The historical development of the English language; etymology, morphology, orthography and semantics. May not be used to satisfy the literature requirement of the College of Humanities and Sciences. For English majors, these courses (limit of six credits) may be counted as part of graduate or undergraduate degree, but not both. Crosslisted as: ENGL 451.

LING 452. Language and Gender. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211,215, 236, 291 or 295. A study of relationships between gender and language by focusing on such issues as differences between the ways women and men use language, relationships between language and power and ways in which language reflects and reinforces cultural attitudes toward gender. May not be used to satisfy the literature requirement of the College of Humanities and Sciences. Crosslisted as: GSWS 452/ENGL 452.

LING 453. Modern Rhetoric. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: UNIV 200 or HONR 200, and ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. A study of a broad range of modern rhetorical theories, emphasizing their possible relationships with linguistics, literary criticism, civic engagement and the process of writing. Crosslisted as: ENGL 453.

LING 552. Teaching English as a Second Language. 3 Hours.
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. Crosslisted as: ENGL 552/TEDU 552.

LING 650. Second Language Acquisition. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course is designed for those who plan to work with English language learners in diverse instructional settings. A major focus of this course is analyzing second language acquisition theories and how they apply in classroom settings. In-depth analysis of readings will enhance the students' understanding of second language acquisition and the research related to this field. Students will observe classroom teaching, analyzing the application of SLA theories utilized in the instructional setting. Crosslisted as: TEDU 650.

MANAGEMENT (MGMT)

MGMT 291. Topics in Management. 1-3 Hours.
Variable hours. Variable credit. Maximum of 3 credits per topic. Prerequisite: permission of instructor. An in-depth study of selected business topics. Graded as pass/fail at the option of the department.

MGMT 303. Creativity and Ideation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Course explores the individual, social and institutional contexts for creativity and ideation. Students will examine four specific concepts in support of exploration in these areas: knowledge, curiosity, creativity and ideation.

MGMT 310. Managing People in Organizations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course is restricted to students who have completed at least 54 credits (junior standing). Introduces students to the management of people in organizations, focusing on the managerial skills, knowledge and activities needed for a successful business operation. Topics include planning, organizing, staffing and leading; effectively utilizing human capital to achieve an organization's objectives in today's competitive environment.

MGMT 313. Entrepreneurial Finance. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: FIRE 311 or permission of instructor. Enrollment is restricted to students who have completed at least 54 credit hours (junior standing). This course emphasizes financial management needs for entrepreneurs or persons who expect to be employed in closely held corporations.

MGMT 319. Leadership. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 310. This course is restricted to students who have completed at least 54 credit hours (junior standing). Coverage of the major approaches to leadership considering individual, team, organizational and cultural perspectives. Emphasis on self-assessment and on historical and contemporary leadership cases.

MGMT 321. Survey of Entrepreneurship. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Underlying concepts in entrepreneurship; the importance of entrepreneurs and the problems they face; entrepreneur characteristics and competencies; what makes an idea entrepreneurial; managing relations, ethics and sustainability; opportunity recognition, critical thinking and emphasis on innovative concept development; detailed concept feasibility analysis.

MGMT 331. Human Resource Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 301, STAT 210 or STAT 212. This course is restricted to students who have completed at least 54 credit hours (junior standing). Introduces students to the role of human resource management in attracting and retaining a productive workforce. Includes human resource planning, recruitment and selection; employee diversity and development; performance appraisal and reward systems; labor and employee relations; and public policy related to HRM practices.

MGMT 389. Managerial Skills Development. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 310. A practicum in the development of personal, interpersonal and team-management skills as applied to leadership and teamwork.

MGMT 403. Human Resource Development. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: junior standing. Designed to improve qualifications of those seeking employment in the human resources field. Focuses on human resource development and organization development and their relationship to human resource management.

MGMT 418. International Management. 3 Hours.
3 lecture hours. 3 credits. Prerequisite: junior standing. The study of the environment of international business, ethics and social responsibility in international settings, culture and its effect on behavior and management practice, and the strategies and management practices of firms engaged in international activities. Aims to provide students with the knowledge, skills and sensitivities needed to be effective managers in the international business environment. Crosslisted as: INTL 418.

MGMT 419. Doing Business in Europe. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: junior standing and permission of instructor. Designed primarily as a core integrative course for students enrolled in the Certificate in International Management Studies, but other students are welcome. The course has three goals: a) integration of foreign languages, European studies and international management; b) infusion of other business areas relevant to doing business in Europe (such as international marketing, finance law and economics); and c) the development of cultural sensitivity and social responsibility. The course will be organized as a series of seminars with faculty and other speakers from the above disciplines. Crosslisted as: INTL 419.

MGMT 420. Labor and Employment Relations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 331. This course is restricted to students who have completed at least 54 credit hours (junior standing). Managerial decision-making in labor management relationships; the collective bargaining process and the administration of labor agreements; the impact of public policy and labor legislation.

MGMT 423. Social Entrepreneurship and Innovation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to students who have completed at least 54 credit hours (junior standing). An advanced management course in promoting societal good through entrepreneurial activities. Students will learn the various forms of entrepreneurship that benefit society, developing an understanding of the many contexts in which such entrepreneurship occurs and its impact on society. Students will identify issues of societal/environmental marginalization, ideate potential solutions, generate in-depth research relevant to course projects and take part in presentations regarding their findings and the development of a socially conscious venture.

MGMT 431. Strategic Human Resource Management. 3 Hours.
3 lecture hours. 3 credits. Prerequisite: MGMT 331. This course is restricted to students who have completed at least 54 credit hours (junior standing). A critical study of selected problems in human resource management.

MGMT 433. Compensation Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 331. The design and implementation of compensation and reward systems that both support an organization's strategy and enhance organizational effectiveness.

MGMT 434. Strategic Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MGMT 310; MKTG 301; FIRE 311; SCMA 301, STAT 210 or STAT 212; and SCMA 325. This course is restricted to business majors with senior standing. Integrative course to analyze policy issues at the overall management-level involving functional areas such as production, finance and marketing, in context with the economic, political and social environment.

MGMT 435. New Venture Strategy and Initiation. 3 Hours.
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisites: MGMT 321; completion of MGMT 435 to enroll in MGMT 436. First semester: provides students with an integrated strategic analysis of entrepreneurial firms and how they establish competitive advantage. Second semester: engages students in intensive development of a comprehensive business plan using knowledge and skills from MGMT 435. Students should take MGMT 436 immediately following MGMT 435.

MGMT 436. New Venture Strategy and Initiation. 3 Hours.
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisites: MGMT 321; completion of MGMT 435 to enroll in MGMT 436. First semester: provides students with an integrated strategic analysis of entrepreneurial firms and how they establish competitive advantage. Second semester: engages students in intensive development of a comprehensive business plan using knowledge and skills from MGMT 435. Students should take MGMT 436 immediately following MGMT 435.

MGMT 444. Occupational Safety, Health and Security. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Covers the principles and practices, and regulatory dimensions of occupational safety, health and security. Causes of workplace health hazard exposures, accidents and domestic and international industrial violence are studied with an emphasis on prevention. Characteristics of effective occupational safety, health and workplace security programs are studied to facilitate understanding and application in the workplace. Crosslisted as: FIRE 444.

MGMT 446. International Human Resource Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 331, INTL/MGMT 418 or ECON/INTL 329. Covers the application of human resource management activities in an international context. Highlights similarities and differences with domestic methods; current practices in the selection, development, compensation and maintenance of parent-country, host-country and third-country nationals; and the impact of regulatory and cultural differences between countries. Crosslisted as: INTL 446.

MGMT 447. Human Resource Information Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 331. This course is restricted to students who have completed at least 54 credit hours (junior standing). Covers contemporary human resource information software used in the primary activities of human resource management involving recruitment, selection, performance appraisal, employee benefits, pay administration, safety and health, human resource development, job analysis, human resource planning and job structuring. Emphasis is on introducing the software and practical application through hands-on experience in the computer laboratory.

MGMT 491. Topics in Management. 1-3 Hours.
Semester course; variable hours. Variable credit. Maximum of 3 credits per course; maximum total of 6 credits for all topic courses. Prerequisite: junior standing. An in-depth study of a selected business topic, to be announced in advance.

MGMT 492. Independent Study in Management. 1-3 Hours.
Semester course; 1-3 credits. Maximum total of 3 credits. Prerequisites: junior or senior standing as a major in a business curriculum and approval of adviser and department chair prior to course registration. Intensive study under supervision of a faculty member in an area not covered in-depth or contained in the regular curriculum.

MGMT 493. Internship in Management. 3 Hours.
Semester course; 3 credits. Prerequisites: senior standing in the major offering the internship and permission of the department chair. Intention to enroll must be indicated to the instructor prior to or during advance registration for semester of credit. Involves students in a meaningful experience in a setting appropriate to the major. Graded as pass/fail at the option of the department.

MGMT 540. Management Theory and Practice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A foundation course that presents theories, principles and fundamentals applicable to contemporary management thought and productive activities.

MGMT 633. Issues in Labor Relations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The conceptual framework of labor relations; the interconnection between labor-management relations and the sociopolitical environment.

MGMT 634. Collective Bargaining and Labor Arbitration. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MGMT 540 and MGMT 524. Provides exposure to the process of managing human resources; focuses on issues concerned with business decisions about acquiring, motivating and retaining employees. Topics may include HRM planning, recruitment, selection, training, performance management, compensation and strategic human resource management. Emphasis will be given to the development, implementation and assessment of human resource management policies and practices consistent with business, legal, environmental and strategic dynamics.

MGMT 641. Organizational Leadership and Project Team Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: completion of all M.B.A. foundation courses or equivalent, or permission from the graduate studies in business office. M.B.A. students take in conjunction with ECON 610. 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 and Strategy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: completion of five of the following courses -- MGMT 641; MGMT 675; ACCT 608; ECON 610; FIRE 621 or FIRE 623; INFO 661; INFO 664; MKTG 671. 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 644. International Business Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ECON 500, MGMT 530, MGMT 540 and MKTG 570. Survey course for students interested in international and multinational management. Review of historical, governmental, monetary, and cultural issues affecting the transfer of resources and management knowledge across national boundaries; multinational business and management strategies; study of management practices in selected countries.

MGMT 649. Compensation Policy and Administration. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 637. 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, administration of compensation systems, and current and future issues.

MGMT 654. Negotiations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An advanced course in management using an experiential approach to explore the practice and theory of negotiation. Topics will include basic approaches to negotiation and conflict management, negotiating in teams, negotiating with agents, ethics in negotiations and international negotiation.

MGMT 655. Entrepreneurship. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Individual and corporate entrepreneurship in high and low technology enterprises. Develops an understanding of the role of entrepreneurship in management theories and practices. Students will develop comprehensive venture analysis plans for presentation.

MGMT 656. Best Practices in Leadership. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: graduate standing. A seminar and experiential exercise course designed to raise the student's practical awareness of major leadership behavior patterns and strategies that promote effectiveness in organizations; raise awareness, flexibility and skill with the student's own personal leadership style; and help students practice, discuss and develop the ability to influence others over whom they may or may not exert positional authority.

MGMT 680. Health, Safety and Security Administration. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MGMT 524; and MGMT 530 or 540. Study of design and development of an effective safety or risk-control program. Topics include organizational needs and assessment, program evaluation, design/implementation of critical program components, 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 637. 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, administering, revising, and evaluating selection programs and procedures.

MGMT 684. Issues in International Human Resource Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 637 or MGMT 641. 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 691. Topics in Management. 1-3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: Approval of proposed work is required by graduate studies office in the School of Business. 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. 1-3 Hours.
Semester course; 3 lecture hours. 1, 2 or 3 credits. Prerequisite: Approval of proposed work is required by graduate studies office in the School of Business. 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.

MGMT 702. Causal Analysis for Organizational Studies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: two 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. Crosslisted as: PSYC 702.

MGMT 703. Advanced Topics in Research Methods for Organizational Studies. 1,2 Hour.
Continuous course; 3 lecture hours. 3 credits. Prerequisities: MGMT 632 or equivalent and permission of instructor. Students must enroll for two semesters. Extensive coverage of applications of methodological and statistical analyses to an array of disciplines related to organizational studies. Emphasizes the skills essential in designing, conducting and interpreting research. Course contact hours spread over fall, intersession and spring semesters. Credits alloted one in fall and two in spring. May be repeated once for credit as topics change each year.

MGMT 737. Seminar in Human Resources. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 637 or equivalent, or permission of intructor. Provides broad exposure to theory and research in the field of human resource management. Topics include strategic and operational human resource planning and staffing; employee relations, development and performance management; external factors such as legal and international environments; and compensation policy and practices.

MGMT 738. Special Focus in Human Resource Management: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 637 or equivalent, or permission of instructor. Provides exposure to specific advanced theoretical and methodological topics related to human resource management. Topics may include staffing, training and development, motivation (i.e., compensation and rewards), HRM metrics, and validity generalization. Topics vary depending upon instructor. See the Schedule of Classes for specific topics to be offered.

MGMT 743. Organizing Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 524 or equivalent, or permission of instructor. Surveys the foundations of management theory as well as more recent research and theory on the leadership through which work is organized and directed.

MGMT 745. Advanced Operations Research. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 524 or equivalent. This course examines organizational life in terms 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 747. Seminar in Human Resources: Macro Foundations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 737 or equivalent, or permission of instructor. Provides broad exposure to theory and research of how firms can use human resource management practices to enhance individual and organizational performance. Topics include emerging theoretical perspectives related to HRM systems, human capital, contextual factors and other factors that influence the linkages between human resources and performance.

MGMT 749. History of Management Thought. 3 Hours.
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. Attitudes and Motivation in Organizations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 524 or equivalent. Critical examination of classic and emerging research on attitudes and motivation in organizations, as well as their relationships to individual and organizational outcomes.

MGMT 757. Corporate Strategy and Long-range Planning. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 642 or equivalent. Analysis and evaluation of current methods and research in the areas of corporate strategy and long-range planning.

MGMT 790. Doctoral Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Open only to Ph.D. students in business. Analyzes and critiques general theories, practices and functions in a specialized area of management research.

MGMT 798. Thesis in Management. 3 Hours.
Year course; 6 credits. Graduate students will work under supervision in outlining a graduate thesis and in carrying out the thesis.

MGMT 799. Thesis in Management. 3 Hours.
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 Hours.
1-12 credits. Limited to Ph.D. in business candidates.

MANAGEMENT - MASTER'S (MSTM)

MSTM 601. Survey of Financial and Managerial Accounting. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Restricted to students enrolled in the Master of Management program. An introduction to the essential concepts of financial and managerial accounting in a global environment, including working capital management, capital budgeting and capital structure planning.

MSTM 602. Fundamentals of Financial Management. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Restricted to students enrolled in the Master of Management program. A study of the essential concepts of financial management in a global environment, including working capital management, capital budgeting, capital structure planning and dividend policy.

MSTM 603. Essentials of Market Planning and Analysis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to students enrolled in the Master of Management program. Presents and analyzes buyers and sellers in the marketplace, including how firms/organizations assess, analyze, create, deliver and capture value. Course incorporates the importance of customer-driven strategies and tactics for not-for-profit and public-sector organizations, as well as for-profit firms. Provides a framework for analyzing the impact of external forces on marketing decision-making, as well as the need for marketers to be ethical and socially responsible in the development and implementation of marketing plans. This framework extends not only to the traditional, domestic marketing environment, but also to global and technologically evolving (e.g., Internet) market settings.

MSTM 604. Quantitative Methods in Management. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Restricted to students enrolled in the Master of Management program. Students will develop an ability to interpret and analyze business data in a managerial decision-making context. Managerial applications are stressed in descriptive statistics, probability, sampling, estimation, hypothesis testing, simple regression and correlation analysis.

MSTM 605. Managing Organizations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to students enrolled in the Master of Management program. Explores the fundamental principles of management theory and practice as well as organizational behavior. Provides an understanding of teams, management principles, change and innovation within an organization.

MSTM 606. Introduction to Management Information Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to students enrolled in the Master of Management program. Provides an understanding of the importance and role of information systems in modern business processes, analysis and decision-making. Presents principles of information technology and systems methodologies for the design and development of operational, managerial and strategic business information systems. A project management focus will provide the framework for the course.

MSTM 607. Production and Operations Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to students enrolled in the Master of Management program. Examines concepts relating to the operations function in both manufacturing and service organizations. The operations process is responsible for planning, organizing and controlling of resources to efficiently and effectively produce goods and services that meet organization goals. Quantitative tools of analysis used to support decision-making in the various operations management activities will be surveyed and case analysis will be employed to relate theory to practice.

MSTM 608. Customer Service Quality Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to students enrolled in the Master of Management program. Designed to enable students to understand and use appropriate concepts, frameworks and theoretical models to facilitate analysis of different types of services and customer-service settings, as well as to be able to contribute to the development and implementation of appropriate service strategies. Emphasizes other key issues facing service firms/organizations, such as managing supply and demand, the overlap in marketing/operations/human resource systems and the importance of relationship management.

MSTM 609. Management of Human Capital. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to students enrolled in the Master of Management program. Provides an overview of human resource issues and the process of managing human resources. Topics may include HRM planning, recruitment, employee development, performance management, compensation and strategic human resource management.

MSTM 610. Managerial Perspectives in a Global Environment. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to students enrolled in the Master of Management program. Emphasizes the social, legal, political and ethical responsibilities of a business to internal and external stakeholders, including investors, employees, the community and the environment. Students learn about the interconnectivity between business and natural, social and financial environments, as well as about the need to maintain and balance these to sustain current and future generations.

MSTM 620. Master of Management Project Course. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to students enrolled in the Master of Management program. Students integrate the knowledge and experience gained from courses in various business fields in order to solve a management problem for a real company. Students use a team approach and work collaboratively to analyze the problem and recommend solutions. Students will also create reports of their work using a variety of media.

MARKETING (MKTG)

MKTG 301. Marketing Principles. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course is restricted to students who have completed at least 26 credit hours (sophomore standing). An introduction to the activities, set of institutions and processes for creating, communicating, delivering and exchanging offerings that have value for customers, clients, partners and society at large.

MKTG 302. Marketing Problems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MKTG 301. This course is restricted to students who have completed at least 54 credit hours (junior standing). A case course requiring the senior marketing student to apply their knowledge in solving marketing managerial problems. Marketing majors should take this course in the semester immediately following the term in which they complete MKTG 301.

MKTG 310. Information for Marketing Decisions. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MKTG 301; and MGMT 301, STAT 210, or STAT 212. This course is restricted to students who have completed at least 54 credit hours (junior standing). Students receive an overview of the marketing research process. The course includes coverage of primary research, secondary data sources and marketing information systems. Students learn to apply research findings to marketing decisions.

MKTG 315. Buyer Behavior. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MKTG 301. This course is restricted to students who have completed at least 54 credit hours (junior standing). Study of the relevant psychological, sociological and anthropological variables that shape buyers' activities and motivations in household and organizational decision-making. Throughout the course, students consider the issue of why consumers behave as they do in the marketplace and the nature of their choices as individual, family and institutional buyers.

MKTG 320. International Marketing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MKTG 301. This course is restricted to students who have completed at least 54 credit hours (junior standing). Designed to help students develop an understanding of international marketing policies and the differences among foreign marketing environments. Students compare and contrast domestic and international marketing and examine recent changes in the international marketing environment. Crosslisted as: INTL 320.

MKTG 325. Business-to-business Marketing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MKTG 301 and junior standing. This course focuses on strategy development for marketers whose customers include other businesses, the government and/or institutions. It explores the buying behavior of these organizations and highlights how the product development and management processes for such customers differ from the processes used for consumer marketing.

MKTG 330. Integrated Marketing Communications. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MKTG 301. This course is restricted to students who have completed at least 54 credit hours (junior standing). An overview of the steps required to develop an integrated marketing communications campaign. Topics include advertising, public relations, sales promotion, personal selling and direct marketing. Special emphasis is placed on the role of new technologies and interactive media.

MKTG 335. Introduction to Personal Selling. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MKTG 301. This course is restricted to students who have completed at least 54 credit hours (junior standing). Examines the fundamental nature of personal selling in the promotion mix, including the sales process and the techniques used in performing the selling function. Explains the diverse decisions and activities necessary to manage the outside sales force efficiently and effectively to achieve the organization's overall goals.

MKTG 340. Retail Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MKTG 301. This course is restricted to students who have completed at least 54 credit hours (junior standing). A comprehensive view of retailing and an application of marketing concepts in a practical retail managerial environment. Students learn to evaluate retail firms and to identify their strengths and weaknesses.

MKTG 430. Experiential Marketing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MKTG 301, MKTG 330 and junior standing. This course will introduce the student to topics and strategies involving brand experiences and experiential marketing tactics. Students will explore experiential marketing, a marketing strategy designed to cultivate positive brand-consumer experience through products, communication and staged brand experiences. Additional concepts to be examined include brand strategy, marketing and the five senses, event marketing, mobile marketing, ambush marketing, guerilla marketing, venues and sponsorships, sampling, premiums, technology, social media, and data collection.

MKTG 435. Selling in the Business Marketplace. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MKTG 301, MKTG 335 and junior standing. This course focuses on selling strategy and tactics for sales managers and field sales representatives whose customers include other businesses, government and/or institutions. Areas of concentration include preparing for, and conducting, effective business-to-business sales calls, including prospecting, scheduling customer sales meetings, needs identification, presentation and securing new business.

MKTG 442. Services Marketing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MKTG 301. This course is restricted to students who have completed at least 54 credit hours (junior standing). Students develop both a theoretical and practical understanding of "the service product," including the role of customer service in retail and industrial settings. Students learn techniques for analyzing and improving service system design. Students develop an understanding of "quality" as it relates to service products, and they exercise a number of approaches for assessing and improving perceived service quality.

MKTG 445. Nonprofit Marketing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MKTG 301. This course is restricted to students who have completed at least 54 credit hours (junior standing). Examines the relationship between marketing and organizational success in the nonprofit sector, as well as the impact of nonprofit organizations on local, national and global economies. Through real-world applications, students learn to combine marketing strategies and tactics with civic engagement, community service and corporate social responsibility. Students must complete a minimum of 20 service-learning hours with the nonprofit organization that is the focus of the course.

MKTG 448. Digital Marketing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MKTG 301 and MKTG 330. This course is restricted to students who have completed at least 54 credit hours (junior standing). Examines Internet marketing as a necessary ingredient to successful worldwide marketing strategy. Students analyze markets using Web-based techniques for market evaluation, competitive analysis, market comparison and selection. Discussion includes comparison of e-business versus traditional business perspectives on marketing strategies and tactics. Crosslisted as: INTL 448.

MKTG 450. Product Development and Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MKTG 301. This course is restricted to students who have completed at least 54 credit hours (junior standing). Study of the role of marketing in developing and managing products. Essential concepts include the use of project teams for product development and the application of a new product development process. Topics include innovation, technology, listening to the voice of the customer, product design, branding, positioning and product life-cycle management.

MKTG 470. Field Project in Marketing. 3 Hours.
Semester course; 3 credits. Prerequisite: MKTG 301. This course is restricted to students who have completed at least 54 credit hours (junior standing). Students take part in a real-world project under faculty supervision, with the topic announced in advance. Examples include conducting a marketing research project, creating an advertising campaign, writing a marketing case study about an existing business and developing a marketing plan.

MKTG 475. Honors Seminar in Marketing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MKTG 301 and permission of department chair. This course is restricted to students who have completed at least 54 credit hours (junior standing). Students conduct research about major firms in the Richmond region. Chief marketing officers of these firms teach students about current marketing issues and evaluate the students' projects.

MKTG 491. Topics in Marketing. 1-3 Hours.
Semester course; variable hours. Variable credit, with a maximum total of 3 credits per course. For marketing majors, a maximum total of 6 credits for all topics courses. Prerequisite: MKTG 301. An in-depth study of a selected business topic, to be announced in advance.

MKTG 492. Independent Study in Marketing. 1-3 Hours.
Semester course; 1-3 credits. For marketing majors, a maximum total of 3 credits for all MKTG 492 courses. Prerequisites: MKTG 301, junior standing and permission of adviser and department chair prior to course registration. Intensive study or research under supervision of a faculty member in an area not covered in depth or contained in the regular curriculum.

MKTG 493. Internship in Marketing. 3 Hours.
Semester course; 3 credits. Prerequisites: senior standing in the major offering the internship and permission of the department chair. Intention to enroll must be indicated to the instructor prior to or during advance registration for semester of credit. Involves students in a meaningful experience in a setting appropriate to the major. Graded as pass/fail at the option of the department.

MKTG 570. Concepts and Issues in Marketing. 3 Hours.
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.

MKTG 656. International Marketing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Pre- or corequisite: MKTG 671. Orientation to the international market place. Formulation of international marketing strategies for firms participating in global trade. Emphasis on international environment, multinational economic blocs, international competition and development of international marketing strategies.

MKTG 657. International Market Planning Project. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MKTG 656; pre- or corequisite: MKTG 671. 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.

MKTG 670. Essentials of Market Planning and Analysis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to students enrolled in the Master of Management program. Presents and analyzes buyers and sellers in the marketplace, impact of external forces on marketing, customer-driven strategies and tactics, creation of market-driven competitive advantage, responsible and ethical marketing, Internet and global marketing.

MKTG 671. Marketing Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Detailed study of concepts and procedural alternatives in the delineation of the market target, the development and implementation of the marketing mix, and the control and analysis of the total marketing effort.

MKTG 672. Concepts in Consumer Behavior. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Pre- or corequisite: MKTG 671. A study of the pertinent psychological, sociological and anthropological variables that influence consumer activity and motivation.

MKTG 673. Marketing Research. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOS 543, SCMA 302, SCMA 524, STAT 541 or STAT 543; pre- or corequiste: MKTG 571. 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.

MKTG 674. Service Quality Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Pre- or corequisite: MKTG 301 or MKTG 671. This course enables marketing students to develop a better 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.

MKTG 675. Digital Marketing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MKTG 301; pre- or corequisite: MKTG 671. Focuses on the basic digital tools available to marketers. The strategic value of digital marketing to the organization as it relates to the buyer behavior model is explored through lecture, cases, guest speakers and a group project. The group project teams partners with local companies to gain practical experience with digital marketing.

MKTG 678. Marketing Analytics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SCMA 524 or STAT 541. Develops and sharpens students' analytical and statistical skills in preparation for advanced marketing decision-making. Analyses and statistical techniques covered include descriptive statistics, cross-tabulation, analysis of variance, regression and cluster analysis applied to marketing phenomena.

MKTG 690. Research Seminar in Marketing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: Approval of proposed work is required by graduate studies office in the School of Business. This course is designed to provide research experience for candidates not following the MKTG 798-799 program.

MKTG 691. Topics in Marketing. 1-3 Hours.
Semester course; 1-3 lecture hours. 1, 2 or 3 credits. Study of current topics. Topics may vary from semester to semester.

MKTG 693. Field Project in Marketing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: Approval of proposed work is required by graduate studies office in the School of Business. 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.

MKTG 697. Guided Study in Marketing. 1-3 Hours.
Semester course; 3 lecture hours. 1, 2 or 3 credits. Prerequisite: Approval of proposed work is required by graduate studies office in the School of Business. 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.

MKTG 798. Thesis in Marketing. 6 Hours.
Year course; 6 credits. Graduate students will work under supervision in outlining a graduate thesis and in carrying out the thesis.

MKTG 799. Thesis in Marketing. 6 Hours.
Year course; 6 credits. Graduate students will work under supervision in outlining a graduate thesis and in carrying out the thesis.

MASS COMMUNICATIONS (MASC)

MASC 101. Mass Communications. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Open only to mass communications majors or media studies minors, or by permission of School of Mass Communications. A comprehensive overview of mass media which examines its history and evolution. Emphasis is given to the ways in which communications technologies have shaped and are shaped by society. Considers how digital and earlier technologies have led to increasing integration of world cultures and economies. Includes discussion of mass media law and ethics, including the origins and evolution of a free press and the legal framework of contemporary mass media practice.

MASC 151. Global Communications. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Explores how communication media and globalization drive each other and how they both impact the nation-state as well as international institutions. Examines how technology, the global economy and international media corporations influence culture, politics, business, law and other institutions in countries around the world. Explores the relationship between media systems and governments and how both are affected by technology and globalization. Crosslisted as: INTL 151.

MASC 201. Curiousness. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Study and practice of the first attribute for success in creativity: curiousness. Students engage in practical applications, readings, lectures, demonstrations and in-class exercises that build curiosity and help students identify and trust their natural curious nature. Provides advertising and non-advertising majors with rigorous and provocative challenges to stimulate further interest in creating for media.

MASC 203. Journalism Writing. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisites: MASC 101 minimum grade of C, UNIV 112 or both ENGL 295 and HONR 200 with minimum grade(s) of C, and minimum cumulative GPA of 2.5. Study and practice in fact gathering and development of basic writing skills for print, broadcast and online journalism. Focuses on journalistic storytelling, grammar, Associated Press style and knowledge of current affairs.

MASC 204. Story. 3 Hours.
Semester course; 1 lecture and 4 laboratory hours. 3 credits. Prerequisites: MASC 101 minimum grade of C and 201 minimum grade of C, UNIV 112 or both ENGL 295 and HONR 200 with minimum grade(s) of C, and minimum cumulative GPA of 2.5. Focuses on writing for advertising and consumer communications (the best advertising tells stories to which consumers can relate). Students study the parts of a story, what makes a story interesting and how to find those things. Practice includes looking for, finding and constructing a story. A survey of many different ways storytelling is involved in making advertising. Practice in applying storytelling skills to several advertising and communication projects.

MASC 210. Public Relations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Introduction to public relations principles and practices, including analysis of tools, media, ethical responsibilities and emerging technologies. Special attention to the theory and research literature on rational and ethical persuasion.

MASC 251. Global Health and Social Media. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An online service-learning class in which students explore the theory and practice of social media campaigns for global health issues and develop projects for nonprofit clients. The class will explore the following issues: theories and concepts of social media campaigns about global health issues; practical application of social media in health campaigns; targeting online audiences through social media; utilization of multimedia content for social media; and organizational strategies for social media to achieve social benefits.

MASC 261. History and Development of Journalism. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MASC 101 with a minimum grade of C. An examination of the regulatory, technical, economic and creative foundations of print, broadcast and Web-based journalism. Historical, contemporary and ethical issues are also addressed.

MASC 290. Ethical Problems in Mass Media. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MASC 101 minimum grade of C. Examination and analysis of contemporary issues and problems in conventional and new media. The philosophical foundation and principles of ethical decision-making are explored. Critical and unresolved issues are discussed within the legal and ethical framework of modern mass media practice. Students are required to design and justify resolutions to the issues and present defenses for the resolution proposals.

MASC 291. Topics in Communications. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May be repeated once with different content. A study of a specialized topic in mass communications. See the Schedule of Classes for specific topics to be offered.

MASC 300. Technical Prowess. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: MASC 204 minimum grade of C. For advertising students only. Examines the functions of visual and graphic communication in the print and electronic media. Focuses on mastery of graphics software and basic design principles used in advertising. Students gain hands-on experience with state-of-the-art computer graphics and layout programs. (May not be taken if student has taken MASC 301 or 334.).

MASC 301. Graphics for Journalism. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: MASC 203 with a minimum grade of C. For journalism students only. Examines the functions of visual and graphic communication in the print and electronic media. Focuses on creative typographic and layout design principles and integrates practice in editing, graphic creation, digital-image manipulation and professional publishing. Students gain hands-on experience with state-of-the-art computer graphics and layout programs used in newspaper and magazine journalism. (May not be taken if student has taken MASC 300 or 334.).

MASC 303. Reporting for Print and Web. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisites: MASC 203 minimum grade of C and UNIV 200 minimum grade of C or HONR 200 minimum grade of C. Detailed study in reporting and writing news stories for print publications and websites. Focus on interviewing, writing news and features and preparing for entry-level reporting assignments. Students also will learn online presentation skills, including photos, audio, video and interactive elements.

MASC 305. Copy Editing. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: MASC 301 minimum grade of C. Instruction and practice in basic newspaper and online editing with a focus on practical experience in editing local and news service copy for publication. Includes emphasis on headline writing, development of news judgment, accuracy and fairness, and potential legal problems for copy editors. Attention also will be paid to layout and design for newspapers and online.

MASC 317. Visual Acuteness. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: MASC 300 with a minimum grade of C. Enrollment is restricted to advertising majors. Study and practice of visual problem-solving and graphic design. This course uses design thinking, conceptual thinking and process. Topics include building harmonious systems, using the typographic grid and understanding the relationship between type and image.

MASC 333. Public Relations Writing and Media Relations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MASC 203, MASC 210, and UNIV 200 or HONR 200, each with a minimum grade of C. Enrollment restricted to public relations students. An intensive writing course focusing on researching and writing materials in support of the public relations function. Practice in preparing various collateral including news releases and advisories, story pitches, special events background materials, media kits, employee newsletters, community relations materials, and formal public speaking scripts. Explains the role and function of the news media and the unwritten rules that govern interaction with the news media. Students will learn how to construct an effective media relations strategy, how to be interviewed with skill and assurance and how to evaluate media relations within the organization's public relations plan.

MASC 334. Public Relations Graphics and Production I. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: MASC 203 and MASC 210, each with a minimum grade of C. Enrollment restricted to public relations students or media studies minors. Study of the functions of visual and graphic communication for public relations practice. Focuses on basic design principles and skills in editing, graphic creation, digital-image manipulation, Web and interactive content. Students gain hands-on experience with state-of-the-art computer graphics and layout programs. (May not be taken if student has completed MASC 300 or MASC 301.).

MASC 335. Public Relations Graphics and Production II. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: MASC 334 with a minimum grade of C. Enrollment restricted to public relations students only. Continues development of visual and graphic communication skills acquired in MASC 334. Introduces development of additional multimedia skills to include photography, electronic newsletters and video storytelling. (May not be taken if student has completed MASC 300 or 301.).

MASC 336. Social Media in Public Relations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MASC 203 and MASC 210, each with a minimum grade of C. Enrollment restricted to public relations students. Covers development, trends and application of social media. Focuses on social media as a strategic tool for public relations professionals. Identifies and analyzes functionality and best practices, including audience engagement, benchmarking and appropriate metrics for social media monitoring, measurement and evaluation.

MASC 337. Public Relations Management and Case Studies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MASC 203 and MASC 210, each with a minimum grade of C. Enrollment restricted to public relations students. Through intensive review, study and discussion of public relations case studies, students will use and further develop their critical-thinking abilities to analyze how the public relations function was managed to serve organizational goals. Students will critique existing case studies as well as develop their own individual case studies.

MASC 338. Professionalism in Public Relations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MASC 203 and MASC 210, each with a minimum grade of C. Enrollment restricted to public relations students. Study of public relations careers, including in-depth examination of types of practice and industry choices for professionals. Includes development of job-seeking skills such as networking, resume and cover letter writing, interviewing, as well as professional skills such as impromptu and extemporaneous speaking, presentation development and effective meeting management. Focus on ethical practice and understanding of effective long-term professional development activities such as the Accredited in Public Relations and Accredited Business Communicator credentials.

MASC 341. Feature and Article Writing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MASC 303 minimum grade of C or 363 minimum grade of C. Practice in preparing articles and features for newspapers and magazines. Emphasis is on creative journalistic writing and development of writing skills.

MASC 359. International Media Coverage: The Middle East. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: MASC 101 or MASC 151 with a minimum grade of C. This interdisciplinary course explores the media's role in covering cultural, political, religious and other issues in the Middle East. Students will examine the role and impact of the media in both the United States and Middle East in shaping global and regional public opinion. Using webcam and online technology, VCU students will discuss cross-cultural perspectives with students from the other U.S. universities and universities in the Middle East. Crosslisted as: WRLD 359.

MASC 361. History and Development of Journalism. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MASC 203 or 204 with a minimum grade of C. An examination of the regulatory, technical, economic and creative foundations of print, broadcast and Web-based journalism. Historical, contemporary and ethical issues are also addressed.

MASC 363. Introduction to Broadcast Writing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MASC 203 with a minimum grade of C. Corequisite: MASC 367. Students will concentrate on developing news writing and reporting skills for television and radio. Course work will include weekly writing assignments and the production of broadcast-quality radio and television stories. Knowledge of current events is essential.

MASC 367. Audio and Video Journalism. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: MASC 203 with a minimum grade of C. Corequisite: MASC 363. Open to mass communications majors only. Focuses on the purpose, function and execution of basic techniques of audio and video field and studio production operations, especially as they relate to news. Emphasizes the production of broadcast-quality media content. Fieldwork production, remote production and live production, along with audio and video recording and editing, are covered.

MASC 380. History of Advertising. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MASC 203 or 204 with a minimum grade of C. A foundation survey, from prehistoric to present day. What is advertising? How did it get to be that way and what might it become? Advertising's place in society through several eras, with emphasis on U.S. advertising history, but attention also paid to the role of advertising in other countries. An overview of the creation of the ad agency, a summary of its parts, an explanation of its workings and its place in society. Understanding advertising as practiced from various viewpoints including the agency, public, clients and social and political groups.

MASC 381. Great Advertising. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MASC 380 minimum grade of C. Explores the practitioner-oriented approach to the creation, preparation and evaluation of advertising, branding and communications. Views great advertising from the perspective of integrated marketing communication and utilizes case studies of advertising and branding campaigns for some of the world's best-known brands.

MASC 382. Acumen. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MASC 380 minimum grade of C. Focuses on excelling in the business aspects of advertising, branding and communications. To understand an advertising client's business needs, one must understand how the client does business. Students will learn about advertising from within the context of marketing, business and commerce.

MASC 392. Perspicuousness. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisites: MASC 204 with a minimum grade of C and UNIV 200 or HONR 200 with a minimum grade of C. Intensive practice in choosing the right word for the right occasion. Study of the different types of advertising copy used by both local and national advertisers. Focuses on creative thinking and inspired writing for advertising, branding and communications.

MASC 393. Creativity for Television. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: MASC 380 minimum grade of C. For mass communications majors only. Learn the process of developing professional-level television advertising with a concentration in creative thinking and solutions. Students create TV commercials with attention to scripts, storyboards, talent, visual composition, editing, music, sound effects and direction.

MASC 394. Imagination. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: MASC 300 with a minimum grade of C. Study of art direction: practice in visualizing and utilizing media space aesthetically. Students complete assignments each week, ranging from traditional advertising to alternative media venues. Results are presented in front of the class for critique by faculty and fellow students.

MASC 397. Ubiquity. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MASC 204 minimum grade of C. Using media to help achieve the client's ad objective. An intensive problem-based course on using mass, personal and social media to engage the consumer, to help communicate the brand's message and to add impact to a communications campaign. Students will study media planning and buying of all types of media (TV, radio, newspapers, magazines, outdoor, online and nontraditional).

MASC 398. Awareness. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MASC 204 with a minimum grade of C. Understanding what advertisers can look for in their research and how they use research to connect with consumers. Through this intensive research practicum focused on account planning, students will learn to research consumers, competition and brands. Students will use quantitative (such as online surveys) and qualitative (such as focus groups, panel studies, one-on-one interviews) methods to research consumers and target audiences. Students will conduct competitive market research on brands.

MASC 399. Empathy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MASC 204 with a minimum grade of C. Focuses on managing client accounts, team management, group dynamics, negotiating and presentation skills. Students learn how to persuade through understanding of others, including how to make smarter decisions, spark innovation and solve problems more quickly, and how to create a culture of candor, trust, resilience and accountability in clients and in coworkers.

MASC 403. Advanced Reporting. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: MASC 303 minimum grade of C. For mass communications majors only. Capstone course for journalism/print-online concentration. Intensive study of the techniques of reporting meetings and news of public affairs. Attention will be paid to covering governmental agencies at all levels. Instruction in newspaper editing included. Quality of writing will be a paramount and continual consideration. Emphasis on fast-paced deadlines. This course may not be taken simultaneously with MASC 404, MASC 475 or MASC 496 without permission from the instructor.

MASC 404. Specialized Project Reporting. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: MASC 303 with a minimum grade of C. For mass communications majors only. Capstone course for journalism/print-online concentration. Provides news beat experience for students reporting on complex issues facing the public in the urban community. Emphasis also on editing, team reporting, in-depth research and interviewing techniques, and use of public records. This course may not be taken simultaneously with MASC 403, MASC 475 or MASC 496 without permission from the instructor.

MASC 408. Communications Ethics and Law. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MASC 203 or 204 with a minimum grade of C. Study of ethical and legal issues affecting the practice of journalism and public relations. Examination and analysis of contemporary issues and problems in conventional and new media. The philosophical foundation and principles of ethical decision-making are explored. Critical and unresolved issues are discussed within the legal and ethical framework of modern mass media practice.

MASC 409. Truth and Honor. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MASC 204 minimum grade of C and 380 minimum grade of C. For mass communications majors only. A survey of laws pertaining to the creation of advertising, such as trademark and copyright, and to the effects of advertising in the culture. A discussion of ethical questions pertaining to persuasion, communication and the effects of advertising in the culture.

MASC 415. Advanced Video Journalism. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisites: MASC 363 and 367, both with minimum grades of C. Corequisite: MASC 460. Students learn advanced field shooting and editing techniques as well as the inner workings of the television studio, including studio camera operation, advanced audio and video editing, visual storytelling, and advanced camera techniques.

MASC 423. Tourism and Hospitality Public Relations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MASC 203 and MASC 210, each with a minimum grade of C. Enrollment restricted to public relations students. Examines the role and practice of public relations in the tourism and hospitality industries. Students will learn how to use public relations strategies and tactics to stimulate interest among travelers in destinations and specific activities. Emphasis on media relations, special events, sponsorships/partnerships and social media.

MASC 424. Sports and Entertainment Public Relations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MASC 203 and MASC 210, each with a minimum grade of C. Enrollment restricted to public relations students. Examines the role and practice of public relations in the sports and entertainment industries. Students will learn the role of public relations in managing relationships with the news media, fans and fan groups, and other key audiences. Focus on media relations, social media, sponsorships/partnerships, promotions and community relations.

MASC 425. Public Relations Research. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MASC 203 and MASC 210, each with a minimum grade of C. Enrollment restricted to mass communications majors. An introduction to the role of research in public relations, with primary emphasis on content analysis, focus group, survey and communication audit methods and the evaluation of quantitative research data.

MASC 433. Special Events. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MASC 203 and MASC 210, each with a minimum grade of C. Enrollment restricted to public relations students only. Students learn the theory and organizational strategies of special events as a function of public relations. Topics include client consulting, objective setting, budgeting, sponsorships, vendor negotiations and follow-up procedures.

MASC 435. Crisis Communication. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MASC 203 and MASC 210, each with a minimum grade of C. Enrollment restricted to public relations students. Students learn techniques for dealing with sudden and unexpected situations that have a negative impact on organizations and their images to key constituencies. Through case studies and crisis simulation exercises, students develop strategic solutions for crisis situations. Students are provided with the insights, confidence and practical expertise needed to manage the consequences of a wide range of possible crises in ways that maintain, or even enhance, their employer's reputation.

MASC 438. Organizational Communications. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MASC 425 with a minimum grade of C. Enrollment restricted to public relations students only. Focuses on the tools to communicate with employees, volunteers and special organizational internal publics, and how those internal messages are used to achieve the goals and objectives of organizations. Students learn the theories of organizational communication and the techniques used to conduct an internal audit of the communication climate in an organization.

MASC 439. Agency. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MASC 333, 335, 336, 337 and 425, each with a minimum grade of C. Enrollment restricted to public relations students. Application of public relations theory and methods in the preparation of a plan for a public relations campaign. Special attention to the planning process including issues analysis, and application of public relations and research methods.

MASC 450. Style. 3 Hours.
Semester course; 3 lecture hours. 3-3 credits. Prerequisites: MASC 392 and 394, both with a minimum grade of C. For mass communications majors only. An advanced, intensive study of advertising style, forming one's own sense of style and the creative process. Emphasizing strategic and creative development of advertising campaigns. Students will conceptualize advertising campaigns, execute digitally produced, comprehensive advertisements and campaign materials, and assemble a final portfolio. Culminates in a formal portfolio review with professionals from the advertising industry.

MASC 451. Invention. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MASC 450 with a minimum grade of C. For mass communications majors only. An advanced, intensive study of inventiveness in the creative process. Emphasis on strategic and creative development of advertising campaigns that builds on what students learned about advertising style in MASC 450. Prepares students for post-graduate work or study. Students will conceptualize and produce advertising campaigns and assemble a final portfolio. Culminates in a formal portfolio review with professionals from the advertising industry.

MASC 459. Judgment. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MASC 398 and 399 and 6 additional credits of MASC electives, all with minimum grades of C). For mass communications majors only. Application and demonstration of inspiration, innovation, advertising knowledge and skills. Designed to help students in the strategic concentration compile a strong, comprehensive body of work used in brand communications. Students will develop competence in evaluating communication concepts, market situations and client and agency concerns.

MASC 460. Advanced Television Newsgathering. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisites: MASC 363 and 367, both with minimum grade of C. Corequisite: MASC 415. Television news practicum. Using the university and the city of Richmond as their classroom, students will report, write and produce television and multimedia news stories. Electronic newsgathering and editing equipment will be utilized to create professional-caliber projects.

MASC 461. The Documentary. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisites: MASC 303, 415 and 460, each with minimum grade of C. An examination of documentary concepts through analysis of radio, television and film documentaries. The course will center on the development, writing and production of a documentary in the medium (audio or video) of the student's choice.

MASC 462. Photojournalism. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MASC 363 minimum grade of C and 367 minimum grade of C. Examination of theoretical, technical and practical use of photography in communications and reporting, along with theories and legal guidelines of photojournalism. Training in news photography (both still and video) and its application in converged media. Students must have their own manually operable 35 mm film or digital (minimum 3.2 megapixels) single lens reflex cameras with at least a 50 mm lens or a zoom lens capable of 50 mm shooting. Students will use departmental video cameras.

MASC 463. Advanced Radio Newsgathering. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MASC 363 minimum grade of C and 367 minimum grade of C. Radio practicum. Using the university and city of Richmond as their classroom, students will report, write and produce radio news stories. Studio and remote equipment will be utilized to create professional-caliber projects.

MASC 465. Newscasting. 3 Hours.
Semester course; 1 lecture and 4 laboratory hours. 3 credits. May be repeated once for a total of 6 credits. Prerequisites: MASC 303, 415 and 460, each with minimum grade of C. Concentrates on developing on-air skills in radio and television studio and field situations. Emphasizes journalistic principles in delivery of news, public affairs, editorial and interviews. Stresses grammar, diction and broadcast writing.

MASC 466. Television Studio Production. 3 Hours.
Semester course; 1 lecture and 4 laboratory hours. 3 credits. May be repeated for a maximum of 6 credits. Prerequisite: MASC 203 or 204 with minimum grade of C. Instruction and practice in basic television and studio production. Supports the production of television broadcast journalism programming by broadcast journalism students and explores standards, contemporary technologies and best-practices techniques for modern studio video production.

MASC 467. Nonprofit Project Development. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MASC 210 with a minimum grade of C or MASC 380 with a minimum grade of C. Students will be selected to work with area nonprofit clients to create and produce a wide variety of advertising and promotional materials. Students will develop strategy, write creative briefs, recruit teams to work with them during CreateAthon onCampus (a 24-hour creative event held during Spring Break), present work to clients and follow any deliverables through production. Strong emphasis on leadership and a commitment to working with nonprofits.

MASC 474. Diversity in the Media. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MASC 101 with a minimum grade of C. Enrollment restricted to mass communications majors and media studies minors. Examines historical and contemporary issues associated with the presence and portrayal of selected groups in/by the media in the United States. Examines groups based on race, ethnicity, national origin, gender, sexual orientation, disability, religion and other characteristics. Issues related to diversity and diversity awareness in advertising, journalism and public relations are also explored.

MASC 475. Capital News Service. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MASC 303 minimum grade of C. For mass communications majors only. Capstone course for journalism/print-online concentration. Advanced journalism students cover state government and politics, including the Virginia General Assembly, the governor, regulatory agencies and elections. Students produce content for publication by newspapers and other news outlets and for social media. Strong emphasis on fast-paced deadlines. This course may not be taken simultaneously with MASC 403, MASC 404 or MASC 496 without permission from the instructor.

MASC 480. Touch. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MASC 398 minimum grade of C and 399 minimum grade of C. For mass communications majors only. Designing advertising strategies that touch the target audience and engage them in the brand. Students learn to understand the research, the consumer, the competition and the client's brand so that they can develop a strong communication strategy. This is an advanced study of the strategic side of advertising.

MASC 481. Completeness. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisites: creative advertising concentration: MASC 392 and 394, both with minimum grade of C; strategic advertising concentration: MASC 398 and 399, both with minimum grade of C. For mass communications majors only. Intensive study in the planning and preparation of advertising campaigns. Students develop complete advertising plans including research, media and creative strategies, sales promotion plans and merchandising plans.

MASC 485. Web Site Design. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: MASC 300, 301 or 334 with a minimum grade of C. Students will receive an introduction to the processes, principles and tools of website design, development and production. The course will focus on the development of strong interactive interfaces, animation, graphic images, text, and functional site design and organization. In this hands-on, computer-based course, students will design and develop a comprehensive site and launch it to the Internet. Increasing the students' knowledge of design principles and technical skills with Web development tools will be emphasized.

MASC 488. Strategic Communication of Health and Medical Issues. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MASC 425 with a minimum grade of C. Enrollment restricted to public relations students only. Students will discuss the role of media and strategic communication in publics' information-seeking behaviors and formation of attitudes, beliefs and behaviors about health and medical issues. Closes the gap of health information disparity and enhances the communication practice of health-related organizations. Topics examined include thorough case analyses, primary and secondary research and strategic health communication design projects. The principles of strategic communication are applied to areas such as health care public relations, health audience segmentation and messaging tailored for different media forms.

MASC 491. Topics in Communications. 1-3 Hours.
Semester course; variable hours. 1, 2 or 3 credits per semester. May be repeated with different topics for a maximum of 9 credits. Prerequisite: MASC 203 or 204, either with a minimum grade of C. An intensive study of a specialized field of mass communications.

MASC 492. Independent Study. 1-3 Hours.
Semester course; variable hours. Variable credit. Maximum of 3 credits per semester; maximum total of 6 credits for all independent study courses. Prerequisite: MASC 203 or 204 with a minimum grade of C. The course is designed for students who wish to study subject matter not offered elsewhere in the mass communications' curriculum.

MASC 493. Fieldwork/Internship. 1-3 Hours.
Semester course; variable hours. 1, 2 or 3 credits per semester. May be repeated with different topics; maximum total of 6 credits may be applied toward graduation. Prerequisites: MASC 203 or 204, either with a minimum grade of C, and permission of internship coordinator. Selected students will receive on-the-job training under the supervision of an instructor and the employer. Internships are available in newspapers, magazines, public relations, advertising, radio and television.

MASC 496. Mobile and Social Media Journalism. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisites: MASC 303, 363 and 367, each with minimum grade of C. Capstone course for print-online journalism students. Integrates journalism skills and concepts from previous writing and reporting classes and adapts them to mobile and social media. Students work in a newsroom environment to utilize mobile devices and social media platforms to identify compelling story ideas, effectively break news and report on important news events and issues while applying theories and concepts of online social networking to journalism. Students develop their own professional social media portfolios and build online communities. This course may not be taken simultaneously with MASC 403, MASC 404 or MASC 475 without permission from the instructor.

MASC 591. Topics in Mass Communications. 1-3 Hours.
Semester course; variable lecture or laboratory hours (depending on topic). 1-3 credits. May be repeated for a maximum of 6 credits. Prerequisite: permission of instructor and director of graduate studies. An advanced study of a selected topic in mass communications. See the Schedule of Classes for specific topic(s) to be offered.

MASC 602. Advertising Technology for Copywriters, Strategists and Media Planners. 2 Hours.
Semester course; 2 laboratory hours. 2 credits. Restricted to Brandcenter 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 for Macintosh. 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 saving the image. Additionally this course covers the appropriate applications designed to capture and edit digital video, and will include discussion of the use of the Brandcenter'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 Simmons, SRDS and MRI also will be covered in this course.

MASC 604. Media Stories. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Students will identify, create and translate stories to the multiple screens of contemporary media with an emphasis on advertising, public relations and journalism. Students study contemporary storytelling cases and create original stories for professional communications.

MASC 605. Technology in the Classroom. 3 Hours.
Semester course; 2 lecture and 3 laboratory hours. 3 credits. Beginning with a brief treatment of basic desktop 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 QuarkXpress and create promotional fliers/brochures and advertisements for their journalism programs. They will set templates and a style palette for school publications.

MASC 611. Research Methods in Mass Communications. 3 Hours.
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. 3 Hours.
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. 3 Hours.
Semester course; 3 seminar hours. 3 credits. A study of the 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. 3 Hours.
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. 3 Hours.
Semester course; 3 seminar hours. 3 credits. Prerequisites: three undergraduate reporting courses or permission of instructor. A thorough examination of 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. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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. 3 Hours.
Semester course; 3 credits. An examination of historical methodology 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. 3 Hours.
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 626. Critical Thinking in Media. 2 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Focuses on the application of critical and creative thinking to solve communication problems. Provides students with opportunities to explore and expand their creative abilities through brainstorming sessions, creative techniques and team-oriented activities dealing with contemporary advertising, public relations and media cases.

MASC 642. Online Journalism I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Exploration and production of various means of journalistic communication using online resources. Various multimedia projects will be reviewed and discussed, as well as the best use and application of media types based on the information being communicated. Students will research news stories and examine the effectiveness of online presentations while exploring how online journalism can work with more traditional forms of communication.

MASC 643. Online Journalism II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MASC 642. Development of online journalism production skills and familiarity with the best uses and practices for publishing material on the Web and for administering news websites. Students will learn the skills for posting media and also about the systems for maintaining news organizations' entire websites.

MASC 644. Computer-assisted Reporting. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MASC 611 and 642. Provides a practical guide to online research, data analysis and other computer-assisted reporting and research skills. Students will learn how to find authoritative information, including news sources and data, through the Internet and other online resources. Students will also learn how to use spreadsheets, database managers, mapping programs, social networking analysis, statistical packages and other software to sort, summarize, analyze, visualize and present data. Course will cover how to evaluate the reliability of electronic information, how to find trends and integrate them into news reports, and how the First Amendment and journalism ethics apply to digital information.

MASC 645. Visual Journalism. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MASC 611 and 642. A theoretical and hands-on course that immerses students in all aspects of visual journalism, including videography, photography, informational graphics and photojournalism. Examines visual communication theory and applied uses of multimedia, particularly in online journalism. Activities include professional-quality projects for multimedia publication. Addresses legal issues in producing multimedia packages, including copyright law.

MASC 646. Convergence Law and Ethics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MASC 611, 642 and 685. Explores the delicate balance that exists between freedom and control of the mass media (print, broadcast and new media). Focuses on judicial decisions and reasoning, given the impact the courts have on interpreting the First Amendment. Will also focus on new legal and ethical concerns created by the Internet and digital newsgathering and presentation technologies. Students will be immersed in the ethical decision-making process through the case-study approach.

MASC 654. Organizational Communication. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Study of theoretical constructs of the communication process in organizations. Application of communication principles to managerial functions, training, telecommunications and other organizational situations.

MASC 658. Account Leadership. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Restricted to Brandcenter students only. Students will learn first-hand general leadership skills crucial to developing successful relationships with agency personnel and clients. Emphasis will be given to exploring ways students can contribute to accounts not only strategically but creatively as well. Students will learn presentation and communication skills as well as effective ways to manage accounts. Students will sharpen previously prepared strategies as well as interviewing skills.

MASC 660. Advertising Account Research and Planning. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisites: MASC 650 and MASC 651. Develops student's ability to choose the most effective research methods for determining both the correct target 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 develop thoughtful questions that will deliver valuable insight.

MASC 665. Building Global Brands. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MASC 650 and MASC 651. Restricted to Brandcenter students only. Provides thorough coverage of an approach and framework for designing a comprehensive marketing plan suitable for implementations in an international setting, with particular focus on identifying and analyzing the important cultural and environmental uniqueness of single nations or global regions. We also will look at specific examples of cases that will better inform our planning efforts and will spend time examining various cultures in order to respectfully and appropriately engage them in our marketing plan.

MASC 671. Strategic PR in a Digital Environment. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: permission of instructor. An introduction to the thinking and actions required to communicate strategically in today's dynamic socioeconomic environment. Focus is on the skills and information to handle strategic public relations. Introduces cutting-edge technology and using the Internet as a strategic communications tool. Professional responsibilities emphasized.

MASC 672. Strategic PR Research and Evaluation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: permission of instructor. Introduces the basic theories and practices of strategic public relations research and evaluation. Both qualitative and quantitative techniques are examined.

MASC 675. Strategic PR Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: permission of instructor. An interactive exploration of navigating challenges from the perspective of organizational culture. Helps students foster diversity, support organizational change, make leadership more dynamic, operate ethically within the cultural environment and make the organization more effective overall.

MASC 676. Public Relations Ethics and Law. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MASC 675 or permission of instructor. An exploration of ethical and legal dimensions specific to public relations practice. Analysis of critical cases in the field.

MASC 681. Video Applications in Instruction. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: TEDU 556 and 610 or permission of instructor. Emphasizes the design and instructional strategies used with the production of video resources. Differentiates analog and digital video, importing images, video and sound, editing, previewing, transitions, filters, motion settings, superimposing, titles, special effect options, and exporting video. Students will produce and edit a personalized instructional module using digital video hardware and editing software. Crosslisted as: TEDU 620.

MASC 682. Strategic Media Relations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MASC 675 or permission of instructor. Focuses on what makes news, how different media work, how to determine the appropriate vehicle for the message and how to work with the media to control a message.

MASC 683. Strategic PR in the Global Environment. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MASC 671, 672 and permission of instructor. Examines the phenomenon of global strategic communications, including the enabling environmental factors. How to develop an integrated, holistic global communications program and how to manage such a program. Students experience one region of the world with an in-depth study tour.

MASC 684. Multiplatform Storytelling. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MASC 643, 645 and 646. Students will develop new ways of storytelling that leverage the power of the print, broadcast and online media, combining two or more of those platforms into a single, multimedia package. Analyzes the origins of multimedia and its current trends. Themes include the history of multimedia journalism, the adaptation process for traditional media, the search for a business model and the new news audience.

MASC 685. The Business of Media. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Will provide students with both a macro and micro understanding of the business operations of small and large newspapers, television and radio stations and online media. Students will examine newsroom operations, advertising and human resource issues. Will also examine laws and regulations governing media as well as ownership trends.

MASC 686. International Journalism. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MASC 611, 642, 643, 644, 645 and 646. Explores how major news organizations in the U.S. and abroad cover international news in the 21st century as well as the various media structures and systems that are in place in countries around the world. Students will examine the power and impact of global news media in shaping public opinion. They will study trends in international coverage. Students will explore the role of the press in a democracy as well as in authoritarian or communist nations. They will examine the ethical and legal dimensions of international reporting across various media systems, regulations and protocols. The course will also emphasize the ways in which technology is rapidly changing how news is developed and disseminated. Coverage of wars and major world conflicts will also be emphasized.

MASC 688. Converged Media Applications. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MASC 644 and 684. Graduate-level research and production focused on multimedia. Students will complete a significant multimedia project that draws on their experiences and the skills learned in other graduate courses.

MASC 691. Topics in Mass Communications. 1-3 Hours.
Semester course; 1-3 credits. May be repeated for 6 total credits. Prerequisite: permission of instructor and director of graduate studies. An advanced study of selected topic in mass communications. See the Schedule of Classes for specific topic(s) to be offered each semester.

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

MASC 693. Practicum in Mass Communications. 1-6 Hours.
Semester course; variable hours. 1-6 credits. May be repeated for credit. Prerequisite: permission of director of graduate studies. Student participation in planned research or internship experience under the supervision of mass communications faculty. Graded as pass/fail.

MASC 694. Strategic PR Campaign Design and Implementation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MASC 675, 676, 681 and 682. Brings together all the various tasks and concepts used in public relations work to shape an effective campaign. Through projects students become competent and proficient in analyzing cases, strategizing, implementing and evaluating public relations campaigns at senior management levels.

MASC 695. Fieldwork/Internship. 1-3 Hours.
Semester course; variable hours. 1, 2 or 3 credits per semester. Maximum total of 3 credits toward graduation. Prerequisite: permission of director of graduate studies. Selected students will receive on-the-job training under the supervision of an instructor and the employer. Internships are available in newspapers, magazines, public relations, advertising, radio and television. Graded S/U/F.

MASC 697. Portfolio Development for Strategists. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MASC 653. Continues the development and demonstration of critical thinking skills, insights and creative abilities in a variety of areas sought by agency planning directors, media planning directors, management supervisors 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 699. Thesis. 1-3 Hours.
1-3 credits. May be repeated. A maximum of 3 credits may be submitted toward the master's degree.

MATHEMATICS (MATH)

MATH 001. Elementary Algebra. 0 Hours.
Semester course; 3 lecture or 3 laboratory/tutorial hours. No credit. Prerequisite: permission of the department chair. The purpose of this course is to provide laboratory and tutorial instruction for those seeking remediation or review of high school algebra. Topics include basic properties of real numbers, operations with algebraic expressions, solution of equations and inequalities, exponents and radicals, introduction to functions and graphing.

MATH 121. Perspective Geometry. 1 Hour.
Short course (5 weeks); 3 lecture hours. 1 credit. Students will examine ways in which Renaissance artists who developed linear perspective in geometry in order to paint scenes realistically infuenced the development of mathematics and geometry. Topics covered will include the foundations of projective geometry. Pascal's mystic hexagram, Brianchon"s Theorem and duality. A need for higher mathematics will also be introduced and explained. MATH 121-122-123 fulfills the math requirement for art students. The sequence can be taken in any order.

MATH 122. Tessellations. 1 Hour.
Short course (5 weeks); 3 lecture hours. 1 credit. Students will examine ways in which mathematics is rooted in both natural philosophy and art by examining tiling theory. Course topics include Penrose tilings, symmetries and various other tessellations. MATH 121-122-123 fulfills the math requirement for art students. The sequence can be taken in any order.

MATH 123. Visualization. 1 Hour.
Short course (5 weeks); 3 lecture hours. 1 credit. Students will examine ways in which mathematics has been visualized artistically and will develop their own way to express a mathematical idea. Topics covered will include fractals, knots, minimal surfaces, non-Euclidean geometry and the fourth dimension. MATH 121-122-123 fulfills the math requirement for art students. The sequence can be taken in any order.

MATH 131. Introduction to Contemporary Mathematics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: satisfactory score on the VCU Mathematics Placement Test within the one-year period immediately preceding the beginning of the course. An exception to this policy is made in the case where the stated alternative prerequisite course has been completed at VCU. Topics include optimization problems, data handling, growth and symmetry, and mathematics with applications in areas of social choice. Major emphasis is on the process of taking a real-world situation, converting the situation to an abstract modeling problem, solving the problem and applying what is learned to the original situation. Does not serve as a prerequisite for MATH 151 or other advanced mathematical sciences courses.

MATH 141. Algebra with Applications. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: one year of high school algebra and satisfactory score on the VCU Mathematics Placement Test within the one-year period immediately preceding the beginning of the course. An exception to this policy is made in the case where the stated alternative prerequisite course has been completed at VCU. Topics include sets, functions, exponents, logarithms, matrix algebra, systems of linear equations, inequalities, binomial theorems, sequences, series, complex numbers and linear programming.

MATH 151. Precalculus Mathematics. 4 Hours.
Semester course; 3 lecture and 1 mathematics laboratory/recitation hours. 4 credits. Prerequisite: MATH 141 or satisfactory score on the VCU Mathematics Placement Test within the one-year period immediately preceding the beginning of the course. An exception to this policy is made in the case where the stated alternative prerequisite course has been completed at VCU. Concepts and applications of algebra and trigonometry. Topics include graphics, transformations and inverses of functions; linear, exponential, logarithmic, power, polynomial, rational and trigonometric functions.

MATH 191. Topics in Mathematics. 1-3 Hours.
Semester course; 1-3 credits. May be repeated for credit. A study of selected topics in mathematics. For a course to meet the general education requirements it must be stated in the Schedule of Classes. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

MATH 200. Calculus with Analytic Geometry. 4 Hours.
Continuous courses; 4 lecture hours. 4-4 credits. Prerequisite for MATH 200: MATH 151 or satisfactory score on the VCU Mathematics Placement Test within the one-year period immediately preceding the beginning of the course. Prerequisite for MATH 201: completion of MATH 200. Limits, continuity, derivatives, differentials, antiderivatives and definite integrals. Applications of differentiation and integration. Selected topics in analytic geometry. Infinite series.

MATH 201. Calculus with Analytic Geometry. 4 Hours.
Continuous courses; 4 lecture hours. 4-4 credits. Prerequisite for MATH 200: MATH 151 or satisfactory score on the VCU Mathematics Placement Test within the one-year period immediately preceding the beginning of the course. Prerequisite for MATH 201: completion of MATH 200. Limits, continuity, derivatives, differentials, antiderivatives and definite integrals. Applications of differentiation and integration. Selected topics in analytic geometry. Infinite series.

MATH 211. Mathematical Structures. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: calculus-level placement on the VCU Mathematics Placement Test within the one-year period immediately preceding enrollment in the course or MATH 151, MATH 200, MATH 201 or MGMT 212. An alternative prerequisite course may be approved at the discretion of the academic adviser. An introduction to mathematical logic and set theory, including applications in Boolean algebras and graph theory.

MATH 230. Mathematics in Civilization. 3 Hours.
Semester course; 3 lecture hours. 3 credits. For Honors College students only. The growth, development and far-reaching applications of trigonometry, navigation, cartography, logarithms and algebra through ancient, medieval, post-Renaissance and modern times are explored. Will include methods to solve mathematical problems using various historical procedures and will involve collaboration through group projects.

MATH 255. Introduction to Computational Mathematics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 201. (A core course for mathematics/applied mathematics majors.) An introduction to computer algebra systems (CAS) and their use in mathematical, scientific and engineering investigations/computations. Introductory mathematical computer programming using a CAS, including implementation of problem-specific algorithms.

MATH 291. Topics in Mathematics. 1-3 Hours.
Semester course; 1-3 credits. May be repeated for credit. A study of selected topics in mathematics. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

MATH 300. Introduction to Mathematical Reasoning. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 201. (A core course for mathematics/applied mathematics majors.) An introduction to basic concepts of mathematical reasoning and the writing of proofs in an elementary setting. Direct, indirect and induction proofs. Illustrations of the concepts include basic proofs from mathematical logic, elementary set theory, elementary number theory, number systems, foundations of calculus, relations, equivalence relations, functions and counting with emphasis on combinatorial proofs.

MATH 301. Differential Equations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 201. Solutions of ordinary differential equations of first order. Solutions of higher order linear differential equations with constant coefficients and variable coefficients by the methods of undetermined coefficients and variation of parameters, solutions by Laplace transforms and applications.

MATH 302. Numerical Calculus. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 255 (or knowledge of a programming language/mathematical software package) and MATH 201, or permission of the instructor. An introduction to numerical algorithms for solving systems of linear equations, finding zeroes, numerical differentiation and definite integration, optimization.

MATH 303. Investigations in Geometry. 3 Hours.
Semester course; 2 lecture and 3 laboratory hours. 3 credits. Prerequisite: MATH 361. Restricted to students majoring in the liberal studies for early and elementary education in the Bachelor of Interdisciplinary Studies program. A study of topics in Euclidean geometry to include congruence, similarity, measurement, coordinate geometry, symmetry and transformation in both two and three dimensions. These topics will be investigated using manipulatives and computer software.

MATH 305. Elementary Number Theory. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 300. Divisibility, congruences, Euler phi-function, Fermat's Theorem, primitive roots, Diophantine equations.

MATH 307. Multivariate Calculus. 4 Hours.
Semester course; 4 lecture hours. 4 credits. Prerequisite: MATH 201. The calculus of vector-valued functions and of functions of more than one variable. Partial derivatives, multiple integrals, line integrals, surface integrals and curvilinear coordinates. Lagrange multipliers; theorems of Green, Gauss and Stokes. Applications.

MATH 310. Linear Algebra. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 201. Systems of linear equations, vector spaces, linear dependence, bases, dimensions, linear mappings, matrices, determinants, quadratic forms, orthogonal reduction to diagonal form, eigenvalues and geometric applications.

MATH 350. Introductory Combinatorics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 201 with a minimum grade of C. An introduction to basic combinatorial concepts such as combinations, permutations, binomial coefficients, Fibonacci numbers and Pascal’s triangle; basic theorems such as the pigeonhole principle and Newton’s binomial theorem; algorithms such as bubble sort and quicksort; and discussion of basic applications such as chessboard problems, combinatorial games, magic squares and Latin squares.

MATH 351. Applied Abstract Algebra. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 300. A survey of several areas in applied abstract algebra which have applications in computer science such as groups, codes, matrix algebra, finite fields and advanced graph theory.

MATH 353. Experimental Mathematics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 201 with a minimum grade of C. An introduction to a mathematical computing package, computer manipulation of lists and sets, and symbolic computing. Numerical computation will be used to investigate mathematical objects, such as integers, prime numbers, graphs, matrices and to identify properties and patterns among these objects. Random methods will be used to explore properties and patterns in long sequences and large collections.

MATH 356. Graphs and Algorithms. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 201 with a minimum grade of C. An introduction to basic graph theoretic concepts such as trees, colorings and matchings; basic theorems such as the handshaking lemma and the Gallai identities; algorithms such as Dijkstra’s and Kruskal’s; and discussion of famous open problems such as finding shortest tours for a traveling salesman.

MATH 361. Numbers and Operations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: TEDU 101 and either MATH 131 or satisfactory score on the VCU Mathematics Placement Test within the one-year period immediately preceding the beginning of the course. Ways of representing numbers, relationships between numbers, number systems, the meanings of operations and how they relate to one another, and computation within the number systems as a foundation for algebra. Structured observations and tutoring of elementary-level students. Restricted to students majoring in the liberal studies concentration for early and elementary education in the Bachelor of Interdisciplinary Studies program.

MATH 362. Algebra and Functions. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 361. Topics include algebraic concepts, linear, quadratic, exponential, logarithmic, trigonometric functions including graphical modeling of physical phenomena. Attention will be given to the use of graphing technology, the transition from arithmetic to algebra, working with quantitative change, and the description and prediction of change. Structured observations and tutoring of elementary-level students. Restricted to B.I.S. students in the liberal studies for early and elementary education concentration.

MATH 380. Introduction to Mathematical Biology. 4 Hours.
Semester course; 3 lecture and 2 laboratory hours. 4 credits. Prerequisites: MATH 200 and BIOL 151, or permission of instructor. An introduction to mathematical biology. Various mathematical modeling tools will be covered and implemented in a range of biological areas. Additionally, the collaborative research process will be presented and discussed. Crosslisted as: BNFO 380/BIOL 380.

MATH 391. Topics in Mathematics. 1-3 Hours.
Semester course; 1-3 credits. May be repeated for credit. A study of selected topics in mathematics. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

MATH 401. Introduction to Abstract Algebra. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 300 and MATH 310, each with a minimum grade of C. An introduction to groups, rings and fields from an axiomatic point of view. Coset decomposition and basic morphisms.

MATH 404. Algebraic Structures and Functions. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 300 and MATH 310, each with a minimum grade of C; one additional mathematical sciences course; and permission of instructor. Semigroups, groups, rings, integral domains and fields. Exponential, logarithmic and trigonometric functions. Graphing in parametric and polar coordinates. Arithmetic and geometric sequences and series.

MATH 407. Advanced Calculus. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 300. Theoretical aspects of calculus. Topics include properties of real numbers, countable and uncountable sets, sequences and series, limits, continuity, derivatives, and Riemann integration.

MATH 409. General Topology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 407 with a minimum grade of C. Foundations and fundamental concepts of point-set topology. Topological spaces, continuity, convergence, connected sets, compactness, product spaces, quotient spaces, function spaces, separation properties.

MATH 415. Numerical Methods. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 255, MATH 301 and MATH 310, each with a minimum grade of C. Numerical methods for interpolation, solving systems of linear equations and initial value problems (ordinary differential equations) and the exploration of computational error.

MATH 427. Excursions in Analysis: Real. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 307, MATH 310 and MATH 407. May be repeated once for credit with a different emphasis and permission of the instructor. Intensive study of ideas and applications from real analysis.

MATH 428. Excursions in Analysis: Complex. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 307, MATH 310 and MATH 407. May be repeated once for credit with a different emphasis and permission of the instructor. Intensive study of ideas and applications from complex analysis.

MATH 429. Excursions in Analysis: Applied. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 301, MATH 307, MATH 310 and MATH 407. May be repeated once for credit with a different emphasis and permission of the instructor. Intensive study of ideas and applications from applied analysis.

MATH 430. The History of Mathematics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 300, MATH 307, MATH 310, and either MATH 301 or OPER 327, all with a minimum grade of C. 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.

MATH 431. Expositions in Modern Mathematics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 300, MATH 307, MATH 310, and either MATH 301 or OPER 327, all with a minimum grade of C. Descriptively studies several major ideas relevant to present-day mathematics, such as the advent of pure abstraction, difficulties in the logical foundations of mathematics, the impact of mathematics and statistics in the 20th century and the computer revolution.

MATH 432. Ordinary Differential Equations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 300, MATH 301, MATH 307 and MATH 310, each with a minimum grade of C. Existence and uniqueness of solutions, linearization and stability analysis, Lyapunov stability theory, periodic solutions, and bifurcations. Applications and simulations are emphasized.

MATH 433. Partial Differential Equations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 300, MATH 301, MATH 307 and MATH 310, each with a minimum grade of C. Parabolic (heat), hyperbolic (wave) and elliptic (steady-state) partial differential equations are studied. Solution techniques such as separation of variables, reflection methods, integral transform methods and numerical methods are demonstrated. Practical problems and applications are emphasized.

MATH 434. Discrete Dynamical Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 300, MATH 301, MATH 307 and MATH 310, each with a minimum grade of C. Theory and applications of difference equations including existence and uniqueness of solutions, linearization and stability, periodic solutions, and bifurcations.

MATH 454. Using Technology in the Teaching of Mathematics. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisites: MATH 200 and STAT 212, each with a minimum grade of C; six additional credits in the mathematical sciences; and permission of the instructor. Using graphing calculators, calculator-based labs and computer software packages in teaching topics in algebra, geometry, trigonometry, statistics, finance and calculus.

MATH 480. Methods of Applied Mathematics for the Life Sciences: Discrete. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 301, MATH 307, MATH 310 and MATH 380, each with a minimum grade of C. Focuses on the use of discrete dynamical system models to describe phenomena in biology and medicine. Students will explore the theoretical mathematics necessary to analyze these models. Computational solutions to these models will be developed and implemented to validate the models and to further explore the biological phenomena.

MATH 481. Methods of Applied Mathematics for the Life Sciences: ODE. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 301, MATH 307, MATH 310 and MATH 380, each with a minimum grade of C. Focuses on the use of ordinary differential equation models to describe phenomena in biology and medicine. Students will explore the theoretical mathematics necessary to analyze these models. Computational solutions to these models will be developed and implemented to validate the models and to further explore the biological phenomena.

MATH 482. Methods of Applied Mathematics for the Life Sciences: PDE. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 301, MATH 307, MATH 310 and MATH 380, each with a minimum grade of C. Focuses on the use of partial differential equation models to describe phenomena in biology and medicine. Students will explore the theoretical mathematics necessary to analyze these models. Computational solutions to these models will be developed and implemented to validate the model and to further explore the biological phenomena.

MATH 490. Mathematical Expositions. 3 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisites: UNIV 200 or HONR 200. Restricted to seniors in mathematical sciences with at least 85 credit hours taken toward the degree. Required for all majors in the Department of Mathematics and Applied Mathematics. A senior capstone course in the major designed to help students attain proficiency in expository mathematical writing and oral presentation, which require the efficient and effective use of mathematics and the English language. Students will learn a variety of topics in mathematics, write reviews of selected award-winning mathematics papers and write a senior paper.

MATH 492. Independent Study. 1-4 Hours.
Semester course; variable hours. 1-4 credits. Maximum 4 credits per semester; maximum total of 6 credits. Generally open only to students of junior or senior standing who have acquired at least 12 credits in the departmental discipline. Determination of the amount of credit and permission of instructor and department chair must be procured prior to registration for the course. The student must submit a proposal for investigating some area or problem not contained in the regular curriculum. The results of the student's study will be presented in a report.

MATH 493. Mathematical Sciences Internship. 3 Hours.
Semester course; the equivalent of at least 15 work hours per week for a 15-week semester. 3 credits. Mathematical sciences majors only with junior or senior standing. Admission by permission from the department chair. Through placement in a position in business, industry, government or the university, the student will serve as an intern in order to obtain a broader knowledge of the mathematical sciences and their applications.

MATH 502. Abstract Algebra I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 401 with a minimum grade of a C, or permission of instructor. A study of groups, subgroups, quotient groups and homomorphisms, group actions, sylow theorems, direct and semi-direct products, rings, integrals domains, and polynomial rings.

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

MATH 507. Bridge to Modern Analysis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to student with graduate standing. Metric spaces, normed vector spaces, inner-product spaces and orthogonality, sequences and series of functions, convergence, compactness, completeness, continuity, contraction mapping theorem, and inverse and implicit function theorems.

MATH 511. Applied Linear Algebra. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 310 or permission of instructor. 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 515. Numerical Analysis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to student with graduate standing. Knowledge of a programming language or mathematical software package recommended. Theoretical derivation and implementation of numerical methods. Topics to include direct methods, data fitting, differentiation, integration and solutions to ordinary differential equations.

MATH 535. Introduction to Dynamical Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to students with graduate standing. Theoretical and computational introduction to continuous and discrete dynamical systems with applications. Topics include existence and uniqueness of solutions, stability and bifurcations.

MATH 550. Combinatorics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 211 or MATH 300; and MATH 350, both with a minimum grade of C; or permission of instructor. Topics include basic counting, binomial theorems, combinations and permutations, recurrence relations, generating functions, and basic graph theory with emphasis to applications.

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

MATH 556. Graph Theory. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 211 or MATH 300; MATH 310; and MATH 356, each with a minimum grade of C; or permission of instructor. Introduction to graph classes, graph invariants, graph algorithms, graph theoretic proof techniques and applications.

MATH 585. Biomathematics Seminar:____. 1 Hour.
Semester course; 2 lecture hours. 1 credit. Prerequisite: MATH 301 or permission of instructor. May be repeated with different thematic content. Opportunity for students to develop their understanding of the connection between mathematics and the areas of biology and medicine. Activities include reading of classical and contemporary research literature, attending seminar talks and class discussions.

MATH 591. Topics in Mathematics. 1-3 Hours.
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 593. Internship in Mathematical Sciences. 3,6 Hours.
Semester course; variable hours. 1-6 credits. May be repeated for credit. Student participation in a planned educational experience under the supervision of a mathematical sciences faculty member. The internship may include supervised teaching, statistical consulting or participation in theoretical or applied research projects. A grade of P may be assigned students in this course. May be applied toward the degree in mathematical sciences only with the permission of the graduate affairs committee.

MATH 602. Abstract Algebra II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 502. A study of modules, vector spaces, field extensions and Galois theory.

MATH 607. Measure and Integration Theory. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: Math 507. Measurable sets and functions, sets of measure zero, Borel sets, Lebesgue measure and integral, fundamental convergence theorems, Lp spaces, and foundations of probability theory.

MATH 610. Advanced Linear Algebra. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Vector spaces, bases and dimension, change of basis. Linear transformations, linear functionals. Simultaneous triangularization and diagonalization. Rational and Jordan canonical forms.

MATH 615. Iterative Numerical Methods. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 515. Theoretical development of solutions to large linear and nonlinear systems by iterative methods with consideration given to optimal implementation.

MATH 632. Ordinary Differential Equations I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 507 and MATH 535. Linear systems theory; existence, uniqueness and continuous dependence for nonlinear systems; invariant manifolds; stable manifold theorem; Hartman-Grobman theorem; Lyapunov stability theory; Hamiltonian and gradient systems.

MATH 633. Partial Differential Equations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 507. Classification of partial differential equations, initial and boundary value problems, well-posedness; first-order equations and methods of characteristics; wave equation; heat equation, transform methods, maximum principle, energy methods; Laplace's equation. Other topics may vary depending on the interest of the students and the instructor.

MATH 640. Mathematical Biology I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 535. Mathematical modeling in the biological and medical sciences. Topics will include continuous and discrete dynamical systems describing interacting and structured populations, resource management, biological control, reaction kinetics, biological oscillators and switches, and the dynamics of infectious diseases.

MATH 650. Advanced Combinatorics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 550. Topics include advanced applications of the pigeonhole principle and inclusion-exclusion principle, recurrence relations, generating functions, special counting sequences, Ramsey theory, and combinatorial designs and codes.

MATH 655. Dynamics and Multivariable Control II. 3 Hours.
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. Crosslisted as: ENGR 655.

MATH 656. Advanced Graph Theory. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 556. This course lays a rigorous theoretical foundation for further advanced study in graph theory. Topics may include connectivity, matching, planarity, coloring, Hamiltonian cycles and topological graph theory, as well as further advanced material.

MATH 661. Number and Operations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Ways of representing numbers, relationships between numbers, number systems, the meanings of operations and how they relate to one another, and computation within the number system as a foundation for algebra; episodes in history and development of the number system; and examination of the developmental sequence and learning trajectory as children learn number concepts. A core course for preparation as a K-8 mathematics specialist. Not applicable to M.S. in Mathematical Sciences.

MATH 662. Geometry and Measurement. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Explorations of the foundations of informal measurement and geometry in one, two and three dimensions. The van Hiele model for geometric learning is used as a framework for how children build their understanding of length, area, volume, angles and geometric relationships. Visualization, spatial reasoning and geometric modeling are stressed. As appropriate, transformational geometry, congruence, similarity and geometric constructions will be discussed. A core course of preparation as a K-8 mathematics specialist. Not applicable to M.S. in Mathematical Sciences.

MATH 663. Functions and Algebra. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examination of representation and analysis of mathematical situations and structures using generalization and algebraic symbols and reasoning. Attention will be given to the transition from arithmetic to algebra, working with quantitative change, and the description of and prediction of change. A core course for preparation as a K-8 mathematics specialist. Not applicable to M.S. in Mathematical Sciences.

MATH 664. Statistics and Probability. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introduction to probability, descriptive statistics and data analysis; exploration of randomness, data representation and modeling. Descriptive statistics will include measures of central tendency, dispersion, distributions and regression. Analysis of experiments requiring hypothesizing, experimental design and data gathering. A core course for preparation as a K-8 mathematics specialist. Not applicable to M.S. in Mathematical Sciences.

MATH 665. Rational Numbers and Proportional Reasoning. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Basic number strands in fractions and rational numbers, decimals and percents; ratios and proportions in the school curriculum. Interpretations, computations and estimation with a corrdinated program of activities that develop both rational number concepts and skills and proportional reasoning. A core course for preparation as a K-8 mathematics specialist. Not applicable to M.S. in Mathematical Sciences.

MATH 667. Functions and Algebra II. 3 Hours.
Semester course; 3 lecture hours, 3 credits. Prerequisite: Math 663 or equivalent. Examination of the K-8 strands related to algebra. A study of linear, exponential and quadratic functions. Use of number lines, coordinate axes, tables, graphing calculators and manipulatives to understand core algebraic ideas and real-world contexts. Course provides preparation for K-8 mathematics specialists. Not applicable to M.S. in Mathematical Sciences.

MATH 690. Research Seminar. 2 Hours.
Semester course; 2 lecture hours; 2 credits. Enrollment is restricted to students with graduate standing. Discussion of topics in the mathematical sciences stimulated by independent reading in selected area. Each student will give at least one oral presentation and complete an expository writing assignment.

MATH 691. Special Topics in Mathematics. 1-3 Hours.
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. Possible 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. 1-3 Hours.
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. 1-3 Hours.
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/F may be assigned in this course.

MATH 707. Functional Analysis I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 507. Banach and Hilbert spaces, bounded linear maps, Hahn-Banach theorem, open mapping theorem, dual spaces, weak topologies, Banach-Alaoglu theorem, reflexive spaces, compact operators, spectral theory in Hilbert spaces.

MATH 715. Numerical Solutions for Differential Equations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 515 or MATH 615. Students will use the finite difference method and the finite element method to solve ordinary and partial differential equations. Course will explore the theoretical underpinnings of the techniques and implement the methods to solve a variety of equations.

MATH 727. Topics in Analysis: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated for credit with different topics. A detailed study of selected topics, which may include complex analysis, geometric analysis, harmonic analysis, mathematical logic, nonlinear functional analysis, nonstandard analysis and variational analysis.

MATH 732. Ordinary Differential Equations II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 632. Center manifold theory; normal form theory; oscillations in nonlinear systems; local bifurcation theory of equilibria and periodic orbits.

MATH 750. Topics in Combinatorics: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with different topics for credit. Prerequisite: MATH 650. A detailed study of selected topics, which may include probabilistic methods, linear algebra methods, extremal problems, partially ordered sets and symmetric functions.

MATH 756. Topics in Graph Theory: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with different topics for credit. Prerequisite: MATH 656. A detailed study of selected topics, which may include extremal graph theory, spectral graph theory, infinite graphs, random graphs and graph minors.

MATH 769. Topics in Applied Mathematics: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with different topics for credit. A detailed study of selected topics, which may include advanced partial differential equations, discrete dynamical systems, fluid dynamics, computational physiology, disease dynamics, kinetic theory, optimal transportation, numerical optimization and population dynamics.

MECHANICAL AND NUCLEAR ENGINEERING (EGMN)

EGMN 102. Engineering Statics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 200 with a minimum grade of C or permission of instructor. Corequisite: PHYS 207 or permission of instructor. The theory and application of engineering mechanics applied to the design and analysis of rigid structures. Equilibrium of two- and three-dimensional bodies. The study of forces and their effects. Applications to engineering systems.

EGMN 103. Mechanical and Nuclear Engineering Practicum I. 1 Hour.
Semester course; 3 laboratory hours. 1 credit. Students will perform a sequence of laboratory modules designed to provide practical hands-on exposure to important topics, equipment and experimental methods in mechanical and nuclear engineering. Topics covered include communication, optimization, reverse engineering, mechanics, thermodynamics and electric circuits.

EGMN 190. Introduction to Mechanical and Nuclear Engineering. 1 Hour.
Semester course; 1 lecture hour. 1 credit. The course will introduce students to the engineering profession, present basic mechanical and nuclear engineering concepts and include seminars presented by alumni, industry and experts in their fields.

EGMN 201. Dynamics and Kinematics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: PHYS 207, EGMN 102 and MATH 201, with a minimum grade of C in each, or permission of the instructor. Kinematics and kinetics of particles. Kinematics of rigid bodies; translation and fixed-axis rotation relative to translating axes, general planar motion, fixed-point rotation and general motion. Kinetics of rigid bodies: center of mass, mass moment of inertia, product of inertia, principal-axes, parallelaxes theorems. Planar motion, work-energy method. Design of cams, gears and linkages.

EGMN 202. Mechanics of Deformables. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGMN 102 and MATH 201, with a minimum grade of C in both, or permission of the instructor. An introductory course covering the mechanics of deformable solids. Subjects include stress, strain and constitutive relations; bending of beams; torsion; shearing; deflection of beams; column buckling; fatigue; failure theory; analysis and design of bar-type members.

EGMN 203. Mechanical and Nuclear Engineering Practicum II. 1 Hour.
Semester course; 3 laboratory hours. 1 credit. Students will perform a sequence of laboratory modules designed to provide practical hands-on exposure to important topics, equipment and experimental methods in mechanical and nuclear engineering. Topics covered include additive manufacturing, radiation detection and measurement, radiation shielding, data acquisition and computer interfacing, coding for instrumentation control.

EGMN 204. Thermodynamics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: PHYS 207 and MATH 201 with a minimum grade of C in both, or permission of the instructor. Fundamental concepts of thermodynamics; first and second law of thermodynamics; entropy and equilibrium; equations of state; properties of pure fluids; molecular interpretation of thermodynamic properties; phase equilibria; work and heat; power cycles; chemical reactions.

EGMN 215. Engineering Visualization and Computation. 3 Hours.
Semester course; 2 lecture and 3 laboratory hours. 3 credits. Prerequisites: mechanical engineering major or permission of the instructor. Programming in C++ and MATLAB will be introduced. The creation and interpretation of graphical communication for engineering students. Two- and three-dimensional part and assembly representations. Dimensioning and tolerancing as a link between design and manufacturing. An introduction to solid modeling and virtual prototyping. The course will impart proficiency in computer and graphical applications of fundamental and practical importance to engineering students.

EGMN 300. Mechanical Systems Design. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGMN 201 and EGMN 202, with a minimum grade of C in both, or permission of the instructor. Basic principles of applied mechanics and materials employed for the design of machine elements and mechanical systems; state of stress, deformation and failure criterion is applied to bearings, brakes, clutches, belt drives, gears, chains, springs, gear trains, power screws and transmissions.

EGMN 301. Fluid Mechanics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: PHYS 207 and EGMN 204, with a minimum grade of C in each, or permission of instructor. Corequisite: MATH 301 or permission of instructor. Basic and applied fluid mechanics; fluid properties; application of Bernoulli and Navier-Stokes equations; macroscopic mass, momentum and energy balances; dimensional analysis; laminar and turbulent flow; boundary layer theory; friction factors in pipes and packed beds; drag coefficients; compressible flow; flow measurements; numerical simulation; applications to the operation and design of turbo machinery.

EGMN 302. Heat Transfer. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ENGR 301, EGMN 204, MATH 301 and 307, with a minimum grade of C in each, or permission of instructor. Basic and applied heat transfer; diffusion and rate concepts; evaporation; boiling and condensation; dispersion coefficients; stagnant film; falling film; porous membrane; packed bed; numerical simulation; applications to industrial processes. Lecture topics will include a review of fundamental concepts in thermodynamics.

EGMN 303. Thermal Systems Design. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 301, ENGR 301 and EGMN 204, with a minimum grade of C in each, or permission of the instructor. Fundamentals of heat transfer, thermodynamics and fluid mechanics applied to the analysis, design, selection and application of energy conversion systems.

EGMN 305. Sensors/Measurements. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 301 with a minimum grade of C, PHYS 208 and STAT 541; or permission of instructor. Introduction to sensors and their utilization for measurement and control; sensor types: electromechanical, electro-optical, electro-chemical; applications in medicine, chemical manufacturing, mechanical control and optical inspection.

EGMN 309. Material Science for Engineers. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CHEM 101 or permission of instructor. The study of materials from a microscopic or atomic level. Consideration of mechanical, electrical, thermal, magnetic and optical properties of metals, ceramics, polymers and composites. Thermal processing for modification of properties, dislocation and phase transformation. Material selection for design with consideration of economic, environmental and societal issues.

EGMN 311. Solid Mechanics Lab. 1.5 Hour.
Semester course; 4.5 laboratory hours. 1.5 credits. Prerequisites: EGMN 201 and 202, with a minimum grade of C in both, or permission of the instructor. Experiments will be conducted on fundamental principles of solid mechanics, materials and dynamics. Topics covered include testing of materials for tensile, compression, bending and torsional loads, vibrations and material microstructure.

EGMN 312. Thermal Sciences Lab. 1.5 Hour.
Semester course; 4.5 laboratory hours. 1.5 credits. Prerequisites: ENGR 301, with a minimum grade of C, or permission of the instructor. Experiments will be conducted on fundamental principles of fluid mechanics, thermodynamics and heat transfer. Topics covered include hydrostatics, Bernoulli equation, impact jets, aerodynamic force, heat pump thermodynamics cycles, heat exchangers and convection heat transfer.

EGMN 315. Process and Systems Dynamics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 301, EGRE 206, EGMN 201 and PHYS 207, all with a minimum grade of C; or permission of instructor. Undergraduate course covering the analysis of chemical, fluid, mechanical and electrical dynamic systems. Pedagogically, a single approach is taught that applies to any of the systems in any of these disciplines using conservation equations and constitutive relationships to build the systems of differential equations needed for the analysis. The mathematical structures of the types of differential equations typically generated in dynamic physical systems are reviewed and both analytical and numerical solution techniques are taught. Finally, the tools used to develop control components for systems in these areas are covered along with the mathematical tools (e.g., Laplace transforms) needed for their analysis.

EGMN 321. Numerical Methods. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 301 and EGMN 215, with a minimum grade of C in both, or permission of instructor. A study of numerical algorithms used in error analysis, computing roots of equations, solving linear algebraic equations, curve fitting, numerical differentiation and integration, numerical methods for ordinary differential equations and a brief introduction to numerical methods for partial differential equations. The course content is tailored for mechanical engineering applications.

EGMN 351. Nuclear Engineering Fundamentals. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to mechanical engineering majors. Prerequisite: MATH 200 with a minimum grade of C or permission of the instructor. An introductory course to familiarize students with the concepts, systems and application of nuclear energy. Topics include radioactivity, fission, fusion, reactor concepts, biological effects of radiation, nuclear propulsion and radioactive waste disposal. Designed to provide students with a broad perspective of nuclear engineering.

EGMN 352. Nuclear Reactor Theory. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGMN 351 with a minimum grade of C or permission of instructor. Corequisite: MATH 301 or permission of instructor. This course introduces the fundamental properties of the neutron, the reactions induced by neutrons, nuclear fission, the slowing down of neutrons in infinite and finite media, diffusion theory, the 1-group or 2-group approximation, point kinetics, and fission-product poisoning. Provides students with the nuclear reactor theory foundation necessary for reactor design and reactor engineering problems.

EGMN 355. Radiation Safety and Shielding. 3 Hours.
Semester course; 2 lecture and 3 laboratory hours. 3 credits. Prerequisite: EGMN 352 with a minimum grade of C, or permission of instructor. Fundamentals of radiation safety and shielding with focus on sources of radioactivity, interaction of radiation with matter, biological effects of radiation, dosimetry, attenuation of gamma rays and neutrons and effectiveness of shielding methods.

EGMN 356. Nuclear Instrumentation and Measurements. 3 Hours.
Semester course; 6 laboratory hours. 3 credits. Prerequisite: EGMN 355 with a minimum grade of C or permission of instructor. Provides an in-depth study of radiation detection systems. Students will understand both the practical operation of detection systems as well as the physical processes involved in radiation detection, attenuation and shielding.

EGMN 401. Mechanical Engineering Leadership. 3 Hours.
Semester course; 9 laboratory hours. 3 credits. Enrollment restricted to students with junior or senior standing in mechanical engineering and permission of the instructor. Senior/junior students will serve as lab teaching assistants in EGMN 103, EGMN 203, EGMN 215, EGMN 311 or EGMN 312. Leadership skills will be honed as the senior/junior students guide, lead and supervise other students as they complete hands-on learning modules and/or design, conduct, analyze and report on experiments in one of these lab courses.

EGMN 402. Senior Design Studio (Laboratory/Project Time). 2 Hours.
Continuous course; 6 laboratory hours. 2 credits. Prerequisite: senior standing and participation in a senior design (capstone) project. Mechanical engineering majors are required to have the following prerequisites: EGMN 300, 303 and 420, and either EGMN 421 or EGRN 420, with a minimum grade of C in each. A minimum of six laboratory hours per week dedicated to the execution phase of the senior design (capstone) project, which should meet appropriate engineering standards and multiple realistic constraints. Tasks include team meetings, brainstorming, sponsor advising, designing, fabrications, assembling, reviewing, studying, researching, testing and validating projects.

EGMN 403. Senior Design Studio (Laboratory/Project Time). 2 Hours.
Continuous course; 6 laboratory hours. 2 credits. Prerequisite: senior standing and participation in a senior design (capstone) project; EGMN 402. A minimum of six laboratory hours per week dedicated to continuing the execution phase of the senior design (capstone) project, which should meet appropriate engineering standards and multiple realistic constraints. Tasks include team meetings, brainstorming, sponsor advising, designing, fabrications, assembling, reviewing, studying, researching, testing and validating projects.

EGMN 416. Mechatronics. 3 Hours.
Semester course; 2 lecture and 3 laboratory hours. 3 credits. Prerequisites: senior standing and EGRE 206 with a minimum grade of C, or permission of instructor. Lecture materials and laboratory experiments focus on the fundamentals of design-oriented mechanical, electrical and computer systems integration. Specifically, students learn analog and digital electronic design, data acquisition, transducers, actuator technologies and control, design with microprocessors and embedded electronics, and application of control theory.

EGMN 420. CAE Design. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGMN 201 and EGMN 215, with a minimum grade of C in both, or permission of instructor. Review of geometric modeling, engineering visualization tools applicable to engineering design. Develop visual thinking and communication skills with assistance of computer modeling tools. Emphasis placed on creative design, application of physical laws, and hands-on virtual or physical projects. Topics include review of kinematics/dynamics of commonly used planar mechanisms and programming techniques for motion simulation. Interdisciplinary projects will be assigned to assess students' design knowledge.

EGMN 421. CAE Analysis. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisites: EGMN 202 and EGMN 215; and MATH 301 and MATH 307, all with a minimum grade of C, or permission of the instructor. Application of computer-aided techniques to the analysis of engineering problems utilizing linear algebra, computer calculations of matrices and numerical solution of governing differential equilibrium equations common to all fields of engineering. Students will be exposed to formulations of finite element methods of analysis. Emphasis is placed on practical aspects of structural FE modeling. Analysis programs such as ANSYS, MSC/PATRAN, MSC/NASTRAN and/or MATLAB are utilized.

EGMN 422. Design and Additive Manufacturing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGMN 420 or permission of the instructor. Design and additive manufacturing is the use of layer-based processes for producing parts directly from computer-aided design models without part-specific tooling. In this course students will learn about various AM technologies focusing upon their potential to support rapid prototyping and manufacturing processes coupled with the important research challenges associated with AM. This course will expand students' knowledge in design and applied engineering as they model, fabricate, test, discuss and iterate upon mechanical 3D objects they design throughout the semester.

EGMN 425. Introduction to Manufacturing Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: senior standing in the School of Engineering or permission of the instructor. Basic principles of systems analysis and modeling applied to manufacturing processes and operations; numerical control, programmable controllers, flexible manufacturing systems, group technology, process planning and control, modeling and simulation of factory operations.

EGMN 426. Manufacturing Processes. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: senior standing in the School of Engineering or permission of the instructor. Introduction to the operation and design of metal fabrication processes; analysis of metal casting, extrusion, rolling, forging, wire and rod drawing; review of metal removal and joining methods; economic and business considerations.

EGMN 427. Robotics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: senior standing in the School of Engineering or permission of the instructor. Introduction to the state-of-the-art and technology of robotics and its applications for productivity gain in industry.

EGMN 428. Polymer Processing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ENGR 301 and 302, with a minimum grade of C in both, or permission of the instructor. Basic principles of momentum and heat transfer applied to the analysis of polymer processing operations; introduction to polymer rheology; operation and design aspects of extruders, blown film, injection molding, thermoforming and compression molding machinery.

EGMN 435. Design for Manufacturing and Assembly. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: senior standing in the School of Engineering or permission of the instructor. Methodologies used in the synthesis and analysis of product design in order to optimize manufacturing and assembly; relationship of design to the production processes, materials handling, assembly, finishing, quality and costs with emphasis on both formed and assembled products.

EGMN 436. Engineering Materials. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: senior standing in the School of Engineering or permission of the instructor. Materials properties and their modification as related to engineering properties and design; elastic and plastic stress-strain behavior of materials along with diffusion in solids, phase equilibria, and phase transformations; materials selection considerations include design, fabrication, mechanical failure, corrosion, service stability as well as compatibility and function in the human body.

EGMN 437. Principles of Polymer Engineering. 3 Hours.
Semester course; 3 lecture and 1 laboratory hours. 3 credits. Prerequisites: EGMN 202 with a minimum grade of C, or permission of the instructor. Basic principles of mechanics applied to the mechanical design and fabrication of polymers; introduction to polymer structure, rubber elasticity, and viscoelasticity; mechanical properties, plastic part design and plastic materials selection; fabrication processes.

EGMN 450. Nuclear Reactor Control and Dynamics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 301, EGMN 201 and EGRN 420, with a minimum grade of C in each, or permission of instructor. An introduction to control theory and its applications for nuclear engineering students. Modeling and development of differential equations for nuclear systems. Analysis of nuclear reactor dynamics in the time and frequency domains. Application of feedback control techniques to reactor operation, stability and performance.

EGMN 451. Nuclear Safety and Security. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGRN 420EGMN 455 with a minimum grade of C, or permission of the instructor. A study of technological risks and security issues related to nuclear power. Analysis of nuclear reactor system components and operational features that are relevant to safety; reactor containment; safety analysis of nuclear power plants using deterministic and probabilistic models; methods for human, environmental and ecological risk assessment; NRC regulations and procedures; safeguarding against natural (earthquake, tornadoes) and human (domestic and international) threats; classification and consequences of accidents including historical case studies.

EGMN 453. Economics of Nuclear Power Production. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGMN 352 with a minimum grade of C or permission of instructor. Fundamentals of engineering economic analysis are applied to energy supply, demand, prices and production with specific emphasis on nuclear energy, the capital cost of nuclear power plants, the nuclear fuel cycle and associated energy technologies.

EGMN 455. Nuclear Power Plants. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGMN 204 and EGMN 352, each with a minimum grade of C, or permission of instructor. Design and analysis of nuclear power plants. Review of thermodynamic cycles and reactor types; analysis of the coupling of the reactor and the power plant; thermal and mechanical design of steam turbines; turbogenerators; auxiliary systems; design synthesis and heat balance calculations; operation of nuclear reactors.

EGMN 456. Reactor Design and Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGMN 302, 303 and 455, each with a minimum grade of C, or permission of instructor. Engineering principles of nuclear reactors, emphasizing power reactors. Specific topics include power plant thermodynamics, reactor heat generation and removal (single-phase as well as two-phase coolant flow and heat transfer), and structural mechanics. The course also covers engineering considerations in reactor design.

EGMN 491. Special Topics in Engineering. 1-5 Hours.
Semester course; variable hours. 1-5 credits. May be repeated with different content. Prerequisite: determined by the instructor. Specialized topics in engineering designed to provide a topic not covered by an existing course or program. General engineering or multidisciplinary. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

EGMN 492. Independent Study in Engineering. 1-5 Hours.
Semester course; variable hours. 1-5 credits. May be repeated with different content. Enrollment requires permission of the instructor. Students must submit a written proposal to be approved by the supervising instructor prior to registration. Investigation of specialized engineering problems that are multidisciplinary or of general interest through literature search, mathematical analysis, computer simulation and/or laboratory experimentation. Written and oral progress reports as well as a final report and presentation are required.

EGMN 501. Advanced Manufacturing Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGMN 425 and EGMN 426, graduate standing in the School of Engineering, or permission of instructor. Studies the fundamental systems required for mechanical, chemical and electrical manufacturing, including material procurement, logistics, quality and distribution. The principles are applied to all types of manufacturing processes from project through continuous. Advanced systems for lean, agile and global manufacturing also are covered.

EGMN 502. Product Design and Development. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: senior or graduate standing in the School of Engineering, 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.

EGMN 505. Characterization of Materials. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: senior or graduate standing in the School of Engineering, or permission of instructor. 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.

EGMN 506. Industrial Hygiene. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to students with senior or graduate standing in the School of Engineering or by permission of instructor. The course will acquaint students with methods used by industrial hygienists to identify, evaluate and control human exposure to toxic contaminants and harmful physical agents in the workplace and in the environment. Students will develop an understanding of the ethical issues confronting industrial hygienists and other health professionals.

EGMN 507. Law and Engineering. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to students with senior or graduate standing in the school of Engineering, or by permission of instructor. The course proposes to acquaint the student with legal concepts that affect the engineering community and enable the student to understand how technical and scientific regulations are promulgated and how interest groups attempt to ensure that regulations consider their positions. In addition, the course introduces intellectual property law: patents, copyrights and trademarks.

EGMN 508. Lean Manufacturing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to students with senior or graduate standing in the School of Engineering or by permission of instructor. The objective of the class is to introduce lean thinking -- defined as a systematic, logical method of identifying and eliminating waste using continuous assessment. The classes focus on managing flow, identifying and eliminating waste, problem-solving, and product and process design.

EGMN 509. Advanced Lean Manufacturing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to students with senior or graduate standing in the School of Engineering or by permission of instructor. The course builds on the knowledge gained in lean manufacturing. The class allows the student to use their lean tools in a real manufacturing environment. The course reviews autonomation, load leveling, distribution, logistics, flow and added work, among many other topics. At the end of the course students will be able to take the Lean Bronze Certificate Test, given by the Society of Manufacturing Engineers.

EGMN 510. Probabilistic Risk Assessment. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: senior or graduate standing in the School of Engineering, or permission of instructor. An introduction to probabilistic risk assessment methods as applied to nuclear power plants. Students will receive hands-on experience in PRA methods by designing and building a PRA model for an operational nuclear power plant. Students will use state-of-the-art software to design a nuclear plant model, using event trees, fault trees, industry failure and unavailability data, and current human reliability analysis methods. Using the completed model, students will calculate and use appropriate risk metrics in typical applications.

EGMN 515. Vibrations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGMN 201 with a minimum grade of C, graduate standing in the School of Engineering or permission of the instructor. Provides students with vibrations theory and practical applications for machines and structures necessary (a) to perform analysis and evaluation of vibrations problems and (b) to recognize suspicious results from canned computer software. Emphasis placed on the formulation of governing differential equations, solution methods, evaluation of results and interpretation of response characteristics of discrete mass systems and continuous mass systems. Work and energy methods, variational methods, and Lagrange's Equations will be used to formulate problems. Solution methods will use exact and approximate methods, including eigensolution methods. Applications to the vibrations of various mechanical systems will use computational techniques, computer simulation and analysis.

EGMN 518. Advanced HVAC. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to students with graduate standing in the School of Engineering or by permission of instructor. The course intends to reinforce the fundamentals of HVAC systems and apply them to research topics. Student will review the basics of HVAC systems; the use of psychrometric charts to deal with various moist-air processes; indoor environment health, thermal comfort and indoor air quality control; heat transmission in building structures; solar irradiation; basic space heating and cooling load calculations; and space air distribution and related equipment.

EGMN 525. Feedback Control. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: experience using MATLAB software; EGMN 315 and EGMN 410, with a minimum grade of C in both; graduate standing in the School of Engineering; or permission of instructor. In-depth study of the fundamentals of feedback control systems theory and design. Topics covered include transfer function modeling, system stability and time response, root locus, Bode and Nyquist diagrams, lead, lag, and PID compensators.

EGMN 530. System Analysis of the Nuclear Fuel Cycle. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGMN 355, with a minimum grade of C, graduate standing in the School of Engineering or permission of instructor. Provides an in-depth technical and policy analysis of various options for the nuclear fuel cycle. Topics include uranium supply, enrichment fuel fabrication, in-core physics and fuel management of uranium, thorium and other fuel types, reprocessing, and waste disposal. Also covered are the principles of fuel-cycle economics and the applied reactor physics of both contemporary and proposed thermal and fast reactors. Nonproliferation aspects, disposal of excess weapons plutonium and transmutation of actinides and selected fission products in spent fuel are examined. Several state-of-the-art computer programs are provided for student use in problem sets and term papers.

EGMN 545. Energy Conversion Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGMN 204 and EGMN 301, with a minimum grade of C in both, graduate standing in the School of Engineering, or permission of the instructor. Quantitative and qualitative study of traditional and alternative systems used to generate electricity. Topics include combustion, coal-fired boilers, nuclear reactors, steam turbine blading, gas turbine combustors, turbo-generator design, internal combustion engines, solar thermal systems, photovoltaic devices, wind energy, geothermal energy and fuel cells. Additional topics of interest to the students may be discussed.

EGMN 550. Energy and Sustainability. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment requires senior or graduate standing in the School of Engineering or permission of instructor. This course will explore the various available energy resource options and technologies with a focus toward achieving sustainability on a local, national and global scale. The course will examine the broader aspects of energy use, including resource estimation, environmental effects, interactions among energy, water and land use, social impacts, and economic evaluations. Students will review the main energy sources of today and tomorrow, from fossil fuels and nuclear power to biomass, hydropower and solar energy, including discussions on energy carriers and energy storage, transmission, and distribution.

EGMN 551. Experimental Methods for Engineers. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: senior or graduate standing in the School of Engineering or permission of the instructor. An introduction to design of experiments theory, DoE and methods such as six-sigma and factorial experimental design to engineering projects. Provides students with the necessary background to plan, budget and analyze an experiment or project.

EGMN 555. Smart Materials. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: senior standing and EGMN 202 and EGMN309, with a minimum grade of C in both, graduate standing in the School of Engineering, or permission of the instructor. Covers various smart materials, such as shape memory alloys and piezoelectric and magnetostrictive materials, current research in material development and diverse applications in areas such as medicine, automobiles and aerospace. The aim of the course is to bridge the gap between different areas of material development, characterization, modeling and practical applications of smart materials.

EGMN 560. Monte Carlo Simulations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to students with senior or graduate standing in the School of Engineering or by permission of instructor. The course covers key aspects of computer modeling and simulation with the emphasis on statistical resampling and Monte Carlo techniques. Students will complete a number of modeling projects utilizing programming languages commonly used in the nuclear industry. As such the course includes gaining a basic proficiency in the appropriate programming language, including the development of good programming practices.

EGMN 565. Design Optimization. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGRM 420 and 421, with a minimum grade of C in each, graduate standing in the School of Engineering, 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.

EGMN 566. Advanced Computer-aided Design and Manufacturing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGMN 420, EGMN 421, EGMN 425 and EGMN 426, with a minimum grade of C in each, graduate standing in the School of Engineering 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.

EGMN 568. Robot Manipulators. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: graduate standing in the School of Engineering 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.

EGMN 570. Effective Technical Writing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: UNIV 200 or equivalent with a minimum grade of C, or permission of instructor. The course will involve intensive study of different aspects of technical communications. Critical reading and writing skills will be developed particularly for technical essays, targeted for both educated and specialized audience. Nontechnical writing will be used as an inspiration for technical writing. Other aspects of technical communications will also be covered.

EGMN 571. Introduction to Computational Fluid Dynamics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGMN 301 with a minimum grade of C, graduate standing in the School of Engineering or permission of the instructor. Students will become familiar with basic aspects of CFD, including characteristics of the governing equations, finite-difference and finite-volume solution methods, implicit versus explicit solution algorithms, grid generation, and numerical analysis. Emphasis placed on mechanical, chemical and bioengineering systems. The final course project will emphasize issues of current research such as biofluid mechanics, medical devices and MEMS.

EGMN 573. Engineering Acoustics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: graduate standing in the School of Engineering or permission of the 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.

EGMN 574. Nuclear Safeguards, Security and Nonproliferation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to students with senior or graduate standing in the School of Engineering or by permission of instructor. This course will explore the political and technological issues involved with nuclear safeguards, security and nonproliferation. Topics studied will include the history of nuclear weapons development, description and effects of weapons of mass destruction, nuclear material safeguards, protection of nuclear materials, proliferation resistance and pathways in the nuclear fuel cycle, international and domestic safeguards, nuclear terrorism, and safeguards measurement techniques for material accountancy programs and physical protection mechanisms.

EGMN 575. Fast Breeder Reactors. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to students with senior or graduate standing in the School of Engineering or by permission of instructor. This course will examine the physical, technical and economic features of fast breeder reactors. In particular, the course will study the need for fast reactors and their design objectives, typical core design principles, and important plant systems. The course will also discuss the major nuclear safety topics and their design approaches.

EGMN 580. Flow Control. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGMN 301 with a minimum grade of C, graduate standing in the School of Engineering or permission of instructor. Passive, active and reactive flow management strategies to achieve transition delay/advance, separation control, mixing augmentation, drag reduction, lift enhancement and noise suppression. Unified framework for flow control. Futuristic reactive control methods using MEMS devices, soft computing and dynamical systems theory.

EGMN 591. Special Topics in Engineering. 1-4 Hours.
Semester course; 1-4 variable hours. 1-4 credits. Prerequisite: senior or graduate standing in the School of Engineering, or permission of the instructor. 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.

EGMN 602. Convective Heat Transfer. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: graduate standing in the School of Engineering, or permission of instructor. In-depth quantitative study of convective heat transfer. Topics include laminar boundary layer flow, laminar duct flow, external natural convection, internal natural convection, transition to turbulence, turbulent boundary layer flow, turbulent duct flow, free turbulent flows, convection with change of phase, convection in porous media.

EGMN 603. Mechanical and Nuclear Engineering Dynamic Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGMN 504 or graduate standing in mechanical and nuclear engineering. This course presents the technical foundation for application and use of dynamic systems and presents methods to formulate the governing differential equations of such systems and to obtain realistic analytical and numerical solutions. The organization of the course presents theory and methods and specific applications for typical dynamic systems.

EGMN 604. Mechanical and Nuclear Engineering Materials. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The course consists of advanced topics in both fundamental and applied materials science including solid state fundamentals, crystal structure, diffraction in crystals, postulates of quantum mechanics, Bloch functions and energy bands, Fermi distributions, classification and processing of materials, alloys and phase diagrams, defects, dislocation dynamics, solid state diffusion, thermal and mechanical properties, corrosion, high temperature deformation mechanisms, basics of fracture mechanics, fundamentals of ionization radiation, irradiation effects on material properties, and materials selection for extreme environment applications.

EGMN 605. Mechanical and Nuclear Engineering Analysis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to students with graduate standing in mechanical and nuclear engineering. The course covers advanced topics in applied mathematics most important for solving practical problems in mechanical and nuclear engineering. Topics include Fourier analysis, partial differential equations, boundary value problems, series solutions, complex analysis, conformal mapping, complex analysis and potential theory, applications in fluid mechanics, vibrations, and mechanical and nuclear engineering problems.

EGMN 606. Mechanical and Nuclear Engineering Continuum Mechanics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to students with graduate standing in mechanical and nuclear engineering. The topics include scalars, vectors and tensors; indicial notation; transformation law; principal values and directions; tensor fields; integral theorems of Gauss and Stokes; stress; Mohr's circle; strain; kinematics of deformation and motion; rate of deformation; general principles (continuity, momentum, energy); constitutive equations; linear elasticity; Hooke's law; three-dimensional elasticity; classical fluids; Navier-Stokes equations; Bernoulli equation; flow (viscous, steady, irrotational).

EGMN 607. Heat and Mass Transfer Theory and Applications. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: EGMN 503. Enrollment requires graduate standing in MNE. A solid theoretical and applied understanding of heat and mass transfer is critical for training competent mechanical and nuclear engineers. This course will provide students with a theoretical understanding of the heat transport processes of conduction, convention and radiation as well as an understanding of parallels with mass transfer. Solution techniques will be both analytical and numerical, consistent with problems faced by modern engineers. Applications in the field of mechanical engineering include the design of cooling systems for automobiles, conventional power plants, heat engines and computers. Applications in the field of nuclear engineering include maintaining nuclear core temperatures and nuclear plant heat dissipation. Mass transfer applications include any process involving multiple species (e.g., two gases) as well as medically oriented transport problems (e.g., blood oxygenation), which are frequently encountered when developing materials or medical devices. Specific topics to be covered include 1D conduction, 2D and 3D conduction, transient conduction, external forced convection, internal forced convection, convection with phase change, thermal radiation, and principles of mass transfer (diffusion and advection).

EGMN 608. Solid Mechanics and Materials Behavior. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: graduate standing in the School of Engineering or permission of the instructor. Studies of stresses and strains in two- and three-dimensional elastic problems. Failure theories and yield criteria. Analysis and design of load-carrying members, energy methods and stress concentrations. Elastic and plastic behavior, fatigue and fracture, and composites will be discussed.

EGMN 609. Advanced Characterization of Materials. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: knowledge of material science and graduate standing in the School of Engineering, or permission of instructor. Study of the physical properties of a wide range of materials by advanced microscopy techniques including electron and scanning probe-based microscopy. Advanced study of deformation and failure in materials including characterization by hardness, fracture toughness and tensile testing, as well as X-ray diffraction.

EGMN 610. Topics in Nuclear Engineering. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: knowledge of calculus and differential equations and graduate standing in the School of Engineering; or permission of instructor. A survey covering the scope of nuclear engineering. Concepts of atomic and nuclear structure, mass and energy, nuclear stability, radioactive decay, radioactivity calculations, nuclear reactions, interaction of radiation (neutrons and photons) with matter, fission chain reaction, neutron diffusion, nuclear reaction theory, reactor kinetics, health physics, reactor power plants (PWR and BWR), waste disposal. Required first course for graduate students in nuclear engineering track who enter with degrees in other disciplines; suitable as a technical elective for other graduate engineering tracks.

EGMN 612. Advanced Computational Methods. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGRM 512 and graduate standing in the School of Engineering, or permission of instructor. Exposes students to the fundamentals of modern numerical techniques for a wide range of linear and nonlinear elliptic, parabolic and hyperparabolic partial differential equations. Topics include equation characteristics; finite difference, finite volume and finite element discretization methods; and direct and iterative solution techniques. Applications to engineering systems are presented, including fluid dynamics, heat transfer and nonlinear solid mechanics.

EGMN 620. Reactor Theory. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGMN 610, proficiency in solving first- and second-order differential equations and graduate standing in the School of Engineering; or permission of the instructor. The neutronics behavior of fission reactors, primarily from a theoretical, one-speed perspective. Criticality, fission product poisoning, reactivity control, reactor stability and introductory concepts in fuel management, followed by slowing-down and one-speed diffusion theory.

EGMN 627. Advanced Manufacturing Simulations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: graduate standing in the School of Engineering and knowledge of material science, computer-aided engineering and manufacturing; or permission of the instructor. Advanced mechanics of the manufacturing processes, their modeling and simulation. Fundamentals of process modeling and use of computational tools. Details and governing theory behind the construction of numerical analysis tools such as FEA will not be provided. However, the intelligent use of this kind of FEA tool in the solution of industrial problems will be taught in addition to analytical methods in rapid assessment of manufacturing processes and systems.

EGMN 630. Technology, Security and Preparedness. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An overview of the role of technology in detecting and defeating terrorism. The course begins with a detailed review of weapons of mass destruction including chemical, biological and radiological devices. This is followed by a review of the various technologies currently being developed and deployed to detect the presence of terrorist weapons and associated activities. These technologies include chemical sensors, biosensors and radiation detectors, portal monitors, satellite and infrared imaging systems, as well acoustic sensors and magnetometers.

EGMN 640. Nuclear Safety. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGMN 610, background in mathematics through differential equations and graduate standing in the School of Engineering; or permission of instructor. Physical and biological aspects of the use of ionizing radiation in industrial and academic institutions; physics principles underlying shielding instrumentation, waste disposal; biological effects of low levels of ionizing radiation.

EGMN 650. Nuclear Radiation and Shielding. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGMN 610, knowledge of calculus and differential equations and graduate standing in the School of Engineering; or permission of instructor. Basic and advanced concepts in radiation sources, gamma ray and neutron shielding, geometry factors in shielding, computational techniques (such as Monte Carlo and discrete ordinates), special topics (such as shield heating, duct steaming and albedo theory) and practical aspects.

EGMN 655. Nuclear Power Plants. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EGMN 610, knowledge of thermodynamics and graduate standing in the School of Engineering; or permission of instructor. Descriptions of mechanical features (containment, core design, steam generation, Rankine and Brayton cycles) of PWR and BWR power plants. Reactor core heat generation. Thermal analysis of fuel pins, fuel elements, flow channels and reactor core. Single- and two-phase heat transfer. Single- and two-phase fluid mechanics. Steady-state and unsteady-state thermodynamic analysis.

EGMN 661. Computational Fluid Dynamics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: graduate standing in the School of Engineering, 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.

EGMN 662. Advanced Turbomachinery Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: graduate standing in the School of Engineering and EGRM 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.

EGMN 663. Viscous Flows. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: knowledge of fluid mechanics and graduate standing in the School of Engineering, or permission of instructor. Designed to introduce graduate students to the fundamentals and the theoretical underpinnings of viscous fluid flows. An extensive project will be included as part of this class.

EGMN 664. Advanced Fluid Mechanics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: graduate standing in the School of Engineering or permission of instructor. Covers the principles necessary to analyze viscous flow. Students learn how to formulate solutions to general viscous flow problems.

EGMN 665. Advanced Biofluid Mechanics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: graduate standing in the School of Engineering and EGRM 512 or EGRM 561, or permission of instructor. Emphasizes the application of fluid mechanics to understand the properties of biological materials pertaining to the human body. This objective will be achieved through the application of fundamental laws (mass, momentum and energy) that govern fluid mechanics. Emphasis will be on respiratory flow dynamics, biofluid measurement techniques, steady and unsteady blood flow, flow through biodevices, turbulence, and mass transport with physiologic boundary conditions.

EGMN 680. Advanced Flow Control. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: knowledge of fluid mechanics and graduate standing in the School of Engineering, or permission of instructor. In-depth passive, active and reactive flow-management strategies to achieve transition delay/advance, separation control, mixing augmentation, drag reduction, lift enhancement and noise suppression. Unified framework and theoretical underpinnings of flow control. Futuristic reactive control methods using MEMS devices, soft computing and dynamical systems theory. An extensive project will be included as part of this class. Not open to undergraduate students. Mechanical engineering students may use EGRM 580 or EGRM 680 (but not both) to meet the requirements for the M.S. and/or Ph.D. degrees. Students cannot receive credit for both EGRM 580 and EGRM 680.

EGMN 690. Mechanical and Nuclear Engineering Seminar. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: graduate standing. Mechanical engineering graduate students will attend a weekly one-hour research seminar. The topic and speaker will change each week in order to cover a broad range of subjects at the forefront of mechanical engineering research. The objective is to expose students to research topics and scholars in the field of mechanical engineering.

EGMN 691. Special Topics in Engineering. 1-4 Hours.
Semester course; 1-4 lecture hours. 1-4 credits. An advanced study of selected topic(s) in engineering. See the Schedule of Classes for specific topics to be offered each semester.

EGMN 692. Independent Study. 1-3 Hours.
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.

EGMN 697. Directed Research in Mechanical and Nuclear Engineering. 1-15 Hours.
Semester course; variable hours. 1-15 credits. Prerequisite: graduate standing or permission of instructor. Research directed toward completion of the requirements for the M.S. or Ph.D. in Mechanical Engineering, under the direction of a mechanical engineering faculty member and advisory committee. Graded S/U/F.

MEDIA, ART, AND TEXT (MATX)

MATX 601. Texts and Textuality. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Explores theories of texts and textuality as they relate to the study of media, the arts and discourse of any kind.

MATX 602. History of Media, Art, and Text. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines the history of communication technologies in their social and cultural contexts, with an emphasis on the development of contemporary digital technology and new media. Students will explore how the interactions between communication practices and technologies are related to institutions, identity formation, cultural values, social practices and economic conditions.

MATX 603. Mass Media. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines the history of mass media and the leading theories, concepts and methods for mass media research.

MATX 604. Interdisciplinary Workshop. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to first-year MATX students. Students gain an understanding of current interdisciplinary theory and practice across media, art, and text. Examination of real-world examples provides a foundation for academic and professional careers in today's interdisciplinary digital environment. Workshopping of students' preliminary dissertation ideas, conference abstracts, teaching portfolios and professional websites develops content and skills needed for the MATX e-portfolio. Graded as pass/fail.

MATX 690. Seminar in Media, Art, and Text. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Graduate-level research and reading centered on interdisciplinary study.

MATX 696. Internship. 1-3 Hours.
Semester course; variable hours. 1-3 credits; may be repeated for a maximum of 6 credits. Planned experiences approved by student's adviser under the supervision of professionals and evaluated by university faculty.

MATX 791. Directed Study. 1-3 Hours.
Semester course; variable hours. 1-3 credits; may be repeated for credit. Focuses on a selected topic chosen by student and approved by student's adviser.

MATX 897. Dissertation Project. 1-12 Hours.
Semester course; variable hours. 1-12 credits; may be repeated for credit. Research and work leading to the completion of the dissertation project.

MEDICAL PHYSICS (MEDP)

MEDP 520. Introduction to Radiation Therapy Physics Laboratory. 1 Hour.
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. Measurements of beam characteristics for treatment machines, including electron linear accelerators, and radioactive sources, including high dose rate brachytherapy are investigated.

MEDP 561. Topographical Anatomy and Physiology. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Restricted to medical physics graduate students. This course will cover fundamental gross anatomy, pathology and physiology as necessary for medical physicists. It will include basic medical terminology and have a focus on cross-sectional CT imaging and MRI, as well as 2-D X-ray imaging. Basic information on pathophysiology of cancer diseases and cancer treatment strategies will be provided.

MEDP 563. Radiological Physics and Radiation Dosimetry. 4 Hours.
Semester course; 3 lecture and 1 laboratory hours. 4 credits. Prerequisites: Equivalent of PHYS 376 and PHYS 380 or permission of instructor. Covers the fundamental conceptual, mathematical and physical aspects of radiation interactions with matter and energy deposition, including a thorough understanding of basic quantities and units. Application to the principles and methods of radiation detection and dosimetry will be emphasized.

MEDP 567. Introduction to Radiation Therapy Physics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Covers the fundamental conceptual and technical aspects of the use of ionizing radiation to evoke a therapeutic response/benefit to patients. Treatment planning and dose calculations for external beam radiation therapy and brachytherapy are emphasized.

MEDP 591. Special Topics in Medical Physics. 1-3 Hours.
Semester course; 1-3 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 medical physics. See the Schedule of Classes for specific topics to be offered each semester and prerequisites. Applicable toward physics major requirements.

MEDP 592. Special Topics. 1-4 Hours.
Semester course; 1-4 variable hours. 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 the research training.

MEDP 601. Health Physics. 3 Hours.
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.

MEDP 630. Radiobiology for the Medical Physicist. 3 Hours.
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.

MEDP 633. Advanced Radiation Therapy Physics. 4 Hours.
Semester course; 3 lecture and 2 laboratory hours. 4 credits. Prerequisites: PHYS 563 and PHYS 567 or instructor's 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.

MEDP 635. Physics of Diagnostic Imaging. 3 Hours.
Semester course; 3 lecture and 1 laboratory hours. 3 credits. Covers the physics of X-ray production, radiography, fluoroscopy and computed tomography. Covers the basics of ultrasound physics, equipment, image quality, safety and quality assurance. Emphasis will be placed on the physical foundations of currently used diagnostic imaging techniques using X-rays and ultrasound and their relevance to the clinical setting.

MEDP 636. Physics of MRI. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Covers the physics of magnetic resonance imaging. 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.

MEDP 637. Physics of Nuclear Medicine. 2 Hours.
Semester course; 2 lecture and 1 laboratory hours. 2 credits. Covers the physics of nuclear medicine imaging (including PET). Emphasis will be placed on the physical foundations of currently used diagnostic techniques and their relevance to the clinical setting.

MEDP 682. Clinical Rotations in Medical Physics. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May be repeated for credit. Prerequisites: at least one graduate medical physics course and permission of instructor. Clinical rotations in various medical physics sub-specialties.

MEDP 689. Medical Physics Literature Review. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Review and discussion of relevant journal articles from the medical physics literature. May be repeated for credit with instructor's permission.

MEDP 697. Directed Research. 1-15 Hours.
Semester course; 1-15 credits. May be repeated for credit. Prerequisites: at least one graduate-level physics course and permission of instructor. Research leading to the M.S. or Ph.D. degree.

MEDICINAL CHEMISTRY (MEDC)

MEDC 310. Medicinal Chemistry and Drug Design. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CHEM 302. 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. Crosslisted as: CHEM 310.

MEDC 526. Research Techniques in Medicinal Chemistry. 1-4 Hours.
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 527. Basic Pharmaceutical Principles for the Practicing Pharmacist. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines basic science principles in organic chemistry and biological chemistry as specifically related to the pharmaceutical treatment of disease.

MEDC 530. Bioinformatics and Genomics in Drug Research. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Covers the basic elements of cellular pathways and drug interactions, and how modern genomics comes into play. Presents bioinformatics principles being used every day in data-intensive fields of research. Introductory and concept-oriented, the course will prepare students for grasping how bioinformatics is being used in many areas of biomedical sciences. Geared toward students coming from a variety of backgrounds in biology, biochemistry and chemistry. While many of the analytical approaches are statistical in nature, there is no requirement for a background in statistics or mathematics. Each student will have the opportunity to design a small project applying bioinformatics concepts. Crosslisted as: BNFO 530.

MEDC 532. Medicinal Chemistry for Nurse Anesthetists. 3 Hours.
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 533. Pharmacognosy. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Designed to introduce the basic concepts of pharmacognosy that apply to crude drugs and semipurified and purified natural products that are typically available in pharmacies. The regulation of herbal products and evaluation of the purity and biovailability of alternative and complementary medicines will be discussed.

MEDC 541. Survey of Molecular Modeling Methods. 1 Hour.
Semester course; lecture and laboratory hour. 1 credit. Introduces computational chemistry and molecular graphics with the current software used for drug design and small molecule/large molecule interactions. Computational chemistry problems will be emphasized in the laboratory.

MEDC 542. Biotechnology-derived Therapeutic Agents. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Provides the fundamentals of biotechnology-derived biological agents including structure, manufacture, stability, analysis, formulation and usage. Selected examples of biological agents in current and future therapy may also be covered.

MEDC 543. Clinical Chemistry for the Pharmacist. 2 Hours.
Semester course; 2 lecture hours. 2 credits. A study of the underlying principles and practical limitations of analytical procedures with emphasis on evaluation of over-the-counter analytical products currently sold or used in pharmacies and assays of organ pathophysiology used in hospitals.

MEDC 553. Clinical Therapeutics Module: Introduction to Medicinal Chemistry. 1 Hour.
Module course; variable lecture hours. 1 credit. Introduces topics in medicinal chemistry common to all drug classes, including structure activity relationships, principles of drug action, drug design and drug metabolism. Drugs acting on the autonomic nervous system are presented as a case study illustrating applications of the general principles.

MEDC 555. Fundamentals of Drug Discovery I. 3.5 Hours.
Semester course; 3.5 lecture hours. 3.5 credits. Students will work individually or in groups to learn the fundamentals of medicinal chemistry and drug discovery. The course utilizes formal lectures, informal group discussions, literature research and formal oral and/or written assignments to impart knowledge and practice of drug discovery. The course focus will be on molecular biology and pharmacological aspects of medicinal chemistry.

MEDC 556. Fundamentals of Drug Discovery II. 3.5 Hours.
Semester course; 3.5 lecture hours. 3.5 credits. Students will work individually or in groups to learn the fundamentals of medicinal chemistry and drug discovery. The course utilizes formal lectures, informal group discussions, literature research and formal oral and/or written assignment to impart knowledge and practice of drug discovery. The course focus will be on methodologies and techniques of medicinal chemistry.

MEDC 591. Special Topics in Medicinal Chemistry. 3.5 Hours.
Semester course; 1-3.5 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. 2 Hours.
Semester course; 2 lecture hours. 2 credits. This course is designed to expose graduate students to the history and practice of medicinal chemistry with an emphasis on drug development, design, structure-activity relationship studies and their association with diseases to prepare students for future work in academia or industry.

MEDC 609. Advanced Organic Synthesis: A Target-oriented Approach. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: permission of instructor. A study of chemical transformations in organic chemistry, their mechanisms and their application to the synthesis of complex target molecules.

MEDC 610. Advanced Medicinal Chemistry II. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: MEDC 601 or permission of instructor. Introduces concepts for understanding the medicinal chemistry of the central nervous system.

MEDC 614. Research Techniques. 1-4 Hours.
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. Crosslisted as: PCEU 614/PHAR 614.

MEDC 620. Advanced Medicinal Chemistry III. 2 Hours.
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. 2 Hours.
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 indexes and physical property correlations. Computational chemistry problems will be emphasized in the laboratory.

MEDC 642. Nucleoside, Nucleotide, Carbohydrate and Peptide Chemistry. 3 Hours.
Semester course; 1 lecture hour. 1 credit. Surveys nucleoside, nucleotide, carbohydrate and peptide chemistry with emphasis on their synthesis.

MEDC 643. Regioselective Drug Metabolism. 1 Hour.
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. 1 Hour.
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. 3 Hours.
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. 3 Hours.
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. 1 Hour.
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. Graded as PR in first semester of enrollment, with a letter grade assigned in the following semester.

MEDC 691. Special Topics in Medicinal Chemistry. 1-4 Hours.
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. 1-15 Hours.
Semester course; 1-15 credits. Research leading to the M.S. or Ph.D. degree.

MEDICINE (MEDI)

MEDI 694. Pediatric Psychology Practicum. 1-3 Hours.
Semester course; one-half day per credit. 1-3 credits. Available only to graduate students in clinical or counseling psychology that are approved by the instructor. A series of training experiences designed to facilitate skill development in pediatric psychology and enhance effectiveness as a pediatric psychologist working within a medical setting. Trainees are given an opportunity to apply and practice diagnostic interviews, patient education, brief consultations and diagnostic and therapeutic skills with a pediatric population. Students will learn to effectively communicate and function as part of an interdisciplinary team in an academic medical setting. Careful supervision and evaluation of the student is provided.

MEDI 695. Independent Study in Health Psychology. 1-3 Hours.
Semester course; 1-3 contact hours. 1-3 credits. Approval from faculty member required. Provides the opportunity for students to explore a special topic of interest in the area of health psychology under the direction of a faculty member. A proposal for a topic of study and anticipated timeline for completion must be submitted to and approved by the faculty mentor; credits will be assigned commensurate with the complexity of the project. Arrangements are made directly with the appropriate faculty member. Graded as S/U/F.

MICROBIOLOGY AND IMMUNOLOGY (MICR)

MICR 365. Infection and Immunity (Dental Hygiene). 2 Hours.
Semester course; 2 lecture hours. 2 credits. A study of infectious diseases and the immune system of humans with emphasis on the distribution properties and roles of pathogenic microorganisms and the varied responses of the host, with emphasis on oral pathologies. Principles of prevention, control and chemotherapy of infectious diseases are major components of the course.

MICR 501. Infection and Immunity (Pharmacy). 4 Hours.
Semester course; 4 lecture hours. 4 credits. Offered to pharmacy students in the first professional year. Others admitted with permission of instructor. A course on the fundamentals of microbiology and immunology with aspects on disease and treatment of interest to dentistry and pharmacy.

MICR 505. Immunobiology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Background in cellular and molecular biology, and biochemistry is recommended. Nondegree-seeking students admitted with permission of instructor. A survey of immunobiology as a total host response to foreign agents, covering the nature of antigens and antibodies, antigen-antibody reactions, immunocompetent cells, allergic reactions, tumor immunology, transplantation immunology, immunological diseases and immunogenetics.

MICR 513. Infection and Immunity (Dentistry). 4 Hours.
Semester course; 4 lecture hours. 4 credits. Offered to dental students in the first professional year. Others admitted with permission of instructor. A course on the fundamentals of microbiology and immunology with aspects on disease and treatment of interest to dentistry and pharmacy.

MICR 515. Principles of Molecular Microbiology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A comprehensive course designed to provide the student with a thorough understanding of microbial physiology, genetics and diversity. Also covered are some basic concepts in microbial pathogenesis and in applied microbiology. The course focuses on structural and functional characteristics of micro-organisms; ecological and physiological diversity of microbes; growth and control of micro-organisms; genetics of bacteria and viruses; bacteria as agents of disease; and applications of microbiology.

MICR 605. Prokaryotic Molecular Genetics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOC 530, BIOC 531, BIOC 532 and BIOC 533; or BIOC 503 and BIOC 504; or permission of instructor; MICR 515 or equivalent recommended. 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 integrating classical and modern methods of genetic analysis with biochemical studies of genetic regulatory mechanisms.

MICR 607. Techniques in Molecular Biology and Genetics. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisites: BIOC 530, BIOC 531, BIOC 532 or BIOC 533; or BIOC 503 and BIOC 504 or equivalent; permission of instructor. Designed to give an overview of the techniques utilized in modern molecular biology. The principles underlying techniques such as plasmid and phage cloning, RNA and DNA analysis, PCR, DNA sequencing, mutagenesis, genomic mapping, heterologous gene expression, and production and analysis of recombinant protein and transgenic mouse technology will be discussed in detail by experts in the field.

MICR 608. Introduction to Microbiology and Immunology Research. 3 Hours.
Continuous courses; lectures and 4 laboratory hours. 3-3 credits. Prerequisite: Permission of instructor. Required of all first-year graduate students. Introduction to all active research programs in microbiology and immunology. Presentations of research programs by investigators and rotation of students through faculty laboratories to gain direct exposure to individual research projects.

MICR 609. Introduction to Microbiology and Immunology Research. 3 Hours.
Continuous courses; lectures and 4 laboratory hours. 3-3 credits. Prerequisite: Permission of instructor. Required of all first-year graduate students. Introduction to all active research programs in microbiology and immunology. Presentations of research programs by investigators and rotation of students through faculty laboratories to gain direct exposure to individual research projects.

MICR 616. Mechanisms of Viral and Parasite Pathogenesis. 3 Hours.
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 618. Molecular Mechanisms of Bacterial Pathogenesis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: undergraduate-level courses in microbiology or microbial physiology, immunology and molecular genetics. The goals of this comprehensive 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 653. Advanced Molecular Genetics: Bioinformatics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: Cell/molecular biology or permission of instructor. An advanced course on contemporary bioinformatics. Topics covered include the principles and practice of DNA, RNA and protein sequence analysis, computational chemistry and molecular modeling, expression array analysis and pharmacogenomics. The course includes lectures, reading, computer lab, homework problem sets and projects. Crosslisted as: BNFO 653.

MICR 684. Molecular Biology of Cancer. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOC 530, BIOC 531, BIOC 532 and BIOC 533; or BIOC 503; or permission of instructor. Advanced graduate-level course to provide theoretical background to graduate students interested in cancer research. Emphasis will be placed on experimental approach integrating classical and modern methods of genetic analysis with biochemical studies in genetic regulatory mechanisms. The course includes presentations by students and interactive discussion of the scientific literature in the area of oncogenesis.

MICR 686. Advanced Immunobiology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Open primarily to residents, medical students and graduate students with an immunology background such as MICR 505. Lectures, seminars, conferences on basic and clinical immunobiology and literature review on the topic, with more emphasis on methods in immunology research and exercising the ability to communicate the topic verbally. 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. 1 Hour.
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. 1-4 Hours.
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. 1 Hour.
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 693. Topics in Molecular Biology and Genetics. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Open to all graduate students. Presents a forum for discussion of the scientific literature in the area of molecular biology and genetics, focusing on molecular mechanisms involved in regulation of gene expression and cell growth with examples from all three kingdoms of life. Consists of presentations by students and interactive discussions of the implications of presented work to the study of molecular biology.

MICR 694. Current Topics in Immunology. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Open to all graduate students. Presents a forum for discussion of the scientific literature in the area of cellular and molecular immunology, focusing on mechanisms involved in the operation and regulation of the vertebrate immune system. Consists of presentations by students and interactive discussions of the implications of presented work to the study of immunology.

MICR 695. Special Topics in Microbiology. 1-4 Hours.
Semester course; 1-4 variable hours. 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 the research training. Graded as S/U/F.

MICR 697. Directed Research in Microbiology. 1-15 Hours.
Semester course; 1-15 credits. Research leading to the M.S. or Ph.D. degree and elective research projects for other students.

MILITARY SCIENCES (MILS)

MILS 101. Military Science and Leadership: Foundations of Officership. 1 Hour.
Semester course; 1 lecture and 1 laboratory hour. 1 credit. Introduces students to fundamental components of service as an officer in the U.S. Army. Forms building blocks of progressive lessons in values, fitness, leadership and officership. Also addresses "life skills" including communications theory and practice (written and oral) and interpersonal relationships.

MILS 102. Military Science and Leadership: Introduction to Leadership. 1 Hour.
Semester course; 1 lecture and 1 laboratory hour. 1 credit. Introduces students to "life skills" of problem-solving, decision-making and leadership. Designed to help students be more effective as leaders, both immediately on campus and in the long term in either military or civilian life. Introduces students to fundamental officer skills such as map reading, land navigation, tactics and leadership values/actions. Using these basic skills, students will build a rudimentary understanding of the core competencies necessary to become an Army officer and leader.

MILS 201. Military Science and Leadership: Innovative Team Leadership. 2 Hours.
Semester course; 2 lecture and 1 laboratory hours. 2 credits. Prerequisites: MILS 101 and 102 or permission of department chair. Explores the dimensions of creative and innovative tactical leadership strategies and styles by examining team dynamics and two historical leadership theories that form the basis of the Army leadership framework. Aspects of personal motivation and team building are practiced by planning, executing and assessing team exercises, and by participating in leadership labs. The course continues to develop knowledge of leadership values and attributes through understanding Army rank, structure and duties as well as broadening knowledge of land navigation and squad tactics. Case studies provide a tangible context for learning the Soldiers Creed and Warrior Ethos as they apply in the contemporary operating environment.

MILS 202. Military Science and Leadership: Foundations of Tactical Leadership. 2 Hours.
Semester course; 2 lecture and 1 laboratory hours. 2 credits. Prerequisite: MILS 201 or permission of department chair. Examines the challenges of leading tactical teams in the complex contemporary operating environment (COE). Highlights dimensions of terrain analysis, patrolling and operation orders. Continued study of the theoretical basis of the Army leadership framework explores the dynamics of adaptive leadership in the context of military operations. Cadets develop greater self-awareness as they assess their own leadership styles and practice communication and team-building skills. COE case studies give insight into the importance and practice of teamwork and tactics in real-world scenarios.

MILS 203. Military Science and Leadership: Leader's Training Course. 6 Hours.
0-6 credits. Prerequisites: enrollment in the ROTC program, military service obligation and permission of department chair. Five-week summer course consisting of leadership training at Fort Knox, Ky. Completion of this course equates to completion of MILS 101, 102, 201 and 202, and enables students to enroll in the advanced military leadership courses. Amount of academic credit awarded depends upon amount of basic military science credit previously earned. Travel pay and salary provided through Department of Military Science and Leadership. Graded pass/fail.

MILS 301. Military Science and Leadership: Adaptive Team Leadership. 3 Hours.
Semester course; 3 lecture and 1 laboratory hours. 3 credits. Prerequisites: MILS 101, 102, 201 and 202 (or MILS 203), permission of department chair and military service obligation. Challenges cadets to study, practice and evaluate adaptive team leadership skills as they are presented with the demands of the ROTC Leader Development and Assessment Course. Challenging scenarios related to small unit tactical operations are used to develop self-awareness and critical thinking skills. Cadets receive systematic and specific feedback on leadership abilities.

MILS 302. Military Science and Leadership: Leadership in Changing Environments. 3 Hours.
Semester course; 3 lecture and 1 laboratory hours. 3 credits. Prerequisite: MILS 301 or permission of department chair. Provides instruction and case studies that build upon leadership competencies and military skills attained in MILS 301 in preparation for future responsibilities as Army officers. Specific instruction is given in individual leader development, planning and execution of small unit operations, individual and team development, and the Army as a career choice.

MILS 306. Military Science. 0 Hours.
0 credit. Prerequisite: MILS 302 and successful completion of four basic military science courses or MILS 203 Basic Military Science for six credits. ROTC National Advanced Leadership Camp. The ROTC camp summer practicum is six weeks long. Individual and group experience for application of leadership training. Exposure to leadership situations that require decisions made under physical and mental stress conditions.

MILS 401. Military Science and Leadership: Developing Adaptive Leaders. 3 Hours.
Semester course; 3 lecture and 1 laboratory hours. 3 credits. Prerequisite: MILS 302 or permission of department chair. Develops student proficiency in planning, executing and assessing complex operations, functioning as a member of a staff, and providing performance feedback to subordinates. Cadets are given situational opportunities to assess risk, make ethical decisions and lead fellow ROTC cadets. Lessons on military justice and personnel processes prepare cadets to make the transition to becoming Army officers. MS IV (senior) cadets lead lower-level cadets. Both classroom and battalion leadership experiences are designed to prepare MS IV cadets for their first unit of assignment. Cadets identify responsibilities of key staff, coordinate staff roles and use battalion operations situations to teach, train and develop subordinates.

MILS 402. Military Science and Leadership: Leadership in a Complex World. 3 Hours.
Semester course; 3 lecture and 1 laboratory hours. 3 credits. Prerequisites: MILS 301, 302 and 401, or permission of department chair. Explores the dynamics of leading in the complex situations of current military operations in the contemporary operating environment. Cadets examine differences in customs and courtesies, military law, principles of war, and rules of engagement in the face of international terrorism. Cadets also explore aspects of interacting with non-government organizations, civilians on the battlefield and host nation support. Course places significant emphasis on preparing cadets for Basic Officer Leadership courses and their first unit of assignment. Utilizes case studies, scenarios and "What now, Lieutenant?" exercises to prepare cadets to face the complex ethical and practical demands of leading as a commissioned officer in the U.S. Army.

MUSIC COMPOSITION (MUSC)

MUSC 201. Class Composition I. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: MHIS 146. Open to all music majors and required of potential composition majors; the emphasis of this class will be on simple rhythmic and melodic studies.

MUSC 315. Counterpoint I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MHIS 246. This class concentrates on two-part writing, canons, species, exercises, short two-voiced pieces and inventions.

MUSC 316. Counterpoint II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MHIS 246. Availability contingent upon student demand and faculty resources. Three- and four-part writing forms based on the chorale; contrapuntal variation forms and fugue will be studied.

MUSC 406. Orchestration. 3 Hours.
Semester course; 3 lecture hours. 3 credits. No degree credit for graduate composition majors. Prerequisite: MHIS 246. Application of idiomatic scoring devices for orchestral instruments and voices in both large and small combinations.

MUSC 611. Analysis for Performance and Composition. 2 Hours.
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 612. Analysis for Performance and Composition. 2 Hours.
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. 2 Hours.
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)

MUED 260. Introduction to Music Therapy. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Provide a historical, theoretical and clinical basis for defining and understanding music therapy. As a survey course to give historical background to the development of the profession, as well as basic understanding of techniques and populations now served by music therapists.

MUED 301. Methods and Techniques: Guitar. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. For music education majors only. Achievement of basic performance competencies and teaching knowledge on the guitar including chording, single-string technique, plectrum and finger styles.

MUED 302. Methods and Techniques: Voice. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. For music education majors only. Achievement of performance competencies in voice including vocal production, diction and solo and group performance.

MUED 303. Methods and Techniques: Woodwinds. 1 Hour.
Continuous courses; 2 laboratory hours. 1-1 credit. Prerequisite: completion of MUED 303 to enroll in MUED 304. For music education majors only. Achievement of performance competencies and teaching knowledge on flute, clarinet, oboe, bassoon and saxophone.

MUED 304. Methods and Techniques: Woodwinds. 1 Hour.
Continuous courses; 2 laboratory hours. 1-1 credit. Prerequisite: completion of MUED 303 to enroll in MUED 304. For music education majors only. Achievement of performance competencies and teaching knowledge on flute, clarinet, oboe, bassoon and saxophone.

MUED 305. Methods and Techniques: Brass. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. For music education majors only. Achievement of performance competencies and teaching knowledge on trumpet, baritone, tuba, trombone and French horn.

MUED 306. Methods and Techniques: Strings. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. For music education majors only. Achievement of performance competencies and teaching knowledge on violin, viola, cello or bass.

MUED 307. Methods and Techniques: Percussion. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. For music education majors only. Achievement of performance competencies and teaching knowledge on snare drum. Introduction to basic techniques of other percussion instruments.

MUED 380. Introduction to Music Education. 2 Hours.
Semester course; 1 lecture and 2 laboratory hours. 2 credits. Prerequisite: passing score on Praxis I or the Virginia Communication and Literacy Assessment or threshold SAT/ACT scores. An introduction to the profession of music education. Emphasis on the study of the historical development of music education in the U.S. along with current thinking, trends, practices and approaches in the profession, and the formation of a personal philosophy of music education. Substantial practicum experience is a fundamental aspect of this course.

MUED 381. Methods and Practicum in Elementary Music Education. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: MUED 380. Study of current methods and materials of music education at the elementary level. Orff, Dalcroze, Kodaly, Gordon and other current music education approaches for the young child will be discussed, observed and demonstrated. An intensive directed practicum is a fundamental aspect of this course.

MUED 382. Secondary Methods/Practicum and Rehearsal Techniques. 4 Hours.
Semester course; 3 lecture and 2 laboratory hours. 4 credits. Prerequisites: APPM 381, MUED 381 and passing score on the Virginia Communication and Literacy Assessment. Development of the varied skills required to successfully administer a secondary music education program. Emphasis on understanding program structure, development and methodologies; development of conducting technique, rehearsal strategies and selecting/arranging literature appropriate for musical growth of students.

MUED 384. Marching Band Techniques. 2 Hours.
Semester course; 1 lecture and 1 laboratory hour. 2 credits. Prerequisite: MUED 380. Discussion of marching band techniques that address the different components of preparation, rehearsal and presentation of events. The application of topics and discussions are presented with marching band choreography using computer software simulation.

MUED 385. Music Education Technology and Arranging. 2 Hours.
Semester course; 1 lecture and 1 laboratory hour. 2 credits. Prerequisite: MUED 380. Basic understanding of current technology in the field of music education. Specific skills developed for arranging school-aged ensembles with CAI, sequencing, productivity software and basic sound reinforcement will be the primary focus.

MUED 483. Special Workshop in Music Education. 0.5-3 Hours.
Semester course; 0.5-3 credits. Flexible semester courses on selected aspects of music education. See the Schedule of Classes for specific topics to be offered each semester.

MUED 485. Music Education Student Teaching I: Elementary. 6 Hours.
6 credits. Prerequisites: MUED 382, APPL 416, passing score on the Praxis II Music Content Knowledge and 2.8 overall GPA. Corequisite: MUED 486. The culminating field experience for music education students. An eight-week directed internship at the elementary general music education level. MUED 485 and 486 provide sequential experience and responsibilities for planning and instruction of music education for children in the P-12 setting.

MUED 486. Music Education Student Teaching II: Secondary. 6 Hours.
6 credits. Prerequisites: MUED 382, APPL 416, passing score on the Praxis II Music Content Knowledge and 2.8 overall GPA. Corequisite: MUED 485. The culminating field experience for music education students. An eight-week directed internship at the secondary instrumental or choral music education level. MUED 485 and 486 provide sequential experience and responsibilities for planning and instruction of music education for children in the P-12 setting.

MUED 583. Special Workshop in Music Education. 0.5-3 Hours.
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. 1-3 Hours.
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. 3 Hours.
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 604. Choral Conducting and Rehearsal Techniques. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course will seek to develop the skills of the choral conductor in rehearsal and performance. Instruction in rehearsal technique and pacing, conducting technique and interpretive gesture, choral diction, score analysis and preparation, performance practices, and the affective/effective conductor will be applied to individual student performance at the podium.

MUED 606. Choral Literature and Style. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course will provide the practicing choral musician with a survey of choral repertoire through the ages, highlighting various genres within each historical period. Emphasis will be placed on stylistic considerations and performance practices. Students will be engaged in determining the standards which define quality choral repertoire.

MUED 608. Teaching the Adolescent Singer. 3 Hours.
Semester course; 3 lecture hours. 3 credits. In this course students will study psychological, behavioral and developmental aspects of the young singer. An in-depth look at the characteristics of the changing male and female voice will include research and conclude with observations of adolescent voices. The class will also cover range, registration and choral repertoire appropriate for the various stages of the adolescent singer.

MUED 610. Psychology of Music. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides an introduction of the psychological foundations of music behavior. Topics will include functions of music in human society and culture, psychoacoustics of musical sound, cognitive processes of music perception and the creation/recreation of music, affective response, music learning theories and measurement of musical ability and learning.

MUED 614. Instrumental Conducting Techniques. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Students in this class will discuss literature, score study strategies, rehearsal techniques and ensemble motivation issues. Conducting technique and rehearsal technique will be developed by hands-on experiences with a workshop band, as well as through guided discussions and classroom sessions. The goal is personal musical growth and enhanced podium effectiveness for each participant.

MUED 616. Researching the Wind Band: Strategies and Resources. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This class is designed to enable students to gain greater access to information relative to all aspects of the wind band. Students will become familiar with a wide variety of sources including written materials, Web-based materials, recordings, video and organizations. There will also be assignments to acquaint students with methods used in the various facets of wind band research.

MUED 618. History and Literature of the Wind Band. 3 Hours.
Semester course; 3 lecture hours. 3 credits. In this class students will study the historical development of wind bands and wind band repertoire. The result of this study will be to enable students to evaluate new repertoire by comparison to masterworks and to be able to place pieces into a historical continuum. Studying the history of wind bands is necessary to understand the current state of the profession and how wind bands fit into the broader spectrum of music history.

MUED 620. Introduction to Research in Music Education. 3 Hours.
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. 2 Hours.
Semester course; 2 lecture hours. 2 credits. The study of the organization, curriculum, course content, administration, and personnel problems in public school music.

MUED 783. Final Project in Music Education. 1 Hour.
Semester course; 1 laboratory hour. 1 credit. May be repeated for a total of 5 credits. The final project is an intensive experience in identifying and developing a topic of interest and value to the student and the profession, and the final presentation of that topic. This course is part of the culminating process for the music education track in the Master of Music program. As an individualized project/course, the faculty chair provides initial approval and gauges progress toward completion of the final project. It is the responsibility of the student to maintain consistent communication with their chair throughout the semester to ensure adequate progress is being made. Completion is determined by the final approval of the faculty chair and committee (if applicable). Completion of the final project is not determined by total number of credits earned in the course. Graded as S/U/F.

MUED 799. Thesis. 1-3 Hours.
Semester course; 1-3 credits. May be repeated. Prerequisite: Permission of the music education coordinator. Preparation of a thesis based on independent research.

MUSIC HISTORY, LITERATURE AND THEORY (MHIS)

MHIS 105. Introduction to Writing Music. 3 Hours.
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisite: completion of MHIS 105 to enroll in MHIS 106. For non-music majors only. Creating and harmonizing melodies, principles of notation and elementary music theory. Second semester emphasis is on creative aspects.

MHIS 106. Introduction to Writing Music. 3 Hours.
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisite: completion of MHIS 105 to enroll in MHIS 106. For non-music majors only. Creating and harmonizing melodies, principles of notation and elementary music theory. Second semester emphasis is on creative aspects.

MHIS 110. Elements of Music. 3 Hours.
Semester course; 3 lecture hours. 3 credits. No degree credit for music majors. A study of music notation, scale and triad forms. Aural skill development will parallel the theoretical studies. Intended to prepare music majors for core curriculum study.

MHIS 115. Fundamental Musicianship. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Enrollment restricted to music majors. Study of fundamental written music notation and structure. Aural skill development parallels theoretical studies for integrated learning of notation and sound. Designed for preparation of music theory sequence for majors.

MHIS 120. Introduction to World Musical Styles. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Enrollment restricted to music majors. A study of non-European musical cultures and practices. Attention will be given to various aspects of music within those cultures. An emphasis will be placed on the development of active cognitive listening skills through guided listening to selected recorded music from non-European societies.

MHIS 145. Theory and Aural Skills I. 4 Hours.
Semester course; 2 lecture and 3 laboratory hours. 4 credits. Open to music majors and minors only. The application of music theory, aural skills and keyboard knowledge are combined in the study of harmonic and melodic structure. Activity begins with rudiments and progresses to diatonic harmony. Emphasis is placed upon the development of aural skills as applied to the presented material.

MHIS 146. Theory and Aural Skills II. 4 Hours.
Semester course; 2 lecture and 3 laboratory hours. 4 credits. Prerequisite: MHIS 145. Open to music majors and minors only. The application of music theory, aural skills and keyboard knowledge are combined in the study of harmonic and melodic structure. Activity begins with harmonic voicing and progresses to secondary harmony as applied to phrase structure in music. Emphasis is placed upon the development of aural skills as applied to the presented material.

MHIS 147. Jazz Theory and Aural Skills. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MHIS 145. Theoretical and aural recognition of established melodic, harmonic and rhythmic traditions within jazz so as to apply successfully to creative performance-practice and composition-arranging pursuits.

MHIS 201. Acoustics. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Recommended prerequisite: MATH 101. Physical properties of sound and wave mechanics applied to the study and analysis of music and musical instruments. Topics will include instrumental and vocal sound production and perception, timbrel characteristics and pitch theory.

MHIS 243. Music Appreciation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Not open to music majors. Designed to encourage understanding of music from selected periods. Development of active cognitive listening skills through guided listening to selected recorded music.

MHIS 244. Experiencing Music. 3 Hours.
Semester course; 1 lecture and 2 laboratory hours. 3 credits. Designed for the purpose of developing familiarity with the elements of music that are part of a successful performance and listening experience. Weekly attendance at both VCU and external events is part of the criteria to develop students' awareness of the creative process in shaping a musical performance.

MHIS 245. Theory and Aural Skills III. 4 Hours.
Semester course; 2 lecture and 3 laboratory hours. 4 credits. Prerequisites: MHIS 146. Open to music majors. The application of music theory, aural skills and keyboard knowledge are combined in the study of harmonic and melodic structure. Second year studies continue with chromatic harmony and modulations. Emphasis is placed upon the development of aural skills as applied to the presented material.

MHIS 246. Theory and Aural Skills IV. 4 Hours.
Semester course; 2 lecture and 3 laboratory hours. 4 credits. Prerequisites: MHIS 245. Open to music majors. The application of music theory, aural skills and keyboard knowledge are combined in the study of harmonic and melodic structure. Final semester of study continues with chromatic harmony and concludes with modern techniques as applied to form in music. Elements of popular styles and jazz are incorporated as appropriate. Emphasis is placed upon the development of aural skills as applied to the presented material.

MHIS 250. Introduction to African-American Music. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introductory survey of black involvement with the development of music in America from 1607 to the present. African-American musical styles will be studied from many aspects, including their African roots and contemporary popular expression. Performance practices will be analyzed and active cognitive listening skills developed through guided listening to selected recordings. Crosslisted as: AFAM 250.

MHIS 256. Musicianship Practicum. 2 Hours.
Semester course; 1 lecture and 1 laboratory hour. 2 credits. Prerequisites: APPM 174 or APPM 374; and MHIS 245. Application of musical analysis, composition, keyboard and ear training in holistic and integrated assignments and projects. Group assignments will lead to development of self-directed project.

MHIS 291. Topics in Music. 1-3 Hours.
Semester course; variable hours. 1-3 credits per semester. May be repeated for a maximum of 6 credits. Flexible semester courses in selected aspects of music performance, theory, literature or history. See the Schedule of Classes for specific topics to be offered.

MHIS 303. Piano Literature. 2 Hours.
Semester courses; 2 lecture hours. 2, 2 credits. Prerequisite: open to music majors; all others must obtain permission of instructor. A survey of stringed keyboard literature. Historical, formal and stylistic considerations of the various periods and composers of keyboard music. Listening and reading assignments included. Fall semester: Baroque and Classical periods (1600-1828); spring semester: Romantic, Modern and Contemporary periods (1828-present).

MHIS 304. Piano Literature. 2 Hours.
Semester courses; 2 lecture hours. 2, 2 credits. Prerequisite: open to music majors; all others must obtain permission of instructor. A survey of stringed keyboard literature. Historical, formal and stylistic considerations of the various periods and composers of keyboard music. Listening and reading assignments included. Fall semester: Baroque and Classical periods (1600-1828); spring semester: Romantic, Modern and Contemporary periods (1828-present).

MHIS 305. Form and Analysis I. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: MHIS 246. An analytical study of musical forms and salient features of melody, harmony, rhythm and timbre of late Baroque, Classical, early and late Romantic compositions.

MHIS 306. Form and Analysis II. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: MHIS 246. Study of traditional and new approaches to form in the music of the 20th century. Examination of post-tonal harmony as a determinant of form, formal aspects of motivicism, contour, rhythm, register, timbre and texture.

MHIS 307. The Physics of Sound and Music. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: A 100- or 200-level physics course or equivalent and the ability to read music or sing or play a musical instrument, or permission of instructor. Basics of the physics of waves and sound. Fourier synthesis, tone quality, human ear and voice, musical temperament and pitch, physics of musical instruments, electronic synthesizers, sound recording and reproduction, room and auditorium acoustics. Not applicable toward the physics major. Crosslisted as: PHYS 307.

MHIS 311. Jazz Arranging I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MHIS 246 and APPM 272, or permission of instructor. A study of the basic harmonic, melodic, notational and orchestrational techniques needed to draft a successful jazz arrangement. The final project will be to write an arrangement for a 12-piece jazz ensemble.

MHIS 312. Jazz Arranging II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MHIS 311. Advanced harmonic, melodic and orchestrational techniques applied to writing for the small jazz ensemble, vocal group and large jazz orchestra.

MHIS 321. Music History I. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Enrollment restricted to music majors. Prerequisite: UNIV 200 or HONR 200. Study of Western music in a historical context from antiquity through the Classical era.

MHIS 322. Music History II. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Enrollment restricted to music majors. Prerequisite: UNIV 200 or HONR 200. Study of Western music in a historical context from the Romantic era to the 21st century.

MHIS 324. Jazz History. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MHIS 120. Study of jazz in a historical context from pre-jazz roots to contemporary styles.

MHIS 350. Studies in the Music of the African Continent and Diaspora. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 6 credits. Prerequisite: MHIS 243 or MHIS/AFAM 250. An in-depth examination of selected topics and issues in African-derived musical and cultural traditions. See the Schedule of Classes for specific topics to be offered each semester. Crosslisted as: AFAM 350/INTL 370.

MHIS 373. Beethoven and Brahms Symphonies. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: MHIS 305. An overview of all symphonies will be the basis for an in-depth analysis of selected movements.

MHIS 380. Survey of the Music Industry. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Topics include copyright, business organization, music production, management, recording, freelancing, grants, taxation and careers allied with music.

MHIS 392. Independent Study. 1-6 Hours.
Semester courses; variable hours. 1-6 credits per semester. Maximum total of 6 credits. Determination of the amount of credit and permission of the instructor and department chair must be obtained prior to registration for the course. Open generally only to students of junior and senior standing who have individual interests in areas not otherwise available to the student.

MHIS 405. Jazz Form and Analysis I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MHIS 312. Arranging and performance-practice techniques across selected jazz styles.

MHIS 406. Jazz Form and Analysis II. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: MHIS 405 or 411. Continuing study of arranging and performance-practice techniques across selected jazz styles.

MHIS 411. Jazz Arranging III. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Availability contingent upon student demand and faculty resources. Techniques of arranging for the contemporary pop medium.

MHIS 412. Jazz Arranging IV. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MHIS 411. A study of the techniques used in modal, blues and other forms of contemporary jazz composition.

MHIS 420. Chamber Music Literature Through 1800. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MHIS 321 or 322. Historical and analytical study of selected chamber music works from the 16th, 17th and 18th centuries.

MHIS 421. Chamber Music Literature Since 1800. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MHIS 321 or 322. Historical and analytical study of selected chamber music works from the 19th, 20th and 21st centuries.

MHIS 422. The History of the Symphony. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MHIS 321 or 322. Historical and analytical study of selected symphonies from the 17th, 18th, 19th and 20th centuries.

MHIS 423. Tone Poems and Concert Overtures. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MHIS 321 or 322. Historical and analytical study of selected tone poems and concert overtures from the 18th, 19th, 20th and 21st centuries.

MHIS 424. History of American Musical Theatre. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MHIS 321 or 322. Historical and analytical study of selected musical theatre productions from the 19th, 20th and 21st centuries.

MHIS 425. Opera History. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MHIS 321 or 322. Historical and analytical study of selected operas from the 17th, 18th, 19th, 20th and 21st centuries.

MHIS 465. Song Literature. 2 Hours.
Semester course; 2 lecture hours. 2 credits. A survey of the vocal literature of Germany, France, England and other countries.

MHIS 474. Bach: Goldberg Variations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MHIS 246 or permission of instructor. A study in performance aspects and theoretical analysis of the Goldberg Variations by Johann Sebastian Bach. Writings on the topic, a printed score of the work and selected recordings will serve as the content for this study.

MHIS 476. Duke Ellington. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: permission of instructor. An overview of the music of Duke Ellington. Lectures and presentations on Ellington recordings, writings and sources of his influences will serve as content for overview.

MHIS 491. Topics in Music. 1-3 Hours.
Semester course; variable hours. 1-3 credits per semester. May be repeated for a maximum of 9 credits. Flexible semester 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 492. Independent Study. 1-6 Hours.
Semester courses; variable hours. 1-6 credits per semester. Maximum total of 6 credits. Determination of the amount of credit and permission of the instructor and department chair must be obtained prior to registration for the course. Open generally only to students of junior and senior standing who have individual interests in areas not otherwise available to the student.

MHIS 513. Arranging. 3 Hours.
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. Orchestral Repertoire. 1,2 Hour.
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 orchestras. Laboratory sessions will utilize available instrumentation for performance.

MHIS 552. Orchestral Repertoire. 1-2 Hours.
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 orchestras. Laboratory sessions will utilize available instrumentation for performance.

MHIS 566. Jazz History and Analysis. 3 Hours.
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. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May be repeated for a maximum of 9 credits. 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. Individual Project. 1-6 Hours.
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. 2 Hours.
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. 2 Hours.
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. 2 Hours.
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. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: MHIS 690 (may be taken concurrently). Principal musical 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. 2 Hours.
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. 2 Hours.
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. 2 Hours.
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. 2 Hours.
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 692. Individual Project. 1-6 Hours.
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 798. Research Project. 2 Hours.
Semester course; 2 credits. Corequisite: APPM 799 Final research or expository document for performance and composition majors. Content to be approved by graduate committee.

NANOSCIENCE AND NANOTECHNOLOGY (NANO)

NANO 570. Nanoscale Physics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course builds a fundamental understanding of the unique properties of materials with nanoscale dimensions and emphasizes the physics and thermodynamics underlying several phenomena encountered in nanotechnology. The course starts from a general description of size effects and then moves to describe the fundamental aspects of nanocluster physics such as magic numbers, and concludes with a description of the theory and fabrication of nanoscale devices. Suggested background: PHYS 380.

NANO 571. Nanoscale Chemistry. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course builds a fundamental understanding of the unique chemical properties of materials with nanoscale dimensions and emphasizes the synthetic chemistry encountered in nanotechnology. The course starts from a description of crystallization and growth models and concludes with discussion of several different synthetic approaches of nanoscale systems. Suggested background: PHYS 380.

NANO 650. Experimental Techniques in Nanoscience I. 1.5 Hour.
Semester course; 1.5 lecture hours. 1.5 credits. The course will focus on a variety of instrumental methods and techniques commonly applied to the characterization of nanomaterials. Particular attention will be placed on the theory behind the measurements, instrument safety, sample preparation and data analysis/interpretation. Topics will focus on X-ray, optical and electron characterization techniques. Suggested background: CHEM 409 or PHYS 450.

NANO 651. Experimental Techniques in Nanoscience II. 1.5 Hour.
Semester course; 1.5 lecture hours. 1.5 credits. The course will focus on a variety of instrumental methods and techniques commonly applied to the characterization of nanomaterials. Particular attention will be placed on the theory behind the measurements, instrument safety, sample preparation and data analysis/interpretation. Topics will cover morphological and physical properties characterization tools. Suggested background: CHEM 409 or PHYS 450.

NANO 660. Theoretical Studies of Nanostructures. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CHEM 660 or PHYS 580. Introduction to theoretical techniques needed to study electronic and magnetic properties of nanostructures. Covers theoretical first-principles approaches to study electronic structure of molecules, clusters, nanostructure materials and condensed matter, including determination of geometry and electronic states. Will also cover magnetic properties in reduced sizes, including quantum effects and the model Hamiltonians. A brief discussion of effective interatomic molecular potentials and their application in monte-carlo and molecular dynamics methods will be included, as well as a discussion of application of nanomaterials to medical areas. Suggested background: CHEM 660 or PHYS 580.

NANO 661. Computational Nanoscience. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CHEM 511, CHEM 512 or CHEM 612. Open only to students admitted to the Nanoscience and Nanotechnology Ph.D. program. Introduction to computational methods used to model true nanostructures containing more than 10⁵ atoms and whose assembly, morphology and properties are governed by noncovalent interactions. Structural and dynamic aspects of the computational methods will be covered throughout the course. Applications to nanotechnology and environmental cleanup will be covered through special topics assignments during the semester and discussed by the end of the course.

NANO 690. Research Seminar in Nanoscience and Nanotechnology. 1 Hour.
Semester course; 2 lecture hours. 1 credit. May be repeated for credit. In addition to reports presented by staff and visiting lecturers, current problems and developments in nanoscience and nanotechnology are discussed. Graded S/U/F.

NANO 692. Nanoscience Seminar Presentation. 1 Hour.
Semester course; 2 lecture hours. 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.

NEUROSCIENCES (NEUS)

NEUS 609. Cellular and Molecular Neuroscience. 4 Hours.
Semester course; 4 lecture hours. 4 credits. Recommended preparation: BIOC 503-504 or equivalent. 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 619. Synaptic Organization of the Brain. 3 Hours.
Semester course; 4 lecture and laboratory hours. 3 credits. Prerequisite: ANAT 610 or equivalent and permission of instructor. Designed to provide an in-depth integrative examination of the neural circuitry underlying the functions of selected regions of the brain and spinal cord. During each class meeting, faculty present lectures followed by an oral presentation by a student. Lecturers will highlight principles that are common to all regions of the central nervous system as well as adaptations that are unique to each. Student also complete weekly take-home essay assignments.

NEUS 640. Neurobiology of CNS Diseases. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: Background in cellular and systems neuroscience similar to NEUS 609 and ANAT 610 or consent of course director. The course explores the cellular and molecular basis of major diseases and conditions affecting the central nervous system as well as current and developing treatment strategies and translational approaches. Topics include stroke and cerebrovascular disease, neurotrauma and regeneration, epilepsy, neurodevelopmental disorders, neurodegenerative disease and dementia, demyelinating diseases, neuropsychiatric disorders and autism, neurooncology, and neuroAIDS.

NEUS 690. Neuroscience Research Seminar. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Consists of faculty and visiting lecturers presenting current research in neuroscience. Students attend one seminar per week and submit a one-page summary description of the seminar. Graded as S/U/F.

NEUS 697. Directed Research. 1-15 Hours.
Semester course; variable hours. 1-15 credits. Research leading to the Ph.D. degree and elective research for other students. Graded as S/U/F.

NURSE ANESTHESIA (NRSA)

NRSA 601. Principles and Practice of Nurse Anesthesia I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Introduces the nurse anesthesia graduate student to concepts necessary to plan and execute safe and individualized anesthetics. Covers formulation of the anesthesia care plan, anesthetic techniques, prevention of complications, fluid management, monitoring and utilization of anesthesia equipment.

NRSA 602. Principles and Practice of Nurse Anesthesia II. 3 Hours.
Semester course; 2 lecture hours. 3 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. 3 Hours.
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. 2 Hours.
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 hematological disorders.

NRSA 605. Principles and Practice of Nurse Anesthesia V. 2 Hours.
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 neuro-anesthesia and anesthesia delivery in specialty settings.

NRSA 606. Principles and Practice of Nurse Anesthesia VI. 2 Hours.
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 611. Advanced Physiological Concepts for the Nurse Anesthetist. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Analyzes complex relationships between body systems and anesthesia. Demonstrates how advanced concepts of physiology and biochemistry relate to concepts of anesthesia theory and practice.

NRSA 620. Advanced Health Assessment for Nurse Anesthetists I. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Provides a systematic approach to advanced health assessment emphasizing best research evidence, cultural competence and anesthetic implications. Accentuates advanced pre-operative and postoperative concepts, diagnosis and approaches for the assessment of human systems in the anesthesia setting focusing on the pulmonary (upper and lower airway), hematologic and vascular systems. Reviews cardinal techniques of inspection, palpation, percussion and auscultation.

NRSA 621. Advanced Health Assessment for Nurse Anesthetists II. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Provides a systematic approach to advanced health assessment emphasizing best research evidence, cultural competence and anesthetic implications. Accentuates advanced pre-operative and post-operative concepts, diagnosis and approaches for the assessment of human systems in the anesthesia setting focusing on the neurological, cardiovascular, gastrointestinal and musculoskeletal systems.

NRSA 622. Clinical Practicum I-II. 1 Hour.
Continuous courses; 112 clock hours (I) and 3 lecture hours (II). 1 credit (I) and 3 credits (II). 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 623 graded as S/U/F.

NRSA 623. Clinical Practicum I-II. 3 Hours.
Continuous courses; 112 clock hours (I) and 3 lecture hours (II). 1 credit (I) and 3 credits (II). 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 623 graded as S/U/F.

NRSA 624. Clinical Practicum III. 6 Hours.
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 625. Clinical Practicum IV. 6 Hours.
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 626. Clinical Practicum V. 6 Hours.
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 627. Clinical Practicum VI. 6 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Covers various pathological 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. 1 Hour.
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. 1 Hour.
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. 1 Hour.
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. 2 Hours.
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. 3 Hours.
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 684. Evidence-based Decision Making in Nurse Anesthesia. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Focuses on providing a foundation in the literature relevant to nurse anesthesia practice. Emphasis placed on establishing a scientific framework for clinical interventions and critiquing the literature in a systematic fashion. Course will culminate in a broad overview of scientific foundations for nurse anesthesia practice in selected domains.

NRSA 701. Human Factors and Patient Safety for Nurse Anesthetists. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Explores the theoretical basis of human error, patient safety and quality assurance in anesthesia care. Introduces a systems approach to error investigation and analysis. Integrates concepts of teamwork, crisis management, simulation and monitoring systems in anesthesia practice. Crosslisted as: DNAP 701.

NURSE ANESTHESIA LAB (NRSZ)

NRSZ 601. Laboratory in Principles and Practice of Nurse Anesthesia I. 1 Hour.
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.

NURSE ANESTHESIA PRACTICE (DNAP)

DNAP 701. Human Factors and Patient Safety for Nurse Anesthetists. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Explores the theoretical basis of human error, patient safety and quality assurance in anesthesia care. Introduces a systems approach to error investigation and analysis. Integrates concepts of teamwork, crisis management, simulation and monitoring systems in anesthesia practice. Crosslisted as: NRSA 701.

DNAP 702. Nurse Anesthesia Patient Safety Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: DNAP/NRSA 701. Focuses on analysis of adverse anesthesia events from a systems perspective, use of multidisciplinary teams to solve management problems and constructive techniques for communicating with patients, families and health care providers who are involved in medical errors.

DNAP 703. Health Services Delivery Systems for the Nurse Anesthetist. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides the necessary scientific foundation, both in theory and practice application, to explore the structure and function of the U.S. health care delivery system as it specifically relates to specialized nurse anesthesia practice, the components of select theories and the translation of these theories to practice.

DNAP 704. Advanced Physiology/Pathophysiology for Nurse Anesthetists I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines normal human physiology and pathophysiology using a body-systems approach, with emphasis on the interrelationships between form and function at the gross and cellular levels of organization. Includes analysis of cellular structure and function as well as the individual components of body systems.

DNAP 705. Advanced Physiology/Pathophysiology for Nurse Anesthetists II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: DNAP 704. Examines normal human physiology and pathophysiology using a body-systems approach with emphasis on the interrelationships between form and function at the gross and cellular levels of organization. Includes an analysis of cellular structure and function as well as the individual components of body systems. Incorporates an overview of genetics.

DNAP 706. Advanced Pharmacology for Nurse Anesthetists I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides an opportunity to focus on the advanced principles of anesthesia related to pharmacology. Presents in-depth material on the pharmacology of various classes of anesthetics and adjuvant therapeutics employed by nurse anesthetists, with an emphasis on general anesthetics.

DNAP 707. Advanced Pharmacology for Nurse Anesthetists II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: DNAP 706. Provides an opportunity to focus on the advanced principles of anesthesia-related pharmacology. Includes discussions on adjuvant therapeutics employed by nurse anesthetists, with an emphasis on local anesthetics.

DNAP 711. Policy and Practice for Nurse Anesthetists. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines governmental and non-governmental issues that influence nurse anesthesia practice. Focuses on developing skills that contribute to leadership and personal effectiveness in impletmenting change in nurse anesthesia and health care. Emphasizes interdisciplinary relationships between CRNAs, nurses, physicians, administrators, policy-makers and other key stakeholders.

DNAP 712. Leadership in Nurse Anesthesia Education. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines principles of teaching and learning applicable to the anesthesia didactic and clinical environment. Presents strategies in teacher/learner communication, presentation development and strategies, curriculum design and methods of evaluation pertinent to nurse anesthesia education.

DNAP 716. Advanced Chemistry and Physics Concepts for Nurse Anesthetists. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Provides advanced theoretical foundations of chemistry, biochemistry and physics relevant for critical application to the practice of anesthesia nursing utilizing the hybrid (blended learning) format.

DNAP 717. Advanced Physiological Concepts for Nurse Anesthetists. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Explores properties of advanced physiology including physiology terms, levels of organization of the human body, homeostasis and feedback systems, anatomic terms, planes and sections, cell physiology and diffusion, transport systems, pressure-volume relationships, pressure-flow-resistance relationships, Fick's principle, the Frank-Starling relationship, and math for physiology utilizing the hybrid (blended learning) format.

DNAP 718. Advanced Health Assessment for Nurse Anesthetists. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides a systematic, evidence-based, advanced physical, psychosocial and cultural evaluation of human systems to acquire and analyze relevant information for the development of a comprehensive patient assessment. Emphasizes advanced preoperative and postoperative techniques in a process whereby the learner translates information pertinent to anesthesia care into practice. Focuses on the symptom and health problem assessment and selection and interpretation of screening and diagnostic tests in order to implement an informed plan of care. Utilizes the hybrid (blended learning) format.

DNAP 721. Clinical Practicum I. 3 Hours.
Semester course; 300 clocked clinical hours. 3 credits. 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. Graded S/U/F.

DNAP 722. Clinical Practicum II. 4 Hours.
Semester course; 400 clocked clinical hours. 4 credits. Prerequisite: DNAP 721. 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. Graded S/U/F.

DNAP 723. Clinical Practicum III. 5 Hours.
Semester course; 500 clocked hours. 5 credits. Prerequisite: DNAP 722. Provides intensive experience in all clinical anesthesia areas. 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. Emphasizes increased responsibility for the delivery of a comprehensive anesthetic regime along the educational/experiential continuum. Graded S/U/F.

DNAP 724. Clinical Practicum IV. 5 Hours.
Semester course; 500 clocked clinical hours. 5 credits. Prerequisite: DNAP 723. Provides intensive experience in all clinical anesthesia areas. 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. Emphasizes increased responsibility for the delivery of a comprehensive anesthetic regime along the educational/experiential continuum. Graded S/U/F.

DNAP 725. Clinical Practicum V. 5 Hours.
Semester course; 500 clocked clinical hours. 5 credits. Prerequisite: DNAP 724. Provides intensive experience in all clinical anesthesia areas. 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. Emphasizes increased responsibility for the delivery of a comprehensive anesthetic regime along the educational/experiential continuum. Graded S/U/F.

DNAP 731. Professional Aspects of Nurse Anesthesia Practice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides an opportunity to focus on a variety of professional issues including but not restricted to the history of nurse anesthesia, professional practice roles, settings and responsibilities of the nurse anesthetist, effective communications, accountability and patient advocacy, cultural competency, professional involvement, code of ethics, regulations, and standards of practice using a hybrid (blended learning) format.

DNAP 733. Evidence-based Decision-making in Nurse Anesthesia. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides a foundation of literature relevant to nurse anesthesia practice. Emphasizes a systematic framework that is termed “evidence-based practice” for clinical interventions and critiquing the literature in an appropriate and manageable fashion. Culminates in a broad overview of scientific foundations for nurse anesthesia practice in selected domains. Utilizes the hybrid (blended learning) format.

DNAP 734. Research Methods and Statistical Measures in Nurse Anesthesia Practice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines relationships among theory, research and causal inference; quantitative and qualitative methodologies will be considered. Surveys issues relevant to research design, measurement, data collection, statistical analysis, interpretation and ethical issues in conducting research — and grounded in work in the domain of anesthesia and critical care. Prepares students to access, critically evaluate and utilize research-based literature and independently initiate a systematic approach to addressing a research hypothesis or research question. Utilizes a hybrid (blended learning) format.

DNAP 735. Principles and Practice of Nurse Anesthesia Practice I. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Introduces the nurse anesthesia student to concepts necessary to plan and execute safe and individualized anesthetics. Covers formulation of the anesthesia care plan, anesthetic techniques, prevention of complications, fluid management, monitoring and utilization of anesthesia equipment. Provides guided practical experience associated with course concepts, including practice with and evaluation of task-specific skills in both simulated and actual operating room environments.

DNAP 736. Principles and Practice of Nurse Anesthesia II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: DNAP 735. 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 or respiratory conditions.

DNAP 737. Principles and Practice of Nurse Anesthesia III. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: DNAP 736. Presents fundamental concepts and techniques essential to clinical anesthesia practice focusing on the theoretical and practical considerations involved in the administration and management of regional anesthesia and pain management.

DNAP 738. Principles and Practice of Nurse Anesthesia IV. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: DNAP 737. Covers the advanced concepts and principles of anesthetic management in obstetrics, pediatrics, hematologic disorders and endocrine disorders.

DNAP 739. Principles and Practice of Nurse Anesthesia V. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: DNAP 738. Covers the advanced concepts and principles of anesthetic management including anesthesia delivery in specialty settings and other specialty topics.

DNAP 789. Nurse Anesthesia Professional Practice. 1-6 Hours.
Semester course; variable clinical hours. 1-6 credits (100 clinical hours per credit). May be repeated up to six credits. Emphasizes analysis and evaluation of experiential learning through the use of critical thinking skills and reflection. Explores concepts of competency and expertise. Focuses on methods of determining best anesthesia practices through identification of problems, review and systematic evaluation of current research, and consideration of economic and other factors that may impact patient outcomes. Graded as S, U or F.

DNAP 799. Nurse Anesthesia Capstone Project. 1-6 Hours.
Semester course; variable hours. 1-6 credits. May be repeated up to six credits. Prerequisites: DNAP 701 and ALHP 708. Focuses on identification of relevant clinical issues in anesthesiology with attendant formulation of critically applicable questions and examination of the relevant research evidence that addresses those questions. Students implement and evaluate a terminal project and disseminate the results through an oral and/or poster presentation, manuscript submission to a peer-reviewed journal or another appropriate medium. Graded as S, U or F.

NURSING (NURS)

NURS 201. Concepts of Professional Nursing. 2 Hours.
Semester course; 2 lecture hours. 2 credits (2 credits lecture). Prerequisite: admission to the School of Nursing. Provides a foundation for all clinical nursing courses. Content focuses on professionalism, professional nursing values and health care delivery The core competencies identified by the Institute of Medicine for health care professionals are introduced as critical components of professional nursing practice, and selected concepts related to these core competencies are emphasized. Course activities are structured to establish effective professional behaviors and learning strategies useful across one's professional career.

NURS 202. Technologies of Nursing Practice. 6 Hours.
Semester course; 3 lecture and 90 clinical/laboratory hours. (3 credits lecture and 3 credits clinical/laboratory). 6 credits. Prerequisite: admission to the School of Nursing. This course introduces the student to the study and application of skills and interventions basic to nursing practice. Content focuses on the development of cognitive, psychomotor, affective, interpersonal and communication skills to become effective members of the collaborative health care team. Students will learn how the concepts of nursing process and evidence-based clinical decision-making are integrated into practice. Opportunities are provided for practice and demonstration of selected skills in the laboratory and in clinical settings. This course emphasizes techniques for the safe acquisition and management of patient information.

NURS 261. Health Assessment for Nursing Practice. 3 Hours.
Semester course; 2 lecture and 30 clinical/lab hours. 3 credits (2 credits lecture and 1 credit clinical/lab). Prerequisite: PHIS 206. Pre- or corequisite: NURS 201. Enrollment requires admission to the School of Nursing. This course builds on the biopsychosocial sciences and focuses on development of knowledge, skills and techniques necessary for history-taking and physical examination in adults. Students are introduced to the nursing process and diagnostic reasoning skills are developed through analysis and documentation of assessment data. A laboratory experience provides opportunities for students to integrate communication and problem-solving skills with the health assessment process. The course focuses on the healthy adult patient and emphasizes the diversity of patient populations in health care settings.

NURS 301. Nursing Informatics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: admission to the School of Nursing. This course focuses on data management and use of information and technology to communicate effectively, provide safe and effective patient care and use research and clinical evidence to inform nursing practice decisions. The course emphasizes information literacy and its application to nursing practice and effective health care delivery. Course delivered online.

NURS 305. Knowledge Validation by Portfolio. 3 Hours.
Semester course; 3 credits. Prerequisite: acceptance into the RN Completion Program and/or faculty recommendation. Culminates in submission of a portfolio for validation of course-specific knowledge and evaluation for full or partial credit. Elective. RN students only. Involves self-assessment of prior learning for RN. Requires correlation of experiential and theoretical knowledge with objectives of selected nursing courses.

NURS 307. Foundations of Professional Nursing I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: admission to the School of Nursing. Corequsite: NURS 301. This course explores historical and contemporary trends influencing professional nursing practice within the U.S. health care system. The course focuses on research within the context of nursing's development as a profession and discipline and within the context of evidence-based practice. The research process and analysis of research studies are emphasized. Course delivered online.

NURS 308. Foundation of Professional Nursing II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: NURS 301 and NURS 307, both with minimum grades of C. This course focuses on the impact of regulation and accreditation on safe patient care delivery. The course emphasizes concepts related to professional nursing practice and explores selected internal and external forces that influence health care delivery. Students will evaluate current nursing practice within the context of previous nursing education and professional nursing standards. Upon successful completion of this course, proficiency credits for prior nursing education will be conferred. Course delivered online.

NURS 309. Population Health. 3 Hours.
Semester course; 3 credits lecture. 3 credits. Prerequisites: admission to School of Nursing and NURS 301 and NURS 307, both with minimum grades of C. This course focuses on core concepts of population health. Socioeconomic, lifestyle, environmental, genetic and other major determinants of population health are examined. The nurse's role in health promotion, disease and injury prevention across the lifespan are emphasized. The importance of collaboration with populations and other health care professionals is highlighted. Course delivered online.

NURS 325. Nursing of Adults I. 6 Hours.
Semester course; 3 lecture and 90 clinical hours. 6 credits (3 credits lecture and 3 credits clinical/laboratory). Prerequisites: NURS 201, NURS 202 and NURS 261. All prerequisites must be completed with a minimum grade of C. Focuses on adult and geriatric patients with acute and chronic physical illnesses that have relatively stable trajectories. Provides theoretical and evidence-based foundations for nursing management and related therapeutic regimens. Emphasizes clinical decision-making and technical skills in the provision of care to adult and geriatric patients in a variety of health care settings.

NURS 335. Nursing of Women. 5 Hours.
Semester course; 3 lecture and 60 clinical/laboratory hours. 5 credits (3 credits lecture and 2 credits clinical/laboratory). Prerequisites: NURS 201, NURS 202 and NURS 261. All prerequisites must be completed with a minimum grade of C. Examines the health needs of women across the life span with an emphasis on the health needs of the childbearing family. Applies nursing process, theory and research with an emphasis on the development of critical thinking skills in the diagnosis and treatment of human responses to health needs of women, neonates and families. Practices clinical skills and applies theoretical knowledge in selected ambulatory care settings for women's health and post-discharge care, and hospital settings for antenatal, intrapartum, post-partum and neonatal experiences.

NURS 345. Nursing of Children. 5 Hours.
Semester course; 3 lecture and 60 clinical/laboratory hours. 5 credits (3 credits lecture and 2 credits clinical/laboratory). Prerequisites: NURS 201, NURS 202 and NURS 261, all completed with a minimum grade of C. Examines health care needs of children within the context of the family system. Focuses on application of evidence, nursing process, communication skills and critical thinking when providing nursing to children. Applies current theory and evidence related to the child and family environment, developmental capacity, stress, adaptation and resilience. Incorporates standards of care for both well and ill children in the provision of care.

NURS 355. Psychiatric-Mental Health Nursing. 5 Hours.
Semester course; 3 lecture and 60 clinical hours. 5 credits (3 credits lecture and 2 credits clinical laboratory). Prerequisites: NURS 201, NURS 202 and NURS 261. All prerequisites must be completed with a minimum grade of C. Examines theoretical, empirical and practical knowledge applied to the prevention and treatment of common psychiatric and mental health conditions encountered in basic nursing practice. Provides students with an integrative perspective from which to incorporate various frameworks of knowledge into practice. Provides didactic knowledge and clinical learning experiences to facilitate students' understanding of actual and potential psychiatric illnesses and mental health problems in individuals, families and communities.

NURS 365. Pathophysiology and Pharmacology I. 3 Hours.
Semester course; 3 lecture hours. 3 credits (3 credits lecture). Prerequisites: anatomy, physiology and microbiology; BIOL 205, PHIS 206, BIOL 209 and admission to the School of Nursing. Introduces general and foundational principles in pathophysiology and pharmacology. Examines pathophysiological mechanisms selected diseases, syndromes and/or conditions and integrates related pharmacotherapeutics. Establishes a biophysiological basis for understanding relevant clinical assessments, clinical manifestations and disease trajectories. Provides a foundation for establishing physiological priorities for nursing care.

NURS 366. Pathophysiology and Pharmacology II. 3 Hours.
Semester course; 3 lecture hours. 3 credits (3 lecture credits). Prerequisite: NURS 365 completed with a minimum grade of C. Examines pathophysiological mechanisms in selected human systems diseases, syndromes and/or conditions and integrates related pharmacotherapeutics. Establishes a biophysiological basis for understanding relevant clinical assessments, clinical manifestations and disease trajectories. Provides a foundation for establishing physiological priorities for nursing care.

NURS 367. Applied Principles of Health and Disease. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: anatomy and physiology; BIOL 205 and PHIS 206. All prerequisites must be completed with a minimum grade of C. Expands on a foundation of basic knowledge of normal functioning and common pathophysiologic conditions. Based on common principles of health and disease: homeostasis and disruptions of homeostasis, growth cycles, communication of information, and repair and regeneration. Develops a foundation of current knowledge in the area of physiology/pathophysiology for practice.

NURS 371. Evidence-based Practice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: STAT 210, NURS 201, NURS 202. All prerequisites must be completed with a minimum grade of C. This overview course focuses on the knowledge and skills required to enact evidence-based practice over one's professional life. Students will examine the relevance of nursing research to evidence-based practice as they review important research concepts and identify factors affecting utilization of evidence in practice. The course formally introduces a model for evidence-based practice with an emphasis on the components of searching for, appraising and synthesizing best evidence.

NURS 396. Nursing Internship. 1-5 Hours.
Semester course; 120 clinical hours per credit. Variable credit. May be repeated. Prerequisites: NURS 325, NURS 335, NURS 345, NURS 355, NURS 365, NURS 366 and NURS 371. All prerequisites must be completed with a minimum grade of C. Provides combination supervised clinical experience and paid work experience in selected settings of the VCU Medical Center. Many of these settings are not available in traditional curriculum. Introduces students to the work life of a nurse.

NURS 397. International Comparison of Nursing Education and Clinical Care. 1 Hour.
Semester course; 30 clinical hours. 1 credit (1 credit clinical/lab). Enrollment restricted to students in the nursing program of the University of Cordoba or VCU. This course focuses on a comparison of the nature of nursing in two countries: the United States and Spain. Specifically, the course focuses on comparing and contrasting the health care systems and examining the nursing education systems and nursing student experiences in Spain and the U.S. Students from the University of Cordoba will engage in clinical simulations designed to expose them to the high fidelity simulators used in U.S. schools. Additionally, students from both schools will engage in guided observation of nursing care provided to patients in acute care settings and citizens within community-based settings.

NURS 403. Evidence-based Practice in Health Care. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: NURS 308 with a minimum grade of C. This course formally introduces models for evidence-based practice, examines hierarchies of evidence, reviews change theories useful to initiate EBP and identifies individual and organizational resources needed for EBP. Emphasis is on developing skills in retrieving and appraising literature relevant to clinical problems, understanding the research process and critiquing evidence from research publications and other sources to inform evidence-based nursing practice. Course delivered online.

NURS 406. Interprofessional Collaborative Practice. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: NURS 308 with a minimum grade of C. Explores the necessity for interprofessionalism in the contemporary health care environment. Core competencies and best practices for interprofessional collaborative practice are emphasized. Participation in virtual team activities provides students with opportunities to apply interprofessional knowledge, skills and attitudes that improve practice and impact patient care outcome. Course delivered online.

NURS 407. Using Evidence in Clinical Practice. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisites: NURS 301 and NURS 307. All prerequisites must be completed with a minimum grade of C. Focuses on skills required to enact evidence-based practice (EBP) over one's professional life, including synthesis of appropriate evidence for use in practice. Formally introduces models for EPB, reviews change theories useful to initiate EBP and identifies individual and organizational resources needed for EBP.

NURS 408. Ethics, Law and Public Policy: Application to Nursing Practice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: NURS 308 with a minimum grade of C. This course examines ethics, law and public policy that influence nursing practice and the nature and function of the health care system. The emphasis of the course will be on the role of the professional nurse as advocate for patients, families, communities and the nursing profession, as well as an advocate for changes in the health care system as needed. Course delivered online.

NURS 409. Population Health: Application to Nursing Practice. 2 Hours.
Semester course; 60 clinical hours. 2 credits (2 credits clinical/lab). Prerequisites: NURS 308 and NURS 309, both with minimum grades of C. This course provides opportunity to apply core concepts of population health in a community within the framework of the nursing process. Epidemiological and population-level data will be used to develop and/or guide interventions in the management of care. The course emphasizes evidence-based approaches to achieving sustainable population health outcomes. Course delivered online.

NURS 410. Applied Ethics in Clinical Practice. 3 Hours.
Semester course; 3 lecture hours. 3 credits (3 credits lecture). Prerequisite: NURS 301. All prerequisites must be completed with a minimum grade of C. Identifies and examines ethical and moral dilemmas encountered in professional nursing practice. Examines personal value systems related to nursing ethics. Discusses relationships between professional nursing and resolution of moral dilemmas. Applies ethical principles to selected dilemmas in clinical nursing practice including patients' rights, informed consent, confidentiality, quality of life, and death and dying.

NURS 415. Community Health Nursing: Theory and Application. 5 Hours.
Semester course; 5 lecture hours. 5 credits. Prerequisites: NURS 301, NURS 307. All prerequisites must be completed with a minimum grade of C. Through this course, which includes 45 hours of community health field experiences, the student will develop an understanding of population-focused nursing based on the scope and core functions of public health. The course provides theoretical content essential to the assessment, planning, implementation and evaluation of the health of communities. The course utilizes an epidemiological approach to population-focused nursing. The course emphasizes the study and application of community health nursing roles for health promotion and disease prevention. The course also evaluates the effects of contemporary issues and health policy on the public's health.

NURS 416. Community Health Nursing. 5 Hours.
Semester course; 3 lecture and 60 clinical hours. 5 credits (3 credits lecture and 2 credits clinical laboratory). Prerequisites: NURS 325, NURS 335, NURS 345, NURS 355, NURS 365, NURS 366 and NURS 371, all completed with a minimum grade of C. Focuses on development of knowledge and skills essential for care of communities and populations. Explores theory and evidence relevant to the assessment, planning, implementation and evaluation of communities and populations. Incorporates epidemiological principles to population-focused nursing and emphasizes the study and application of community health nursing roles for health promotion and disease prevention. Evaluates the impact of health policy on the public's health. Designs an evidence-based service-learning project to address the health care needs of at-risk populations.

NURS 425. Nursing of Adults II. 6 Hours.
Semester course; 3 lecture and 90 clinical hours. 6 credits (3 credits lecture and 3 credits clinical laboratory). Prerequisites: NURS 325, NURS 335, NURS 345, NURS 355, NURS 365, NURS 366 and NURS 371. All prerequisites must be completed with a minimum grade of C. Focuses on the patient in acute phases of physical illnesses and with complicated multisystem health problems. Provides theoretical and evidence-based foundations for nursing management and related therapeutic regimens. Focuses on the development and application of clinical decision-making and an evidence-based model in the provision of care to acutely ill adults in a variety of settings.

NURS 461. Advanced Clinical Assessment. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: NURS 301. All prerequisites must be completed with a minimum grade of C. Expands existing physical and psychosocial assessment skills to address selected complex patient problems. Focuses on acquisition of clinical evidence for assessment of rapidly changing situations, patient risk and situations related to patient safety. Critical analysis of patient data, prioritization of patient needs and effective communication are emphasized.

NURS 462. Advanced Pathophysiological Concepts: Application to Patient Care. 3 Hours.
Semester; 3 lecture hours. 3 credits. Prerequisites: NURS 308 and NURS 403, both with minimum grades of C. This course expands on basic knowledge of normal physiology and common pathophysiologic conditions across the lifespan. The course focuses on advanced knowledge of pathophysiology in relation to complex health care conditions. Integration of appropriate assessment skills and evidence-based pharmacologic and non-pharmacologic interventions are highlighted. The nurse's role in anticipating complications and evaluating clinical outcomes is emphasized. Course delivered online.

NURS 477. Leadership and Management in Health Care. 4 Hours.
Semester course; 4 lecture hours. 4 credits: Prerequisites: NURS 308, NURS 309 and NURS 403, all with minimum grades of C; corequisite: NURS 406. This course examines principles of leadership and management that facilitate coordination and implementation of safe, quality-oriented and ethical patient care. The course emphasizes development of leadership competencies within contexts of the nursing community and interprofessional team in a variety of settings within the contemporary health care delivery system. Course delivered online.

NURS 478. Leadership and Management in Health Care: Theory and Application. 5 Hours.
Semester course; 3 lecture and 60 clinical/laboratory hours (3 credits lecture and 2 credits clinical/laboratory). 5 credits. Prerequisites: NURS 325, NURS 335, NURS 345, NURS 355, NURS 365, NURS 366 and NURS 371, all completed with a minimum grade of C. Integrates principles of leadership and management to prepare students for management, coordination and implementation of safe and ethical patient care in contemporary health care delivery systems. Based on an understanding of nursing's development as a profession, advances enactment of professionalism. Precepted clinical experiences provide opportunities to apply leadership and management principles to nursing practice in a variety of settings and specialty areas.

NURS 488. Clinical and Management Decision-making. 3 Hours.
Semester course; 1 lecture and 60 clinical/lab hours. 3 credits (1 credit lecture, 2 credits clinical/lab). Prerequisites: NURS 406, NURS 462 and NURS 477, all with minimum grades of C. This course is designed as the culminating or capstone experience for the R.N.-B.S. completion program. The preceptor-supervised experience provides opportunities to evaluate outcomes of baccalaureate education within the context of the clinical practice setting, to apply leadership principles and change theories to clinical and management decision-making, to employ concepts of quality and safety, and to use quality improvement processes in the health care setting. Course delivered online.

NURS 491. Special Topics Course. 1-6 Hours.
Semester course; 1-6 lecture hours. 1-6 credits (1-6 credits lecture). Prerequisites: admission to the School of Nursing and permission of instructor. An in-depth exploration of specific topics in nursing theory and practice.

NURS 492. Elective Study. 1-5 Hours.
1-5 credits. Prerequisite: admission to the School of Nursing. Independent study projects planned to meet the learning objectives of the student.

NURS 496. Senior Synthesis. 6 Hours.
Semester course; 2 lecture and 120 clinical/lab hours. Honors section only: 2 lecture, 1 seminar and 120 clinical/lab hours. 6 credits (2 credits lecture and 4 credits clinical/lab). Honors section: 7 credits (2 credits lecture, 1 credit seminar [2 contact hours] and 4 credits clinical/lab). Prerequisites: NURS 325, NURS 335, NURS 345, NURS 355, NURS 365, NURS 366, NURS 371, NURS 425, IPEC 501 and IPEC 502. Honors section prerequisite: NURS 512. All prerequisites must be completed with a minimum grade of C. This course is designed as a culminating experience that meets the criteria of the third tier of the VCU Core Curriculum. It prepares students for successful transition into professional practice; thus it requires higher-level cognitive processes that include synthesis of knowledge, evidence and skills from all previous course work and clinical experiences. The course requires that the student consistently enact professional practice, demonstrate competency in standards of care, application of evidence, professionalism and safe and legal practice. This course is taken during the last semester of the nursing program.

NURS 501. Advanced Professionalization I. 1 Hour.
Semester course delivered online; 1 lecture hour. 1 credit. Prerequisite: admission to the graduate program in nursing. Focuses on socialization to the roles and responsibilities related to advanced nursing preparation. Introduces the history, competencies and roles of advanced practice nursing with an emphasis on role acquisition. Addresses trends and issues which shape advanced practice nursing.

NURS 502. Advanced Nursing Practice: Pharmacotherapeutics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: admission to the graduate program in nursing. Develops the requisite knowledge of pharmacotherapeutics necessary for the safe pharmacological management of common patient problems by the advanced practice nurse.

NURS 503. Ethics, Advanced Nursing Practice and the Health Care Environment. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: NURS 501. Grounded in the disciplinary perspective and heritage of nursing, emphasizes analysis of ethical concepts foundational to advanced nursing practice while considering diverse perspectives of the patient, family, health care team and organizational system. Focuses on applying ethical decision-making frameworks to analyze ethical dilemmas and negotiating individual and team-based values. Addresses development of effective communication and leadership strategies for promoting ethical health care delivery and managing ethical conflicts.

NURS 504. Advanced Nursing Practice: The Biological Basis of Health and Illness Across the Lifespan. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: admission to the nursing program. Focuses on the biological and pathophysiological foundations of health problems across the life span. Uses biologic 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: Foundations in Health Care Finance. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: admission to the graduate program in nursing. Provides students with knowledge and skills necessary to develop and manage operating and capital budgets in a health care environment. Introduces health care economics and accounting principles appropriate for health care financial management. Provides instruction for the development of financial spreadsheets and analyses using selected computer software programs.

NURS 506. Leadership in Health Care and Nursing (Nurse Leadership Institute). 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: permission of instructor. The mission of the Nurse Leadership Institute is to inspire, teach and empower nurse managers seeking to grow as leaders and become catalysts for change. This course explores the role of nursing leaders and their impact on the social, ethical and political issues affecting current and future nursing and health care delivery systems.

NURS 507. Health Promotion and Disease Prevention Across the Lifespan. 4 Hours.
Semester course; 4 lecture hours. 4 credits. Pre- or corequisite: NURS 504. Focuses on advanced nursing assessment and the design and delivery of evidence-based, culturally relevant health promotion and disease prevention strategies for individuals across the lifespan. Applies theories, concepts and research findings related to health promotion, health protection and disease prevention as a basis for clinical decision-making with child, adolescent and adult patients and their families within a variety of care settings.

NURS 508. Policy, Processes and Systems for Advanced Nursing Practice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: admission to the nursing program. Explores various influences on the structure and financing of health care, advanced nursing practice and health outcomes from a macro and micro perspective of the current health care system. Addresses the policy-making process at various levels of government and within institutions, policies affecting current and future nursing care delivery systems and nursing's role in policy advocacy to improve the quality of health care delivery. Using policy, processes and systems-level strategies, including quality improvement and high reliability organizational theory, students will be able to articulate the methods, performance measures, culture of safety principles and quality standards necessary for effective leadership as a change agent in the current health care system.

NURS 511. Health Assessment for Advanced Nursing Practice. 3 Hours.
Semester course; 2 lecture and 45 clinical/laboratory hours. 3 credits (2 credits lecture and 1 credit clinical/laboratory). Prerequisite: admission to the nursing program. Provides the framework for holistic, culturally relevant assessment of individuals. Focuses on advancing students' knowledge and assessment in health history, risk appraisal, health promotion, psychosocial, developmental and functional assessment and physical examination techniques. Emphasizes the application of diagnostic reasoning skills in assessing deviations from normal in selected content in specialty areas. Includes supervised experiences with advanced clinical assessment skills.

NURS 512. Evidence-Based Advanced Nursing Practice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: admission to the graduate program in nursing or Honors College. Grounded in the disciplinary perspective of nursing, focuses on appraisal of research evidence to guide advanced nursing practice. Addresses the use of clinical and epidemiological data to identify clinical problems, health risks and organizational issues that impact health outcomes of individuals, families and communities. Reviews application of criteria for evaluating research studies using foundational knowledge of major research designs and basic statistics. Emphasizes appraisal and synthesis of scientific literature to design evidence-based practice strategies and outcome measures in the context of a selected clinical problem, population health risk or organizational issue. Reviews the process of research translation and ethical conduct of research.

NURS 513. Introduction to Biobehavioral Clinical Research. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: admission to the Graduate School or Honors College; NURS 365 and 371. Focuses on major theoretical frameworks and research design issues in biobehavioral clinical research. Includes common problems of measurement and interpretation, with emphasis on clinical interpretation and applicability.

NURS 514. International Perspectives on Community Health in Developing Countries. 3 Hours.
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 undergraduate (junior or senior level) and graduate students. Explores 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. Crosslisted as: INTL 514.

NURS 540. Spirituality in Health Care. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: admission to the graduate program in nursing. 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. 1-3 Hours.
Semester course; 1-3 credits. Prerequisite: admission to the graduate program in nursing. Explores specific topics in nursing theory and practice.

NURS 592. Directed Study in Nursing. 1-3 Hours.
Semester course; variable hours. 1-3 credits. Prerequisite: admission to the graduate program in nursing. Independent study in a specific area of nursing developed under the supervision of a member of the graduate faculty.

NURS 594. Directed Study: Nursing Clinical Practicum. 1-6 Hours.
Semester course; 45-270 clinical/lab hours. 1-6 credits (1-6 clinical/lab credits). Prerequisite: permission of instructor. Independent study in specific practicum area of nursing developed under the supervision of a faculty member. Graded as pass/fail.

NURS 601. Advanced Professionalization II. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: NURS 501. Designed to prepare students to assume an advanced practice nursing role after graduation. Focuses on role development in advanced practice nursing, marketing oneself as an advanced practice nurse, and regulatory and economic policies that affect advanced practice nursing in today's health care system. Presents strategies to evaluate outcomes attributable to APN practice.

NURS 605. Statistical Methods for Quality Improvement. 3 Hours.
Semester course; 3 lecture hours (delivered online). 3 credits (3 credits lecture). Enrollment restricted to students admitted to a graduate program. This course focuses on common analytic approaches in practice change projects, including correlation, chi-square analysis, independent and paired t tests, analysis of variance, and logistic and multiple regression. Selection of the most relevant analytic strategy to determine clinical significance of a quality improvement initiative will be emphasized. The application of statistical process control methods to health care quality improvement projects will be emphasized. The student will apply principles of statistical analysis to a dataset using statistical software to identify characteristics of participants and outcomes.

NURS 606. Evaluating Evidence to Improve Health Outcomes. 3 Hours.
Semester course; 3 lecture hours. 3 credits (3 credits lecture). Prerequisite: NURS 605. Provides essential skills for using research evidence to support and promote practice change. Collaboration between nursing and other disciplines in problem identification will be explored. Ethical dimensions of quality improvement research and research evidence will be reviewed. Students will formulate a clinical question, search for supporting evidence, apply appraisal principles to evaluate the evidence and derive practice-specific recommendations for implementation.

NURS 607. Epidemiology and Population Health. 3 Hours.
Semester course; 3 lecture hours. 3 credits (3 credits lecture). Prerequisite: NURS 605. Integrates principles of epidemiology, evidence-based clinical prevention, health screening, behavioral modification, disease modification and disease management of populations and quality metrics. Students will assess population health models and frameworks to address a multilevel perspective of the health status of vulnerable populations and sources of health inequalities. Cultural perspectives will be emphasized at a regional, national and global level.

NURS 608. Quality Improvement in Practice. 3 Hours.
Semester course; 3 lecture hours (delivered online). 3 credits (3 credits lecture). Enrollment restricted to students admitted to a graduate program. This course prepares the student for proficiency in the development of quality improvement initiatives for sustainable practice change. The student will assess evidence as it relates to cost, quality and health outcomes (individual and aggregate) within the context of current regional and national health care trends and emerging issues. Emphasis will be on the methods and tools utilized in performance improvement and patient safety. The student will develop a quality or safety initiative using a systems approach.

NURS 609. Health Care Delivery and Reimbursement Systems for Nurse Leaders. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course summarizes contemporary issues in health care delivery, evolving models of health care delivery systems and reimbursement. The focus is on current policies and systemic factors that affect the delivery of health care to the U.S. population and their potential impact on future health care delivery. The course presents factors affecting the evolution of the U.S. health care system and health care provider roles with a focus on the nurse and advanced practice. Issues are presented in context of patient-centered care and population-level aims for quality outcomes.

NURS 610. Health Information and Data Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits (3 credits lecture). Enrollment restricted to students admitted to a graduate program. This course focuses on acquisition of essential leadership skills needed for the design, selection, utilization and evaluation of health information technologies used to influence health care decisions, patient safety and quality of care. Information systems and implementation will be explored. Emphasizes the use of information technology for assessment of health quality outcomes over time leading to sustainable change.

NURS 611. Primary Care Advanced Practice Clinical Procedures. 1 Hour.
Semester course; 7.5 lecture and 22.5 laboratory (contact) hours. 1 credit. Prerequisites: NURS 504 and 511. Provides the foundation for acquiring a beginning level of competency in a variety of common primary care advanced clinical practice skills and procedures. Emphasizes correct technique and includes supervised experiences.

NURS 612. Acute Care Advanced Practice Clinical Procedures. 1 Hour.
Semester course; 7.5 lectureand 22.5 laboratory (contact) hours. 1 credit. Prerequisites: NURS 504 and 511. Provides the foundation for acquiring a beginning level of competency in a variety of common acute care advanced clinical practice skills and procedures. Emphasizes correct technique and includes supervised experiences.

NURS 613. Organizational Behavior and Leadership for Nurse Leaders. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Corequisite: NURS 668. This course introduces students to organizational behavior as it relates to leadership theory based on classic and contemporary readings in organizational behavior. Students will engage in self-evaluative processes to assess and enhance their leadership capabilities in relation to elements of sound leadership principles. The course will examine topics in organizational behavior that relate to the nurse leader role in health care delivery. Management principles are outlined, discussed and put in context to give a realistic focus to issues in leadership and organizational behavior. The course uses case method, simulation, discussion, self-assessment instruments, written exercises and audiovisual aids to illuminate leadership and managerial practices in relation to organizational behavior.

NURS 614. Organizational Systems and Leadership for Nurse Leaders. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: admission to graduate program in nursing, accounting course. This course introduces a systems approach to health care organizational operations leadership and management. Students will gain an understanding of how nurse leaders working with the health care team organize and use structures and analytical approaches to assess and report on the efficiency and effectiveness of work processes that affect patient care, satisfaction and health outcomes. Students will gain skills in operations management by analyzing work processes, patient flow, project management, and the supply chain and customer service.

NURS 615. Diagnosis and Management in Adult-Gerontology Primary Care I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Pre- or corequisites: NURS 501, NURS 504, NURS 507, NURS 511. Provides content on the primary care management of health and illness changes throughout the adult lifespan. This course focuses on increasing the nurse practitioner student's knowledge and clinical decision-making skills in order to provide health screening, identify health promotion needs, and accurately diagnose and manage common health conditions across the adult lifespan. Emphasis is placed on developmental, prevention, pathophysiological, pharmacological and critical-thinking skills in the management of common complex and multisystem disorders.

NURS 616. Diagnosis and Management in Adult-Gerontology Primary Care II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: NURS 615. This course is a continuation of NURS 615. The course includes prevention, pathophysiological, pharmacological and critical-thinking skills in maximizing health with common and complex health problems. Emphasis is placed on increasing the nurse practitioner student's knowledge and clinical decision-making skills in order to provide health screening, identify health promotion needs, accurately diagnose and provide women’s-and adult-specific care and psychobehavioral care across the adult lifespan, particularly in the context of common complex and multisystem disorders.

NURS 617. Advanced Gerontology Primary Care Across the Care Continuum. 4 Hours.
Semester course; 4 lecture hours. 4 credits. Prerequisite: NURS 616. Students will further examine and integrate physiological, psychological and sociocultural processes associated with normal aging. Relevant theories, concepts and research findings from the behavioral, social and biological sciences are analyzed as a basis for advanced nursing practice with older adults and their families. Emphasis is placed on enhancing the individual's health within the context of their functional capabilities, social support networks and environment. Important geriatric care models for effective practice with older adults across the care continuum -- coordinated care, transitions of care and complex care management -- are reviewed.

NURS 618. Diagnosis and Management in Adult-Gerontology Acute Care I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Pre- or corequisites: NURS 501, NURS 504, NURS 507, NURS 511. Provides content on the management of adult and geriatric patients and populations who are physiologically unstable, technologically dependent and/or highly vulnerable to complications. The focus of this course is on increasing students' acute care knowledge and decision-making skills in order to accurately assess, diagnose and manage complex acute, critical, and chronically ill or injured adult and geriatric patients.

NURS 619. Diagnosis and Management in Adult-Gerontology Acute Care II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: NURS 618. This course is a continuation of NURS 618. The course provides content on the management of adult and geriatric patients who are physiologically unstable, technologically dependent and/or highly vulnerable to complications. The focus of this course is on increasing students' acute care management knowledge and decision-making skills in order to stabilize the patient's condition, prevent complications, restore maximum health and provide palliative care.

NURS 621. Leadership and Organizational Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits (3 credits lecture). Prerequisite: NURS 608. Examines system leadership and change within the context of organizational culture. Models and strategies related to leadership, effective organizational processes, organizational change, strategic planning and intraprofessional teamwork will be evaluated. Emphasizes development of skills in system assessment and system intervention design.

NURS 627. Foundational Perspectives of Family-centered Care. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: admission to the graduate program in nursing. This course is foundational to the family nurse practitioner curriculum and provides the theoretical foundation and context for the FNP's role in the care of families. The course will emphasize analysis of theories and research concerning families. The effects of psychosocial, cultural, socioeconomic and spiritual variables on families at risk will be discussed. The effects of transitions and crises on the health/illness status of patients in the context of family will be explored. Culturally appropriate communication skills to facilitate family decision-making and foster positive behavioral change in the patient and caregiver will be analyzed. Students will examine their personal beliefs and family life experiences to inform their developing advanced practice role.

NURS 629. Diagnosis and Management in Family Primary Care I. 4 Hours.
Semester course; 4 lecture hours. 4 credits. Enrollment restricted to students admitted to a graduate program in nursing. This course is designed to introduce the student to the role of the nurse practitioner as a provider of primary care across the lifespan. Concepts of advanced health assessment, pharmacology and pathophysiology are synthesized with a focus on diagnostic decision-making and interdisciplinary management of common acute and chronic health problems. Emphasis is placed on facilitating optimal health and function of patients from newborn through senescence. Strategies to enhance, maintain and restore health are emphasized, while promoting health-seeking behaviors and the impact on family-centered care.

NURS 630. Diagnosis And Management In Family Primary Care II. 4 Hours.
Semester course; 4 lecture hours. 4 credits. Prerequisite: NURS 629. This course is a continuation of NURS 629. Concepts of health promotion and disease prevention, advanced health assessment, pharmacology, and pathophysiology are incorporated into the diagnosis and interdisciplinary management of common acute and chronic health problems. Emphasis is placed on the formation and evaluation of comprehensive evidence-based care with regard to the care of common complex and multisystem disorders. Strategies to enhance, maintain and restore health are emphasized. Health-seeking behaviors and the impact on family are stressed.

NURS 631. Primary Care of Select Populations. 2 Hours.
Semester course; 1 lecture and 45 clinical/lab hours. 2 credits (1 credit lecture and 1 credit clinical/lab). Prerequisites: NURS 629 and NURS 630. This course addresses the diagnosis and management of select primary care topics in women's health, pediatrics, gerontology and psychiatric-mental health. Laboratory experiences including simulation, standardized patients and objective structured clinical examinations will accompany didactic content delivery. Graded P/F.

NURS 635. Advanced Practice Psychiatric Mental Health Nursing Practicum I. 6 Hours.
Semester course; 270 clinical/lab hours. 6 credits (6 credits clinical/lab). Prerequisites: NURS 502, NURS 503, NURS 511 and NURS 657; corequisite: NURS 636. Focuses on the diagnosis and management of mental health problems and psychiatric disorders for individuals, families and groups across the lifespan through faculty supervised clinical experiences with a preceptor. Demonstrates ability to perform a comprehensive psychiatric evaluation while incorporating therapeutic communication skills. Provides opportunities to apply knowledge of standardized taxonomy systems and evidence-based screening guidelines to formulate a differential diagnosis. Requires students to develop plans of care incorporating evidence-based practice guidelines. Performance of clinical skills at a basic level is expected. Graded Pass/Fail.

NURS 636. Advanced Practice Psychiatric Mental Health Nursing Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits (3 lecture credits). Corequisite: NURS 635. Prepares for and builds on practicum experience. Focuses on the management of both acute and chronic psychiatric disorders for individuals, families and groups across the lifespan. Examines the unique characteristics of selected populations diagnosed with mental health problems or psychiatric disorders and ways to address complex management needs through a case study approach. Provides opportunities for students to plan and discuss treatment plans while integrating health promotion and education strategies. Students are expected to apply knowledge of both psychotherapeutic and psychopharmacologic interventions. Focuses on synthesis of evidence to analyze clinical decision-making and formulate a patient-centered plan of care across the treatment trajectory.

NURS 637. Advanced Practice Psychiatric Mental Health Nursing Practicum II. 6 Hours.
Semester course; 270 clinical/lab hours. 6 credits (6 credits clinical/lab). Prerequisite: NURS 635. Builds on previous practicum experience. Focuses on the advanced management of mental health problems and psychiatric disorders for individuals, families and groups across the lifespan through faculty-supervised clinical experiences with a preceptor. Students will implement and evaluate the management of both common and complex mental health problems and psychiatric disorders. Provides opportunities for the synthesis, application and evaluation of knowledge needed to provide evidence-based psychiatric care. Focuses on strategies to lead the interprofessional health care team in quality improvement methods. Promotes the provision of high-quality, collaborative and ethical care. Performance of clinical skills at the advanced level is required. Graded as Pass/Fail.

NURS 638. Health Policy Leadership and Advocacy. 3 Hours.
Semester course; 3 lecture hours. 3 credits (3 credits lecture). Prerequisite: NURS 606. Emphasizes critical analysis of the political, organizational, economic, ethical, and quality and safety dimensions of health policy issues. Contextual factors such as social justice, health disparities, vulnerable populations, access to care, health care financing and the globalization of health care will be explored. Leadership skills in health policy advocacy will be refined throughout the course.

NURS 639. Health Informatics for Nurse Leaders. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The course gives students a broad overview of health informatics in the context of the health care organization; discusses principles of informatics and information flows in nursing and health care using systems analysis techniques; and emphasizes understanding of how nurse leaders implement, manage and evaluate health care information and informatics projects. Information and communication technology system integration, data security, as well as ethical and regulatory issues, will be reviewed. Current topics and issues related to the use, retrieval, evaluation and dissemination of health care information will be discussed, as well as the role of informatics in decision-making.

NURS 643. Family Primary Care Practicum I. 6 Hours.
Semester course; 270 clinical/lab hours. 6 credits (6 credits clinical/lab). Prerequisites: NURS 629 and NURS 630; corequisite: NURS 644. This precepted practicum course is designed to provide opportunities for students to develop beginning competencies as a family nurse practitioner. Critical-thinking and diagnostic-reasoning skills will be developed. Skills of advanced health assessment and knowledge of the management of common health problems will be applied in the clinical setting. Students will order, conduct and interpret appropriate screening and diagnostic tests, generate differential diagnoses and, in conjunction with the preceptor, determine diagnosis and management plan. Students will demonstrate effective case presentations to preceptor and document appropriately. A minimum of 45 practicum hours (135 hours total) in women's health, geriatrics and pediatrics will be completed between the two practicum courses. Graded as pass/fail.

NURS 644. Family Primary Care Seminar. 1 Hour.
Semester course; 1 seminar hour (15 lecture hours). 1 credit. Corequisite: NURS 643. Seminars will emphasize skill development in the teaching-coaching function. A case-study approach will provide the basis for in-depth assessment and discussion of health and illness problems. Case analysis and discussion will enhance the student's ability to manage the health and illness status of patients and families over time. Graded as pass/fail.

NURS 645. Family Primary Care Practicum II. 6 Hours.
Semester course; 270 clinical/lab hours. 6 credits (6 credits clinical/lab). Prerequisites: NURS 643, NURS 644; corequisite: NURS 646. This practicum course serves as the culminating experience in the family nurse practitioner concentration focused on skill refinement with increasing responsibility in the delivery of primary care to families. Students will work with clinical preceptors to assimilate practice management skills pertaining to economics, reimbursement for services and time management. Primary care skills including prioritization, management and coordination of both routine and complex episodic and chronic illness problems and technology utilization are refined. Interdisciplinary collaborative practice skills are emphasized. Configuration of practicum hours will be based on results of individualized assessment and evaluation performed in NURS 644. A minimum of 45 practicum hours (135 hours total) in women's health, geriatrics and pediatrics will be completed between the two practicum courses. Graded P/F.

NURS 646. Family Primary Care Final Synthesis Seminar. 1 Hour.
Semester course; 1 seminar hour (15 lecture hours). 1 credit. Prerequisites: NURS 643, NURS 644; corequisite: NURS 645. This seminar is designed to facilitate the student's ability to integrate theory, research and clinical practice. An in-depth analysis of the evaluative, consultative, systems leadership and advocacy functions of the nurse practitioner role within a professional, ethical and legal framework will be performed. Students will complete an evidence-based clinical project that demonstrates synthesis of knowledge, as well as written, oral and critical-thinking skills. Graded P/F.

NURS 651. Decision Analysis for Quality Outcomes Across Populations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: accounting course. This course focuses on managerial decision-making and planning. The main focus is to introduce widely used methods that aid in decision-making and planning, including intuitive approaches, quantitative methods (samples and probabilities, decision trees, tradeoff analysis) and applied approaches to evaluate problems as well as progress toward solutions (assessing risk, root cause analysis, gap analysis and benchmarking). Each method uses real-world illustrations. Students will have the opportunity to use applied approaches to pose solutions to problems faced by nurse managers and leaders.

NURS 652. Health Care Managerial Finance I: For Nurse Leaders. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: accounting course. This course provides introductory business financial management training. The course describes opportunities for improving a health system's fiscal efficiencies and delivery by providing practical approaches to budgeting, financial analysis and the management of financial resources. The course provides instruction on the development and analysis of financial spreadsheets. Financial accounting principles are reviewed. Conceptual and real-world issues will be addressed using tools to analyze nursing and health care organizational performance, costs, budgets and variance.

NURS 653. Health Care Managerial Finance II: Economic Evaluation and Analysis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: NURS 651 and NURS 652. This course presents an overview of the macro and micro economy as an influencing factor on health care delivery presented in the context of ethical considerations and techniques that enhance efficiency. The course covers various cost-effectiveness analysis tools that enhance the ability of decision-makers to assess efficiencies and effectiveness. The main goal for students is to understand the parameters for using these techniques and how they are applied in nursing as well as in interdisciplinary approaches in health care settings.

NURS 655. Nurse as Leader. 2 Hours.
Semester course; 4 seminar hours. 2 credits. Prerequisite: admission to the graduate program in nursing. Explores central theories and practice 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 leader and provide culturally diverse urban arena for practicing emerging competencies. Requires an action plan designed, in consultation with faculty mentor, to systematically improve leadership skills.

NURS 656. Diagnosis and Management of Psychiatric Disorders Across the Lifespan. 4 Hours.
Semester course; 4 lecture hours. 4 credits. Prerequisite: NURS 657. Students will develop advanced practice psychiatric-mental health nursing knowledge related to the psychodiagnostic, psychopharmacologic and psychotherapeutic evaluation/treatment of psychiatric disorders across the lifespan. This course focuses on the neurobiological basis of psychiatric disorders and associated evidence-based treatments. Addresses knowledge needed for comprehensive and collaborative management of culturally diverse clients with psychiatric disorders in both acute and primary health care settings.

NURS 657. Advanced Practice Psychiatric Mental Health Nursing: Theory and Practice Across the Lifespan. 4 Hours.
Semester course; 4 lecture hours. 4 credits. Prerequisite: NURS 504. Focuses on advanced psychiatric mental health nursing practice by integrating theoretical, clinical and research knowledge related to psychotherapeutic management of acute and chronic mental health problems and psychiatric disorders. Examines knowledge of theories and psychotherapeutic techniques for individuals, families and groups across the lifespan. Analyzes interprofessional practice as applicable to the psychiatric mental health setting.

NURS 662. Diagnosis and Management in Adult-Gerontology Critical Care. 4 Hours.
Semester course; 4 lecture hours. 4 credits. Prerequisites: NURS 618 and 619. Provides content on selected common health and illness changes encountered in adult-geriatric critical care settings. The focus of this course is on increasing students' knowledge about common problems seen in the adult critical care environment.

NURS 664. DNP Residency: Mentored Practicum. 1-6 Hours.
Semester course; 45-270 clinical/lab hours (45-270 clinical hours). 1-6 credits. May be repeated for a maximum total of 18 credits. Prerequisites: NURS 605 and NURS 608; 500 clinical practice hours. Mentored study that facilitates student demonstration of DNP competencies through documented learning experiences and implementation of the DNP project. Practice setting and focus of residency hours are individualized to student's specific area of interest. Residency activities will be mutually developed by the student and faculty adviser, culminating in a professional portfolio that demonstrates achievement of all course objectives by the completion of the 12 required residency credits. Graded as Pass/Fail.

NURS 665. DNP Project I: Proposal Development. 3 Hours.
Semester course; 3 lecture/seminar hours. 3 credits (3 lecture/seminar credits). Provides the student with the support and direction needed to develop a comprehensive DNP project proposal. The DNP project is designed to improve quality and/or safety patient outcomes. Students use evidence-based practice to design the DNP project that is focused in a specialized clinical area. Students work in collaboration with their faculty adviser and DNP project team. Graded as pass/fail.

NURS 666. Strategic and Change Management for Quality Outcomes for Nurse Leaders. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisites: NURS 613; accounting course. This course introduces strategic management principles, models and tools useful for implementing sustainable organizational change. Students will be able to align organizational and nursing-specific mission, vision and goals setting a strategic direction. Students gain applied practice in select strategic and change-management processes in real-world nursing contexts and discuss how these processes optimize or hinder quality patient care outcomes. Finally the course explores factors that facilitate sustaining a strategic direction and how sustainability builds markers of superior performance and quality.

NURS 667. DNP Project II: Project Implementation and Evaluation. 3 Hours.
Semester course: 3 lecture/seminar hours. 3 credits (3 lecture/seminar credits). May be repeated. Program culminates in the successful completion of a scholarly project designed by the student in collaboration with the faculty adviser and DNP project team. The DNP student will analyze and summarize findings and defend the DNP project. The final DNP product (criteria outlined in the DNP handbook) is a scholarly manuscript that provides evidence of the student's critical thinking and ability to translate research through problem identification, proposal development, implementation, and evaluation. Graded as pass/fail.

NURS 668. Human Resource and Customer Relationship Management for Nurse Leaders. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: NURS 508, NURS 609 and accounting course; corequisite: NURS 613. This course examines the role of human resource management in health care and nursing organizations in meeting the challenge of continually improving patient care services. Students will gain an understanding about strategies useful to empower, motivate, hire and retain nursing talent. The course discusses topics in HR management appropriate for nurse leaders and frontline managers such as nursing workforce training, competencies, performance appraisals, recruitment and retention, and progressive disciplinary approaches. HR concepts about workforce capabilities and employee satisfaction will be discussed in relation to their association with patient satisfaction and health care delivery outcomes.

NURS 669. Adult-Gerontology Acute Care Practicum II. 4 Hours.
Semester course; 180 clinical hours. 4 credits (4 credits clinical practicum). Prerequisite: NURS 678. Focuses on providing acute care management of adults-older adults with complex acute, critical and chronic health conditions. Particular emphasis will be placed on integrating health promotion, protection and disease-prevention interventions; safety principles; and risk-reduction strategies through faculty-supervised clinical experiences with a preceptor. Building on previous practicum experience, students guide and evaluate resuscitation, stabilization and rehabilitation interventions while integrating preventive strategies to reduce complications. Provides opportunities to develop and carry out the plan of care and incorporate evidence-based practice guidelines to improve patient outcomes. Performance at the intermediate level is expected. Graded pass/fail.

NURS 675. Adult-Gerontology Primary Care Practicum II. 4 Hours.
Semester course; 180 clinical hours. 4 credits (4 credits clinical practicum). Prerequisite: NURS 676. Focuses on primary care management of adults-older adults throughout the wellness-illness spectrum with particular attention on integrating health maintenance and risk-reduction interventions for patients with comorbidities through faculty-supervised clinical experiences with a preceptor. Building on previous practicum experience, students implement health screening, health promotion, health protection and risk-reduction strategies for adolescent-older adults within the context of their current health issues and comorbidities. Provides opportunities to develop and carry out the plan of care incorporating evidence-based practice guidelines to improve patient outcomes. Performance at an intermediate level is expected. Graded pass/fail.

NURS 676. Adult-Gerontology Primary Care Practicum I. 1-3 Hours.
Semester course; 45-135 clinical hours. 1-3 credits (1-3 credits clinical practicum). Prerequisite: NURS 511. Focuses on providing primary care management of adolescent-older adults across the wellness-illness continuum through faculty-supervised clinical experiences with a preceptor. Provides opportunities to focus on the differing and unique developmental, life stage needs that impact a patient's care across the adult age spectrum and application of evidence-based strategies in directing health promotion, health protection, disease prevention and primary care management of injuries and disease. Students must demonstrate ability to synthesize theoretical, scientific and contemporary clinical knowledge for the assessment and management of both health and illness states and apply knowledge within the framework of different practice models and populations. Performance at a basic level is expected. Graded as pass/fail.

NURS 677. Adult-Gerontology Primary Care Practicum III. 5 Hours.
Semester course; 255 clinical hours. 5 credits (5 credits clinical practicum). Prerequisite: NURS 675. Focuses on advanced primary care management of adolescent-older adults with complex health issues and comorbidities through faculty-supervised clinical experiences with a preceptor. Building on previous practicum experience, students implement and evaluate health screening, health promotion, health protection, disease prevention, risk-reduction strategies and systems-based coordination in the management of adults-older adults with complex health conditions. Provides opportunities for leadership within the interprofessional health care team to direct quality improvement methods, implementation of evidence-based practice guidelines to address a clinical problem and evaluation of patient and systems-based outcomes. As the final practica course, performance at the advanced level is expected. Graded as pass/fail.

NURS 678. Adult-Gerontology Acute Care Practicum I. 1-3 Hours.
Semester course; 45-135 clinical hours. 1-3 credits (1-3 credits clinical practicum). Prerequisite: NURS 511. Focuses on providing acute care management of adolescent-older adults who are physiologically unstable, technologically dependent and highly vulnerable to complications through faculty-supervised clinical experiences with a preceptor. Provides opportunities to focus on the provision of a spectrum of care ranging from disease prevention to acute and critical care management. Students must synthesize theoretical, scientific and contemporary clinical knowledge for the assessment and management of both health and illness states and apply knowledge within the framework of different practice models and differing populations. Performance at a basic level is expected. Graded as pass/fail.

NURS 679. Adult-Gerontology Acute Care Practicum III. 5 Hours.
Semester course; 225 clinical hours. 5 credits (5 credits clinical practicum). Prerequisite: NURS 669. Focuses on advanced acute, critical and chronic management of adolescent-older adults who are physiologically unstable, technologically dependent and highly vulnerable to complications through faculty-supervised clinical experiences with a preceptor. Building on previous practicum experience, students integrate health screening, promotion, protection and disease-prevention interventions; safety principles; risk-reduction strategies; and systems-based coordination in the management of adults-older adults with complex acute, critical and chronic injuries and illnesses throughout the trajectory of resuscitation, stabilization and rehabilitation. Provides opportunities for leadership within the interprofessional health care team to direct quality improvement methods, implementation of evidence-based practice guidelines to address a clinical problem and evaluation of patient and systems-based outcomes. As the final practica course, performance at the advanced level is expected. Graded as pass/fail.

NURS 680. Leading People. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: admission to the graduate program in nursing. 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: admission to the graduate program in nursing. 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 687. Management Systems and Health Care Outcomes. 4 Hours.
Semester course; 4 lecture hours. 4 credits. Prerequisite: admission to the graduate program in nursing. Focuses on the effective management of human, material and fiscal resources in a competitive institutional environment. Evaluates selected approaches to assessing the quality of patient outcomes using information technology. Examines issues related to obtaining and organizing clinical and administrative data to support decision making. Takes a comprehensive approach to program and business planning.

NURS 690. Application of Financial Concepts. 4 Hours.
Semester course; 4 lecture hours. 4 credits. Prerequisite: NURS 505. 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 Hours.
Semester course; 3 laboratory hours. 3 credits. Prerequisite: NURS 512. Participates in ongoing research. Implements research with faculty direction and supervision.

NURS 692. Integrative Administrative Systems Practicum I. 2 Hours.
Semester course; 90 clinical hours. 2 credits (2 credits clinical practicum). Prerequisite: admission to the graduate program in nursing. Focuses on the application of nursing knowledge in a variety of settings within the integrative systems specialty of nursing administration and leadership. Practicum experiences focus on the negotiation of learning objectives and the definition of a project for an organizational change to be implemented in subsequent practica courses under the supervision of 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. Graded as P/F.

NURS 693. Integrative Administrative Systems Practicum II. 2 Hours.
Semester course; 90 clinical hours. 2 credits (2 credits clinical practicum). Prerequisite: NURS 692. Focuses on the application of nursing knowledge in a variety of settings within the integrative systems specialty of nursing administration and leadership. Practicum experiences focus on the analysis of primary and secondary data related to the project negotiated in Practicum I and development of a plan to implement the selected organizational project. The student will identify the necessary skills and competencies appropriate to implementing the plan. 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. Graded as P/F.

NURS 694. Integrative Administrative Systems Practicum III. 2 Hours.
Semester course; 90 clinical hours. 2 credits (2 credits clinical practicum). Prerequisite: NURS 693. Focuses on the application of nursing knowledge in a variety of settings within the integrative systems specialty of nursing administration and leadership. Practicum experiences focus on the execution of the plan for the organizational project using established evaluation measures. Provides opportunities for achievement of competencies in advanced nursing practice through faculty-supervised administration and leadership experiences with a preceptor. Student will demonstrate the synthesis of knowledge gained from previous courses and practica experiences. Graded as P/F.

NURS 695. Managing for Performance and Health Care Outcomes. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: NURS 508 and NURS 512. This course synthesizes organizational systems approaches to design, identify, analyze and benchmark quality and safety initiatives in health care settings across the continuum. Students will gain an overview of how evidence drives decisions about and implementation of processes in organization performance improvement. Students will also apply principles in quality and safety project design to address a specific issue affecting patient care outcomes.

NURS 696. Practicum I: Comparative Health Care Delivery Systems for Nurse Leaders. 2 Hours.
Semester course; 90 clinical/lab hours. 2 credits. Prerequisites: NURS 609, NURS 613 and NURS 614. This practicum experience is designed to integrate theory with the reality of various organizational contexts impacting health care delivery systems, nursing systems and leadership. The overall purpose is to provide students with opportunities to compare how different systems influence nursing practice and nursing leadership. The practicum is designed with three separate units to give students opportunities to compare different health care settings, which may include local, regional, national and international contexts. Graded Pass/Fail.

NURS 697. Practicum II: Comparative Interdisciplinary Health Care Leadership Roles. 1 Hour.
Semester course; 45 clinical/lab hours. 1 credit. Prerequisite: NURS 696. In this course the student applies principles of professional inquiry and discovery to engage in dialogue with nurse leaders as well as interdisciplinary professional managers and leaders in ambulatory care settings. Students will also gain applied experience in ancillary department settings central to health care delivery that are important in maintaining organizational system efficiency and effectiveness but generally are outside the domain of nursing-directed patient care. Ancillary department experiences may take place in ambulatory or inpatient settings. Graded Pass/Fail.

NURS 698. Practicum III: Applied Integrative Health Care Delivery Leadership. 3 Hours.
Semester course; 135 clinical/lab hours. 3 credits. Prerequisite: NURS 697. In this course the student applies a broad range of managerial knowledge, skills and multidisciplinary theoretical constructs, e.g., nursing, business, organizational systems, organizational behavior, strategy and change management. Students will complete a formal organizational-level gap analysis and communicate formally and informally to others in the organization about a strategic and change-management plan to address the nursing issue(s) examined in the gap analysis. Students will gain guided experience from a nurse leader about management roles, the organizational perspective on strategic and change initiatives and implementation techniques. Graded Pass/Fail.

NURS 700. Scientific Integrity: Responsible Conduct of Research. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Enrollment restricted to students admitted to a doctoral program. This course is intended for students to develop and refine their understanding of and skills in applying ethics and law of research, with a focus on the National Institute of Health's Office for Human Research Protections' responsible conduct of research topics.

NURS 701. Statistical Methods for Nursing Research. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides knowledge about data management, basic statistical tests, graphics and tables, and necessary software. Presents statistical tests: contingency table analysis, one- and two-sample t-tests, one- and two-factor analysis of variance, simple linear regression, multiple linear regression, and analysis of covariance. Defines selected statistical terminology and concepts. Uses data from relevant studies to illustrate various statistical tests and corresponding assumptions.

NURS 702. Advanced Statistical Concepts for Nursing Research. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: NURS 701. Presents advanced statistical methods and necessary statistical assumptions. Explains optimal modeling approaches for different data types and study designs. Data types: binary data, ordinal data, multinomial data, time-to-event data, longitudinal data, hierarchical data and multivariate data. Analytic methods discussed will include nominal, ordinal and multinomial logistic regression, Kaplin-Meier estimation, Cox proportional hazards model, mixed effects models, factor analysis, principal components, canonical correlation, classification and clustering.

NURS 703. Philosophy of Human Sciences. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: admission to the doctoral program in nursing. 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. Analysis and Construction of Theory for Nursing Research. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: NURS 703. This course focuses on analysis and critique of theoretical and conceptual foundations of research and the development process associated with constructing nursing disciplinary knowledge. Emphasis is placed on the processes for concept and theory development within the context of a research trajectory relevant to the discipline.

NURS 720. Foundations of Biobehavioral Research. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: NURS 704 or permission of instructor. This course provides a foundation for critically examining and developing research frameworks and models used to conduct biobehavioral research. The course explores assumptions about the dimensions, interactions and outcomes of biology and behavior from basic science through interventional approaches. This course discusses current applications of biobehavioral research including translational research to improve nursing practice and clinical outcomes.

NURS 721. Advanced Concepts in Biobehavioral Research. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: NURS 720 or permission of instructor. This course focuses on applying concepts and measures used in biobehavioral research. It also discusses biobehavioral research priority areas, current methods and data sources. In addition, students will evaluate the types of measures used in biobehavioral research and relate these to their own focus areas. Students will apply their knowledge from the prerequisite course to develop a research proposal incorporating a research framework, concepts and measures, and methods used in biobehavioral research.

NURS 725. Synthesis and Emerging Trends in Scientific Inquiry. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: NURS 720 and NURS 721, or NURS 731 and NURS 732, or permission of instructor. This course explores emerging trends in different areas of scientific inquiry to help students develop their understanding of the current and evolving research environment. Designed to synthesize the current state of the science and apply it to the student's area of research. In addition, the student will apply approaches to incorporating emerging trends into an individualized research program and strategic career development.

NURS 731. Foundations in Health Care Quality Research. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: NURS 704 or permission of instructor. This course provides a foundation for critically examining and developing research frameworks and models used to conduct health care quality of research. The course explores assumptions about health care quality, its dimensions and outcomes at the individual, organizational and population levels. Different approaches to health care quality research will be discussed. Finally, current applications of quality research to policy, health system accountability and various levels of the provision of health care are reviewed.

NURS 732. Advanced Concepts in Health Care Quality Research. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: NURS 731 or permission of instructor. This course focuses on applying concepts and measures used in quality health services research. It also discusses health care quality research priority areas, current quality and safety measures, and data sources. In addition, students will evaluate the types of quality and safety measures used in health care quality research and relate these to their focus areas. Students will apply their knowledge from the prerequisite course to develop a research proposal incorporating a research framework, concepts and measures, and methods used in health care quality research.

NURS 770. Quantitative Research. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: NURS 701 or permission of instructor; corequisite: NURS 702. This course provides knowledge and skills for identifying and selecting appropriate designs for quantitative health care research. The course analyzes major groups of research designs for fit with various types of research questions. This course examines strengths and weaknesses of the groups of research designs. Focuses on elements of research design that enhance rigor.

NURS 772. Qualitative Research. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course provides knowledge and skills for the design and implementation of qualitative health research and the management and analysis of qualitative data. The course analyzes various research designs for ability to generate scientifically rigorous findings related to nursing or health care. This course explores current challenges, debates and controversies in qualitative research.

NURS 773. Perspectives on Research Design. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: NURS 703 and NURS 704. Analyzes philosophical foundations of a variety of research designs. Explores assumptions underlying the selection and evaluation of quantitative, qualitative and mixed-methods designs. Focuses on the epistemological, ontological and methodological foundations of research design and implications for knowledge development.

NURS 776. Research Program Development Seminar I. 2 Hours.
Seminar course; 1 lecture and 2 seminar hours. 2 credits. Prerequisite: admission to the doctoral program in nursing. 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. 2 Hours.
Seminar course; 1 lecture and 2 seminar hours. 2 credits. Prerequisite: admission to the doctoral program in nursing. Analyzes and integrates the state of knowledge development in a selected area of inquiry. Develops an individualized trajectory of scholarly career development.

NURS 778. Research Program Development Seminar III. 2 Hours.
Seminar course; 1 lecture and 2 seminar hours. 2 credits. Prerequisite: admission to the doctoral program in nursing. 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 for the advancement of a program of research.

NURS 791. Special Topics. 3-6 Hours.
Semester course; variable hours. 3-6 credits. May be repeated. Prerequisite: admission to the doctoral program in nursing. Explores specific topics in nursing.

NURS 792. Directed Research Inquiry. 1-6 Hours.
Semester course; 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 per semester. Prerequisite: admission to doctoral program in nursing and permission of the instructor. Provides a mentored independent study in a selected theoretical or conceptual area of inquiry within the context of a student's research focus. The purpose of this course is to increase the student's knowledge in a selected theoretical or conceptual area. This directed study will be developed under the supervision of a member of the graduate faculty. Graded as P/F.

NURS 796. Directed Research Experience. 1-9 Hours.
Semester course; variable hours. 1-9 credits. A minimum of 2 credits is required by the completion of course work. Prerequisite: admission to the doctoral program in nursing and permission of the instructor. Provides a mentored research experience in areas of faculty research expertise. The purpose of this course is to increase the student's exposure to and involvement in research under the direction of a graduate faculty member who is actively engaged in a research project. This mentored research experience will be developed under the supervision of a member of the graduate faculty. May be taken in the semester(s) the student is preparing for the comprehensive exam and for dissertation preparation prior to admission to candidacy. Graded as P/F.

NURS 797. Practicum in Nursing Research. 1-3 Hours.
Semester course; 1-3 practicum hours (45-135 clinical/lab hours). 1-3 credits (1-3 clinical lab credits). May be repeated. Prerequisite: NURS 700 or permission of instructor. Enrollment restricted to students admitted to a doctoral program and by permission of instructor. This course focuses on the development of skills and techniques for the conduct of research through active participation in either an ongoing faculty research project or an element of the student's research area. The practicum is structured individually through discussion with the supervising faculty member. Emphasis is on the practical application of research skills and growth in knowledge related to the conduct of research. Graded as Pass/Fail.

NURS 898. Dissertation. 1-12 Hours.
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.

OCCUPATIONAL THERAPY (OCCT)

OCCT 520. Occupational Therapy Applications: Kinesiology. 2 Hours.
Semester course; 1 lecture and 2 laboratory hours. 2 credits. Addresses basic components of motion, biomechanics, joint structure, specific muscle groups and muscle function. Analyzes functional activities necessary to carry out the tasks and roles of productive living using these principles.

OCCT 521. Neuroscience Applications to Occupational Therapy. 3 Hours.
Semester course; 2 lecture hours. 2 lab hours, 3 credit hours. 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 literature in matching function and dysfunction with structure and organization. Case examples across the life span used to understand these potential relationships and link material to OT theories and frames of reference guiding practice.

OCCT 522. Interdisciplinary Medical Lectures. 3 Hours.
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 530. Nature of Occupational Therapy. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Provides an overview of fundamentals of occupational therapy through use of official documents of the American Occupational Therapy Association and other authoritative sources. Introduces practice definitions, philosophical and ethical underpinnings, professional roles, and organizations in the field of occupational therapy.

OCCT 531. Interpersonal Communication and Group Dynamics. 2 Hours.
Semester course; 1 lecture and 2 laboratory hours. 2 credits. Introduces oral and written communication skills and group process techniques. Addresses interpersonal relationships, principles of therapeutic involvement, observation, analysis of communication patterns, interview methods and OT terminology. Provides experiences in group leadership, assertiveness techniques. Laboratory exercises chart path of personal development, professional socialization.

OCCT 532. Life Span Occupational Development. 3 Hours.
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. 4 Hours.
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 practice patterns and advocacy issues. Emphasizes concepts integral to understanding and using human occupation as a basis for practice as well as the dynamic relationship among occupational therapy principles, values and theories.

OCCT 534. Occupational Therapy Evaluation and Intervention Overview. 3 Hours.
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. Verbal communications and written documentation will be covered.

OCCT 580. Introduction to the Profession of Occupational Therapy. 2 Hours.
Semester course; 1 lecture and 2 laboratory hours. 2 credits. Provides an overview of fundamentals of occupational therapy through use of the Official Documents of the American Occupational Therapy Association and other authoritative sources. Introduces practice definitions, philosophical and ethical underpinnings, professional roles and organizations, and the clinical reasoning process, as well as characteristics and values recommended for successful performance as a professional occupational therapist.

OCCT 589. Advanced Functional Anatomy. 5 Hours.
Semester course; 2 lecture and 6 laboratory hours. 5 credits. Taught as an intensive six-week course with one lecture and three lab hours, five days a week. Addresses the anatomy of the human body relevant to occupational therapy practice including, but not limited to, the skeletal system, muscle tissue and the muscular system, and the cardiovascular system. Anatomical/medical terminology including anatomical planes, anatomical position, abbreviation of terms and terms of movement are covered.

OCCT 590. Functional Movement Analysis in Occupational Therapy. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: OCCT 589. Addresses kinesiology and functional anatomy including the basic components of palpation, joint structure and the study of kinematics, specific muscle groups and muscle function. Functional activities necessary to carry out the tasks and roles of productive living are analyzed and emphasized using these principles.

OCCT 591. Neuroscience Applications to Occupational Therapy. 4 Hours.
Semester course; 3 lecture and 2 laboratory hours. 4 credits. Lab focuses on structures, basic function and inter-relationships; lecture addresses structure-function relationships, system organization and structure relationships, and higher order functions in the typical nervous system. Case examples across the lifespan will link function with dysfunction, and application to injury, disorder, disease processes common to occupational therapy practice. Course relies on a current review of neuroscience literature in matching function and dysfunction with structure and organization.

OCCT 592. Introduction to Injury, Illness and Disability. 3 Hours.
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 of disease for each. Addresses value and limitations of this knowledge to the 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 for certain impairments.

OCCT 593. Analysis of Human Occupation. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Prerequisite: OCCT 580. Explores activities and occupation and related professional terminology, activity analysis and therapy as a teaching/learning process. Emphasizes analysis of occupational performance skills and the transaction between client factors, activity demands and context.

OCCT 594. Theoretical Foundations of Occupational Therapy. 4 Hours.
Semester course; 4 lecture hours. 4 credits. Prerequisite: OCCT 580. Examines theoretical constructs underlying occupational therapy practice. Uses a historical framework to critically examine the ideas put forth by earlier frames of reference and current conceptual models of practice. Emphasizes concepts integral to the understanding and use of human occupation as a basis for practice as well as the dynamic relationships among occupational therapy principles, values and theories.

OCCT 613. Adult Occupational Performance I. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: OCCT 592. Examines adult evaluation and treatment fundamentals that support occupational performance interventions. Covers evaluation and treatment content underlying and applicable to all areas of occupational performance. Includes specific assessments, practical information on understanding clients with a variety of conditions and therapist skills.

OCCT 614. Pediatric Occupational Performance I. 4 Hours.
Semester course; 2 lecture and 4 laboratory hours. 4 credits. Prerequisite: OCCT 522. Focuses on occupational performance of young children (infants, toddlers and preschoolers) with disabilities. Explores principles and theories of normal development as a baseline for identifying the impact of illness, injury or environmental factors on occupational engagement. Examines a variety of frames of reference, evaluative and intervention approaches for children and their families in medical, home, community and educational settings. Uses a holistic approach to develop a child's abilities to engage in their occupations while meeting expectations of family and environment.

OCCT 615. Level I Fieldwork in Occupational Therapy. 1 Hour.
Semester course; 54 clinical hours. 1 credit. Enriches classroom learning by providing directed observation and participation in clinical practice settings. Provides experiences supervised by professionals working in one of a variety of clinical settings (e.g., early intervention, schools, hospitals, nursing homes, home health agencies or mental health settings). Arranges placements to complement the treatment intervention courses. Prepares students for the more complex level II fieldwork clinical experience.

OCCT 616. Research Process in Occupational Therapy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Covers basic steps in research process, including problem definition, literature review, design, data collection and analysis, and dissemination of findings. Addresses qualitative and quantitative research approaches, critical analysis of literature and reviews statistical concepts.

OCCT 617. Therapeutic Process in Occupational Therapy. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Focuses on essential knowledge of therapeutic use of self, group process techniques, interview methods, therapist interaction skills, assessment of process and social interaction occupational performance skills, and individual and group intervention applicable to core and specialty psychosocial practice with youth and adults in support of participation in occupation.

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

OCCT 621. Occupational Therapy Practice Activities II: Assistive Technologies. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Focuses on the evaluation, activity analysis and intervention process with a range of assistive technology, including software, hardware and low-tech solutions. Includes the development of skills for adaptation of activities and contexts.

OCCT 623. Occupational Therapy Practice Activities III: Activity and Occupational Synthesis. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Emphasizes altering, adapting and modifying activities and contexts to increase occupational performance. Includes experiential learning in the community and exposure to adapted leisure activities.

OCCT 630. Adult Evaluation and Intervention I: Foundations. 2 Hours.
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 all areas of occupational performance. Includes specific assessments, practical information on understanding clients with a variety of conditions and therapist skills.

OCCT 633. Adult Evaluation and Intervention II: Facilitating Function With Disability Across the Continuum of Care. 4 Hours.
Semester course; 2 lecture and 4 laboratory hours. 4 credits. Introduces students to assessment and intervention strategies, tools and equipment typically used in adult physical disability settings across the continuum of care. Focuses on occupational performance while considering client factors, tasks and context. Draws on practical experience and application of materials taught in previous adult physical disability course work. Working with the instructor, clinical faculty and people with disabilities in laboratory and lecture sessions, utilizes clinical reasoning skills, technologies and strategies typically employed to treat a variety of adult functional disability conditions across the continuum of care, including ADL, IADL, community living vocational training, play and leisure.

OCCT 635. Psychosocial Evaluation and Intervention I: Foundations. 2 Hours.
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 core 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. Fieldwork I in Psychosocial Occupational Therapy. 2 Hours.
Semester course; 1.5 lecture and .5 clinical hours. 2 credits. Focuses on occupational performance of adolescents and adults with psychosocial dysfunction. Provides service-learning fieldwork I experiences applying clinical reasoning, and conceptual practice models to plan, implement and evaluate evidence-based intervention in community-based mental health settings. Preliminary step to the more complex level II fieldwork experience.

OCCT 640. Pediatric Evaluation and Intervention I: Infant and Preschool Children. 3 Hours.
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 12. 4 Hours.
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. 3 Hours.
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. 3 Hours.
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 administrative tasks. Includes supervision, consultation and the planning of occupational therapy fieldwork education.

OCCT 654. Children and Young Adult Advanced Assistive Technology Applications in Occupational Therapy. 3 Hours.
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. Exposes students to tools and 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 relative to their area of pediatric or young adult research and clinical practice.

OCCT 655. Older Adult Advanced Assistive Technology Application in Occupational Therapy. 3 Hours.
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, low vision, 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Requires instructor's permission for non-occupational therapy majors. Briefly reviews basic structure and organization of nervous system in typical individuals. Emphasizes student examination of current neuroscience literature relative to diseases and disabilities encountered in clinical practice, matching function and dysfunction with structure and organization. Students explore individual topics of interest; present to other professionals. Addresses specific cases from participants' clinical and professional experience, and links this to contemporary OT theories and frames of reference guiding practice.

OCCT 660. Level I Fieldwork in Occupational Therapy. 1 Hour.
Semester course; 45 clinical/seminar hours. 1 credit. Enriches classroom learning by providing directed observation and participation in clinical practice settings. Provides experiences supervised by professionals working in one of a variety of clinical settings (e.g., early intervention, schools, hospitals, nursing homes, home health agencies or mental health settings). Placements arranged to complement the treatment/intervention courses. A preliminary step to the more complex Level II Fieldwork clinical experience.

OCCT 661. Occupational Therapy in the Schools. 3 Hours.
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. 3 Hours.
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 occupation and occupational performance.

OCCT 663. Beyond the Basics: Advanced Evaluation and Intervention in Pediatric Occupational Therapy. 3 Hours.
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 use of 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. 2 Hours.
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 and develop strategies based on previously presented material. Incorporates assistive technology as an intervention tool into the case-based learning process. Graded as Pass/Fail.

OCCT 671. Advanced Theory in Occupational Therapy. 1-4 Hours.
Semester course; 1-4 lecture hours. 1-4 credits. May be repeated for a maximum of 4 credits. Integrates examination of historical and current theoretical constructs reflected in professional literature and published conceptual models of practice with the clinical expertise of experienced occupational therapists. Examines the clinical reasoning process and fosters high-level theoretical and clinical thinking. Builds upon entry-level study of theory to emphasize dynamic relationship between theory, clinical reasoning and client-based and occupation-based practice.

OCCT 673. Health Care Delivery and Occupational Therapy Practice Models. 3 Hours.
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. Covers principles 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. 1-9 Hours.
Semester course; students must complete 480 clinical hours. Variable credit. Maximum of 9 credits per semester. Clinical experience must be different from that offered in OCCT 681. Expands experience in delivering occupational therapy services to a variety of individuals across the lifespan and in a variety of settings. Promotes interpretation of previously learned skills and knowledge through clinical reasoning and reflective practice. Extends skills of professionalism and competence as entry-level occupational therapists. Graded as P/F or PR.

OCCT 681. Level II Fieldwork in Occupational Therapy: B. 1-9 Hours.
Semester course; students must complete 480 clinical hours. Variable credit. Maximum of 9 credits per semester. Clinical experience must be different from that offered in OCCT 680. Expands experience in delivering occupational therapy services to a variety of individuals across the lifespan and in a variety of settings. Promotes interpretation of previously learned skills and knowledge through clinical reasoning and reflective practice. Extends skills of professionalism and competence as entry-level occupational therapists. Graded as P/F or PR.

OCCT 685. Advanced Clinical Reasoning: Asking the Right Questions. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides foundation and understanding of the source of clinical reasoning as a basis of clinical practice in occupational therapy through case-based learning. Promotes clinical reasoning within the practice of occupational therapy, bridging practice theories, evidence-based practice and clinical skills. Requires examination of existing knowledge and data, and development of a clinical project proposal.

OCCT 686. Advanced Clinical Reasoning Applications. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: OCCT 685 Forms the application component of clinical reasoning process; offers opportunity to experience clinically based project implementation within the context of ongoing practice. Facilitates mentoring relationships with colleagues in an identified specialty area to promote leadership in clinical reasoning. Implements project proposals developed in OCCT 685; data will be collected, interpreted and summarized.

OCCT 689. Occupational Therapy Assessment and Evaluation. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: OCCT 592. Provides introduction to evaluation and intervention process as it relates to areas of occupation, occupational performance skills (i.e., motor, process and social interaction), client factors and context. Focuses on general evaluation of assessments for various clients, treatment settings and environments. Emphasizes oral and written communication, accurate documentation and use of assessment data to develop appropriate treatment intervention and discharge planning for individuals.

OCCT 690. Occupational Therapy Seminar. 1-3 Hours.
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. 1-3 Hours.
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 692. Assistive Technologies for Occupational Engagement. 2 Hours.
Semester course; 4 laboratory hours. 2 credits. Prerequisite: OCCT 593. Focuses on the evaluation, activity analysis and intervention process with a range of assistive technology, including software, hardware and low-tech solutions. Includes the development of skills for adaptation of activities and contexts.

OCCT 693. Occupational Synthesis and Adaptations. 2 Hours.
Semester course; 1 lecture 2 lab hours. 2 credits. Prerequisites: OCCT 593 and 692. Builds upon activity analysis skills. Emphasizes altering, adapting and modifying activities and contexts to promote increased occupational performance. Includes development of planning and construction skills, experiential learning and exposure to adapted leisure activities in the community, and design and production of an adaptive project for an individual with a disability, therapist or facility.

OCCT 695. Fieldwork: Specialty (Optional). 1-9 Hours.
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 of 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 acquired 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 and clinical faculty. Fieldwork must be completed no later than 24 months following completion of the academic phase.

OCCT 697. Independent Study. 1-3 Hours.
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 desired 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. 1-3 Hours.
Semester course; 1-3 credits. Completion of a proposal for a research project relevant to occupational therapy.

OCCT 700. Enabling Occupational Performance: The Canadian Perspective. 3 Hours.
International study course; 2 lecture and 2 laboratory hours. 3 credits. Introduces guiding principles for enabling occupation within a Canadian context. Examines client-centered practice from perspective of Canandian occupational therapists and publications by the Canadian Association of Occupational Therapists. Focuses on theory and implementation. Characteristics of components of the Canadian Occupational Performance Moded will be examined as determinants of health, well-being and participation of individuals, groups and communities. Examines issues pertaining to Canadian society, culture and history, trends that have affected the Canadian health and social services system, and comparisons between Canadian and American systems. Course takes place in summer semester in London, Ontario, Canada.

OCCT 709. Research Process and Statistical Analysis in Occupational Therapy. 4 Hours.
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. Quantitative Research Processes. 3-4 Hours.
Semester course; 3-4 lecture hours. 3-4 credits. Prepares students as critical consumers of research. Provides overview to basic steps in research process, including problem definition, literature review, design, data collection and data dissemination. Students critically analyze each step and compare across different examples. Discussion of strengths and weaknesses in all areas of research. Focus on quantitative approaches with general introduction to basics of qualitative research for comparison.

OCCT 711. Research Process in Occupational Therapy: Qualitative Methods. 3 Hours.
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. Focuses on qualitative methods in occupational therapy research and their application to practice.

OCCT 713. Adult Occupational Performance II. 4 Hours.
Semester course; 2 lecture and 4 laboratory hours. 4 credits. Prerequisite: OCCT 613. Expands the depth and breadth of content introduced in prerequisite course. Analyzes assessment and intervention strategies, tools and equipment typically used in adult occupational therapy settings across the continuum of care. Examines evaluation and treatment of functional disability for adults in clinical and natural environments. Focuses on occupational performance, while considering client factors, tasks and context. Stresses application of knowledge of clinical reasoning, theoretical practice models and cultural and contextual issues in evaluating and planning treatment.

OCCT 714. Pediatric Occupational Performance II. 4 Hours.
Semester course; 2 lecture and 4 laboratory hours. 4 credits. Prerequisite: OCCT 614. Focuses on occupational performance of children with disabilities ages 6 through adolescence. Explores a variety of frames of reference and evaluative and intervention approaches for children and their families in multiple practice arenas, emphasizing the child's performance in educational settings. Uses a holistic approach to develop the 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 715. Level I Fieldwork in Occupational Therapy. 1 Hour.
Semester course; 54 clinical hours. 1 credit. Enriches classroom learning by providing directed observation and participation in clinical practice settings. Provides experiences supervised by professionals working in one of a variety of clinical settings (e.g., early intervention, schools, hospitals, nursing homes, home health agencies or mental health settings). Arranges placements to complement the treatment intervention courses. Prepares students for the more complex level II fieldwork clinical experience.

OCCT 716. Evidence-based Practice in Occupational Therapy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines one of the roots of clinical practice: the existence of evidence. Provides an overview of evidence-based practice in general, and more specifically, in occupational therapy. Emphasizes in-depth information on levels of evidence, developing practice questions and understanding available resources. Analyzing existing evidence is included. Addresses clinical application and resources for further study. Emphasizes practical application of EBP concepts to OT, laying groundwork for best practice.

OCCT 717. Level I Fieldwork in Psychosocial Occupational Therapy. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: OCCT 617. Focuses on occupational performance of adolescents and adults with psychosocial dysfunction. Provides service learning level I fieldwork experiences to apply knowledge of clinical reasoning and conceptual practice models to plan, implement and evaluate evidence-based group intervention in community-based mental health settings. Prepares students for the more complex level II fieldwork clinical experience.

OCCT 720. Policy, Advocacy and Management for Occupational Therapy Practice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Addresses the principles and application of leadership and management skills within the context of occupational therapy services, federal and state legislation and regulations, national requirements, and the various contexts of service delivery. Focuses on knowledge and skills for the management of human and nonhuman resources for efficient and effective occupational therapy services. Evaluates contemporary policy issues, including trends in occupational therapy settings. Covers principles of reimbursement systems with analysis on the impact on occupational therapy practice. Focuses on changes in practice sites, service delivery models and patient demographics. Emphasizes how occupational therapists can influence 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 721. Clinical Reasoning in Occupational Therapy. 3 Hours.
Semester course; 1 lecture and 4 laboratory hours. 3 credits. Prerequisites: OCCT 617, OCCT 713, OCCT 714. Utilizes case studies to develop clinical reasoning skills and examine evaluation and treatment alternatives for persons with occupational performance limitations. Focuses on lifespan development issues. Uses cases designed to integrate and develop strategies based on previously presented material.

OCCT 729. Research Practicum. 3 Hours.
Semester course; 3 seminar hours. 3 credits. Supervised investigation of selected problems in occupational therapy. Exposes students to varied tasks integral to 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 735. Evidence Bases for Occupational Therapy Practice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines one of the roots of clinical practice: the existence of evidence. Provides an overview of evidence-based practice (EBP) in general and, more specifically, in occupational therapy. Provides in-depth information on levels of evidence; developing practice questions, understanding available resources and analyzing existing evidence is included. Ties in with clinical reasoning skills, extending them to understanding the literature. Clinical application and resources for further study will be addressed. Emphasis on practical application of EBP concepts to OT, laying groundwork for best practice.

OCCT 736. Developing Fundable Projects. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines the environment and opportunities for seeking and obtaining external funding in the area of health-related sciences. Will address proposals for program development and evaluation, training and research. Studies components of typical proposals and supports proposal development by student. Analyzes and critiques student proposals using both peer and instructor review. Discusses relationships between proposal writing and leadership skills and knowledge.

OCCT 739. Program Development and Evaluation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Explores basic program development, program evaluation and needs-assessment methods necessary for developing upcoming capstone leadership projects. Focuses on conceptualization, design, models and approaches, and operational procedures used in program development and evaluation. Presents the planning and evaluation cycle, categories of evaluation, program development models and needs-assessment techniques used in creating programs. Explores ideas for program development from a variety of perspectives, including potential for evaluation of processes and outcomes, social and clinical indicators of need, asset mapping, and potential impact of the program. Emphasizes the roles of key stakeholders, regulatory bodies and evaluators, development and use of program theory, and dissemination of evaluation results for improvement of programs and policies.

OCCT 740. Concepts in Disability Leadership for Occupational Therapists. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides basic descriptions of leadership and innovation, especially as they apply to the disability community, and presents theoretical concepts of organizational leadership. Presents concepts of change in organizational, community, political and social action/social movement contexts. This is the first of a series of three courses on leadership in disability for occupational therapists.

OCCT 741. Disability Leadership Applications for Occupational Therapists. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Fosters development of skills needed to assume leadership roles in disability-related areas of practice by creating detailed proposals for the practicum in disability leadership for occupational therapists, to be implemented in the third course in the series. Students increase understanding of leadership concepts by conducting needs assessments and collecting other pilot data in community settings that provide services for people with disabilities. The second of a series of three courses on leadership in disability for occupational therapists, course focuses on application of theoretical concepts learned in the first leadership course.

OCCT 742. Practicum in Leadership for Occupational Therapists. 4 Hours.
Semester course; 1 lecture and 3 laboratory hours. 4 credits. Builds leadership skills in occupational therapists for work in health care, education and disability-focused organizations. Emphasizes relationships with other professionals, governing boards, regulatory bodies and other key stakeholders through an identified and pre-approved leadership project. Promotes exploration of personal styles of leadership. Serves as applied practicum course in leadership development.

OCCT 743. Synthesis and Evaluation of Capstone Leadership Project. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Culminating course in the four-part leadership series. Focuses on synthesis and evaluation of capstone leadership project. Leads to assessment and critique of project implementation through compilation and analysis of project results. Re-examines leadership theories, personal leadership styles and their relationship to program outcomes. Proposes and critiques resources for project sustainability, clinical application and dissemination. Requires written and verbal presentation of final project and assessment of its value to the health care community.

OCCT 759. Fieldwork Education Seminar. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: OCCT 715. Promotes professional formation through the integration of foundation concepts and skills necessary for succeeding in fieldwork II and professional practice. Emphasizes policies and procedures, self-awareness and growth, and supervision and communication skills. Extends skills of professionalism and preparation for level II fieldwork experiences.

OCCT 760. Level II Fieldwork in Occupational Therapy. 1-9 Hours.
Semester course; variable hours (54 clinical hours/credit). 1-9 credits, Prerequisites: IPEC 501, OCCT 580, OCCT 589, OCCT 590, OCCT 591, OCCT 592, OCCT 593, OCCT 594, OCCT 613, OCCT 614, OCCT 615, OCCT 616, OCCT 617, OCCT 689, OCCT 693, OCCT 713, OCCT 714, OCCT 715, OCCT 716, OCCT 717, OCCT 720, OCCT 721, OCCT 759, OCCT 752, OCCT 780, OCCT 781. Expands experience in delivering occupational therapy services to variety of individuals across the lifespan in a variety of settings. Promotes interpretation of previously learned skills and knowledge through clinical reasoning and reflective practice. Students extend skills of professionalism and competence as entry-level occupational therapists. Students must complete 480 clinical hours of OCCT 760.

OCCT 761. Level II Fieldwork in Occupational Therapy. 1-9 Hours.
Semester course; variable hours (54 clinical hours/credit). 1-9 credits, Prerequisite: OCCT 760. Clinical experience must be different from that offered in OCCT 760. Expands experience in delivering occupational therapy services to variety of individuals across the lifespan in a variety of settings. Promotes interpretation of previously learned skills and knowledge through clinical reasoning and reflective practice. Students extend skills of professionalism and competence as entry-level occupational therapists. Students must complete 480 clinical hours of OCCT 761.

OCCT 780. OTD Leadership Seminar. 2 Hours.
Seminar course; 2 lecture hours. 2 credits. A six-week intensive course that focuses on exploration of special topics integral to advancement of occupational therapy practice including, but not limited to, principles of leadership theory, research, emerging practice areas, teaching and learning, and advanced theory.

OCCT 781. Program Development and Evaluation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Six-week intensive course. Prerequisite: OCCT 616. Explores basic program development, program evaluation and needs assessment methods necessary for developing upcoming leadership-based doctoral practicum. Focuses on conceptualization, design, models and approaches, and operational procedures used in program development and evaluation. Presents the planning and evaluation cycle, categories of evaluation, program development models and needs assessment techniques used in creating programs. Explores ideas for program development from a variety of perspectives including potential for evaluation of processes and outcomes, social and clinical indicators of need, asset mapping and potential impact of the program. Emphasizes the roles of key stakeholders, regulatory bodies and evaluators, development and use of program theory, and dissemination of evaluation results for improvement of programs and policies.

OCCT 782. Professional Development Portfolio. 2 Hours.
Seminar course; 3 lecture hours. 3 credits. Prerequisites: OCCT 780, OCCT 781. Requires development of independent proposal for professional development based on selection of leadership topic of interest. Guided by a contract written by student and approved by faculty member. Results in an individual professional development portfolio.

OCCT 783. Doctoral Practicum. 10 Hours.
Semester course; variable hours (54 clinical hours/credit). 1-10 credits. Prerequisite: OCCT 761. Provides practical leadership opportunity and advanced skills in one or more areas of interest in clinical practice, administration, research, program or policy development, advocacy, education or theory development. Implements previously proposed, developed and approved project. Completes individualized specific learning objectives and evidence of learning under direct supervision or mentorship. Student must complete 540 practicum hours.

OCCT 784. Practicum Evaluation and Dissemination. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: OCCT 761. Focuses on synthesis and evaluation of doctoral practicum experience, compilation and analysis of practicum outcomes, and interpretation and application of findings or outcomes. Requires development and critique of dissemination products, written and verbal presentation.

OCCT 793. Clinical Specialty Practicum. 2-4 Hours.
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 bases 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 Hours.
3-6 credits. Completion of a proposal for a master's degree thesis relevant to occupational therapy.

OCCT 799. Thesis. 1-6 Hours.
1-6 credits. Completion of a master's degree thesis relevant to occupational therapy.

OPERATIONS RESEARCH (OPER)

OPER 327. Mathematical Modeling. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 200. Fundamental concepts of mathematical modeling. Topics may include differential equation models, optimization models and probabilistic models. Practical problems will be discussed throughout.

OPER 391. Topics in Operations Research. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. May be repeated with different topics for a maximum of 6 credits. A study of selected topics in operations research. See the Schedule of Classes for specific topics to be offered each semester and prerequisites. Because of the changing subject matter to be treated in this course, enrollment requires permission of the instructor.

OPER 427. Deterministic Operations Research. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CMSC 245 or CMSC 255, MATH 310 and OPER 327. Introduction to topics in optimization including linear programming, network models and integer programming. Focuses on constructing sound models and on solving them using appropriate software. Algorithms and model properties are also discussed. Students may not receive degree credit for both OPER 427 and OPER 527.

OPER 428. Stochastic Operations Research. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CMSC 245 or CMSC 255, MATH 310 and STAT 309. Introduction to topics in discrete-event and Monte Carlo simulation including the application of probabilistic models in real-world situations, random number generation, random variate generation and Monte Carlo integration. Students may not receive degree credit for both OPER 428 and OPER 528.

OPER 520. Game Theory and Linear Programming. 3 Hours.
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. Crosslisted as: MATH 520.

OPER 527. Optimization I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: graduate status in mathematical sciences or systems modeling and analysis, or permission of the instructor. Introduction to optimization and mathematical programming. Course addresses fundamental concepts of optimization (such as optimality conditions and duality) as well as the construction, solution, analysis and application of linear programming and network models. Emphasis is placed on using software to solve problems as well as on understanding its underlying methodology. Integer programming models will be introduced. Students may not receive degree credit for both OPER 427 and OPER 527.

OPER 528. Stochastic Simulation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: graduate status in mathematical sciences, systems modeling and analysis, or decision sciences and business analytics, or permission of the instructor. An introduction to stochastic discrete-event simulation. The course covers simulation modeling and programming in general-purpose languages (e.g., VBA for Excel) and (briefly) in specialized simulation environments (e.g., Arena, @Risk). The probability foundations of stochastic simulation of stochastic processes, random number and variate generation, variance reduction techniques, and proper design and analysis of the simulation experiment are emphasized. Applications are drawn from manufacturing, finance, logistics and service systems. Students may not receive degree credit for both OPER 428 and OPER 528.

OPER 591. Topics in Operations Research. 1-3 Hours.
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 627. Optimization II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: OPER 527. This course will address basic theory and algorithms for nonlinear optimization (unconstrained and constrained). Both theoretical foundations and practical implementations of optimization algorithms will be covered.

OPER 635. Network Models and Graph Theory. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: OPER 527 or permission of the 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 for the course 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 multicommodity flows.

OPER 636. Machine Learning Algorithms. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to students with graduate status in mathematical sciences, systems modeling and analysis, decision sciences and business analytics, or computer science, or by permission of the instructor. Includes an in-depth analysis of machine learning algorithms for data mining, equipping students with skills necessary for the design of new algorithms. Analyses will include framing algorithms as optimization problems and a probabilistic analysis of algorithms. Students will be exposed to current areas of research in the construction of data mining algorithms. Crosslisted as: STAT 636.

OPER 639. Practical Optimization. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: OPER 527. 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 these programs will be discussed from a practical and theoretical point of view.

OPER 641. Stochastic Simulation and Monte Carlo Methods. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: STAT 513 and either STAT 503 or STAT 613. Addresses the methodological foundation of applying stochastic modeling and simulation with a focus on introducing simulation concepts through examples, algorithms and experiments. Topics include simulation output analysis, input modeling, simulation optimization, steady-state simulation, variance reduction techniques, sensitivity analysis and Monte Carlo optimization.

OPER 643. Decision and Risk Analysis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: graduate status in mathematical sciences, systems modeling and analysis, or decision sciences and business analytics, or permission of the instructor. 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: graduate status in mathematical sciences or systems modeling and analysis, or permission of the instructor. This operations research course provides a development of some basic queuing systems. Such systems will include birth-death queues, as well as the M/G/I and GI/M/S queuing systems. Other topics may include the GI/G/I queues, overflow queues and some basic queuing networks.

OPER 647. Multiobjective Decision Analysis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: graduate status in mathematical sciences, systems modeling and analysis, or decision sciences and business analytics, or permission of the 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. Systems Reliability Analysis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: graduate status in mathematical sciences or systems modeling and analysis, or permission of the 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 also will be discussed. Crosslisted as: STAT 648.

OPER 649. Statistical Quality Control. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: graduate status in mathematical sciences or systems modeling and analysis, or permission of the 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. Crosslisted as: STAT 649.

OPER 690. Research and Communications Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: 9 graduate credits in operations research (OPER) and/or statistics (STAT) and permission of the instructor. Designed to help students attain proficiency in professional and academic communication and research in the context of statistics and operations research. The course focuses on the discipline-specific communication and research skills necessary to excel in careers or graduate studies in these disciplines. Crosslisted as: STAT 690.

OPER 691. Special Topics in Operations Research. 1-3 Hours.
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 696. Applied Project. 1-3 Hours.
Semester course; 1-3 lecture hours (to be arranged). 1-3 credits. Up to three credits will be applied to the M.S. in Mathematical Sciences (operations research or statistics concentration) per section. Can be repeated for credit. Prerequisite: SSOR 690 or permission of the faculty adviser. Designed to allow students to apply concepts and theories learned in other courses to a practical situation. Includes the selection, written description, completion and written report of the project and a presentation of the findings. Students may not receive credit for both OPER/STAT 696 and OPER/STAT 698. Graded as Satisfactory/Unsatisfactory. Crosslisted as: STAT 696.

OPER 697. Directed Research. 1-3 Hours.
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. 1-3 Hours.
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/F may be assigned in this course.

OPER 731. Discrete Optimization. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: OPER 527. Provides the theoretical background necessary to design and evaluate advanced solution techniques for discrete optimization problems. Topics include theory of polyhedra and valid inequalities for integer programming models, matchings, computational complexity, and sufficient conditions for integer programs to be polynomially solvable. Scheduling, packing, covering and routing models will also be examined.

OPER 732. Optimization Under Uncertainty. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: OPER 527; graduate standing in mathematical sciences or systems modeling and analysis; or permission of the instructor. Offers an exploration of issues concerning decision-making problems under uncertainty using mathematical programming tools. Topics addressed include modeling uncertainty in optimization models, two-stage stochastic programs with recourse, chance constrained programs, statistical inference in stochastic programs and robust optimization. Special attention is paid to the algorithms, approximation via sampling and applications.

OPER 736. Mathematics of Knowledge and Search Engines. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: STAT 541 or equivalent. Investigates the mathematics, methods and algorithms for searching for and extracting structures of interest (knowledge) from large and possibly high-dimensional datasets. The motivation is the rapid and phenomenal growth of the search engine (as demonstrated by Google) as a major tool for search on the Internet, which has impacted commerce, education and the study of social, financial and scientific datasets. The development of the mathematical and statistical learning algorithms behind these search engines has led to advances in how large, high-dimensional datasets can be effectively analyzed for the extraction of knowledge. Crosslisted as: STAT 736.

OPER 741. Advanced Stochastic Simulation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: STAT 513, OPER 528 and either OPER 503 or 613, or permission of the instructor. This is an advanced-level course on stochastic modeling and simulation. State-of-the-art topics on simulation theory and methodology will be taught through lectures and guided literature review. Tentative topics include advanced simulation output analysis, simulation optimization, steady-state simulation, nested simulation, metamodeling, variance reduction (stratification, importance sampling, quasi-Monte Carlo, etc.).

OPER 743. Decision Analysis II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: OPER 643 or OPER 647. Introduces the current areas of research in the field of decision analysis, which applies to hard problems involving sequential decisions, major uncertainties, significant outcomes and complex values. Includes current research in decision structuring and representation, modeling uncertainty with subjective probabilities, modeling preferences with utility functions and modeling multiattribute preferences.

OPER 791. Special Topics in Operations Research. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. May be repeated for credit. Prerequisite: permission of instructor. A detailed study of selected advanced topics in operations research.

ORAL AND CRANIOFACIAL MOLECULAR BIOLOGY (OCMB)

OCMB 701. An Introduction to Oral Biology. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Restricted to students enrolled in the oral health research graduate program or by permission of the instructor. An overview course on the development, structures and tissues of the head and neck. Topics include craniofacial and dental development, cancers of the head and neck, the oral microbiome, immune responses in the oral cavity, the connection between oral and systemic diseases and recent advances in bioengineering for oral disease.

OCMB 702. Oral Pathogenesis. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Restricted to students enrolled in the oral health research graduate program or by permission of the instructor. This course will provide a basic understanding of the nature of disease and current therapeutic approaches to bacterial, viral and molecular diseases of the head and neck and bone pathologies originating from development defects and/or trauma. Students will learn about the molecular causes of diseases and general approaches to understanding and treating disease.

OCMB 703. Research Topics in Oral Biology. 1 Hour.
Semester course; 1 seminar hour. 1 credit. Restricted to students enrolled in the oral health research graduate program or by permission of instructor. This course will provide an in-depth discussion of current research in head and neck diseases. Students will be expected to critically evaluate relevant literature, discuss approaches to solving research topics and begin to identify possible areas of research for their dissertation. Graded as Pass/Fail.

OCMB 704. Oral Biology Seminar Series. 1 Hour.
Semester course; 1 seminar hour. 1 credit. This course will consist of a series of seminars by invited speakers addressing research topics in selected areas of oral health research and a series of student-led journal clubs. Graded P/F.

OCMB 705. Oral Biology Oral Biology Directed Research. 1-15 Hours.
Semester course; 1-15 laboratory research hours. 1-15 credits. Restricted to students enrolled in the oral health research graduate program or by permission of the instructor. This course will provide practical laboratory experience in participating laboratories. Graded Satisfactory/Unsatisfactory/Fail.

OCMB 706. Proposal Preparation. 1 Hour.
Semester course; tutorials and lectures. 1 credit. Restricted to students enrolled in the oral biology graduate program or by permission of the instructor. This course will provide students with the opportunity to draft an NIH application. Graded P/F.

OCMB 707. Research Skills and Career Development. 1 Hour.
Semester course; tutorials and workshops. 1 credit. Restricted to students enrolled in the oral health research graduate program or by permission of the instructor. This course will provide students with the opportunity to develop skills required to conduct and communicate their research, including assessing literature and managing databases, poster and oral presentations, finding research funding, preparing for writing the thesis, and exploring career opportunities outside academia. Students receive CO grading throughout enrollment with a pass/fail grade and credit earned during the final semester.

ORAL DIAGNOSTIC SCIENCES (ORPT)

ORPT 301. Dental Radiology. 1 Hour.
Semester course; 1 lecture hour. 1 credit. This is an introductory course that covers radiation physics, radiation biology and geometrical principles as applied to radiology and radiographic anatomy. Students will study the radiographic anatomy of the head and neck and exposure and processing techniques for diagnostic radiographic examinations of the head and neck. Areas are covered with the intent to link these principles to the knowledge needed in clinical practice.

ORPT 324. Oral Pathology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course is designed to provide the student with a body of basic information on general and organ specific pathology. The purpose of the course is to enable the student to better recognize and interpret symptoms, signs and pathologic characteristics of organ, systemic and oral disease that will be encountered in practice. Included is study relating to the etiology, pathogenesis, prognosis, prevention and treatment of oral disease. Students will study the development, reactive and neoplastic conditions of the oral cavity with emphasis placed on the more commonly occurring diseases.

ORPT 540. Clinical Pathology Conference. 1 Hour.
Semester course; seminar hours. 1 credit. Through this course, students develop advanced skills in the diagnosis and treatment of common oral pathologic findings.

ORPT 621. Dental Radiology. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Designed to provide the predoctoral dental student with an introduction to the theory, principles and techniques of diagnostic imaging and lay the groundwork for future studies in diagnostic interpretation.

ORPT 622. Oral Pathology. 3 Hours.
Yearlong course; 3 lecture hours. 3 credits. A problem-solving/critical-thinking experience emphasizing the more common oral abnormalities. The soft tissue and osseous pathologic entities will be discussed individually as well as within differential diagnosis cluster. By the end of the course the student should, when presented with an abnormality, be able to establish a differential diagnosis, discuss the salient features and present a logical sequential approach to discovering the final diagnosis and management.

ORPT 700. Senior Selective in Oral Diagnostic Sciences. 1 Hour.
Semester course; 50 clinical and 4 didactic hours. 1 credit. Prerequisites: D4 class status in good standing with above average grades in ORPT 621, ORPT 622, ORPT 732, and permission of the course director. This selective will allow the student to experience a variety of activities in oral and maxillofacial radiology, medicine, atypical facial pain and histopathology.

ORPT 701. D4 Selective in Forensic Dentistry. 1 Hour.
Semester course; .5 lecture and 1.5 clinical hours. 1 credit. Enrollment restricted to students in the D.D.S. program as selected by the course director. This course will give selected students with an interest in expanding beyond the normal curriculum the opportunity to experience a variety of dental forensic activities, including working with the chief medical examiner's office in Richmond in the proper identification of unidentified bodies. Graded as Pass/Fail.

ORPT 732. Clinical Oral Pathology and Oral Medicine. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Designed to provide students with the knowledge to recognize, diagnose and treat the common diseases/conditions found in dental practice.

ORPT 737. Radiology Rotation. 1.5 Hour.
1.5 year course; clinical contact hours. 1.5 credits earned following completion of both ORPT 737 and OPT 747. This three-semester progressive clinical science course prepares the predoctoral dental student to be a competent practitioner of oral and maxillofacial radiographic technique and diagnostic interpretation.

ORPT 747. Radiology Rotation. 1.5 Hour.
1.5 year course; clinical contact hours. 1.5 credits earned following completion of both ORPT 737 and OPT 747. This three-semester progressive clinical science course prepares the predoctoral dental student to be a competent practitioner of oral and maxillofacial radiographic technique and diagnostic interpretation.

ORAL SURGERY (ORSG)

ORSG 431. Management of the Medically Compromised Dental Patient and Medical Emergencies in the Dental Office. 2 Hours.
Semester course; 2 lecture and 3 clinical/laboratory hours. 3 credits. Provides students with the knowledge and skills to provide safe and effective care for medically compromised patients. The student will have didactic and clinical experience in obtaining, recording and interpreting the findings of physical examination, obtaining and interpreting results of appropriate clinical laboratory and radiological examination, and communicating with other health care professionals. Instruction in physical evaluation provides the student with sufficient knowledge, judgment and skill to recognize normal findings as well as significant deviations from the normal. Didactic material includes a study of disease processes that affect the major organ systems of the body. In addition, students will have the opportunity to recognize and manage medical emergencies that can occur during dental treatment. Care for individuals with physical and mental disabilities will be presented with emphasis on the management of this special population in the general dental office.

ORSG 622. Introduction to Oral Surgery. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Designed to introduce the second-year student to basic principles in oral surgery. The course prepares the student for entry into the oral surgery clinical rotation.

ORSG 700. Senior Selective in Oral and Maxillofacial Surgery. 1 Hour.
Semester course; 46 clinical and 4 didactic hours. 1 credit. Prerequisites: successful completion of ORSG 622, 731, 733, 739, D4 class standing and permission of the course director. This elective will allow a qualified student the opportunity to observe and/or participate in a variety of activities in oral and maxillofacial surgery that extend beyond the standard undergraduate curriculum.

ORSG 731. Medical Management of Emergency Care Dental Patients. 2 Hours.
Semester course; 2 lecture contact hours. 2 credits. Students develop an understanding of systemic and medical conditions which may influence the provision of dental care by a provider. The course also is aimed at enabling students to incorporate the importance of medical conditions which directly impact dental treatment planning.

ORSG 733. Principles of Oral and Maxillofacial Surgery. 1.5 Hour.
Semester course; 1.5 lecture hours. 1.5 credits. A lecture series designed to provide a foundation of professional knowledge associated with the surgical skills to fully enable the student to diagnose, treat and, when necessary, refer oral and maxillofacial surgical problems encountered in general practice.

ORSG 739. Clinical Oral Surgery III. 2.5 Hours.
Yearlong course; 120 clinical hours. 2.5 credits. Entails clinical rotations through the OMS clinic. An entry-level clinical course designed to provide practical experience in basic oral surgery and observation of the more complex procedures performed by oral and maxillofacial surgeons. Students receive a grade of CO for fall, with a P/F grade and all credit hours earned in spring. Students receive a grade of CO for fall, with a P/F grade and all credit hours earned in spring.

ORSG 749. Clinical Oral Surgery IV. 2 Hours.
Yearlong course; 80 clinical contact hours. 2 credits. Provides the senior dental student with rotation-based clinical experience in which they further refine and develop their skills in clinical oral surgery and medical assessment of the patient for surgery. Cases treated by the senior student in this rotation are generally more complex (medically and surgically) than those treated in ORSG 739. Course graded as CO in the first semester with P/F grade awarded upon completion of second semester.

ORTHODONTICS (ORTH)

ORTH 532. Biomechanics: Theoretical Basis for Tooth Movement. 1 Hour.
Semester course; 15 lecture/seminar hours. 1 credit. Introduces physical science of mechanics and engineering statics as 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. 1 Hour.
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, transient or definitive crowding and tooth irregularities, oral habits, ectopic and other tooth eruption problems.

ORTH 623. Orthodontics Lecture. 2 Hours.
Semester course; 2 lecture contact hours. 2 credits. An introduction to orthodontics meant to provide second-year dental students with a basic understanding of the diagnosis and treatment of orthodontic problems. The emphasis will be on understanding basic, universally applicable orthodontic concepts rather than on learning specific details relating to particular treatment mechanisms or appliances. This is consistent with current trends in the specialty, which recognize that orthodontic solutions are often attainable by many routes, with a common goal of maximizing the functional, esthetic and stable end result. There will be an overview of growth and development, emphasizing how favorable or unfavorable growth may influence orthodontic diagnosis and treatment. A detailed description of the development of occlusion will also be presented with an emphasis on recognizing and diagnosing abnormalities related to tooth eruption and craniofacial growth.

ORTH 650. Literature Review. 2 Hours.
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. 2 Hours.
Semester course; 30 lecture/seminar hours. 2 credits. Must be taken every semester of the program. Discusses the increases in size and complexity that occur in the craniofacial region including variations in proportionality and related variations in facial form and dental occlusion. Provides special emphasis on compensations in skeletal and soft tissue structures. Examines the basis for prediction of change.

ORTH 654. Orthodontic Diagnosis and Treatment Planning. 2 Hours.
Semester course; 30 seminar hours. 2 credits. Must be taken every semester of the program. Considers and discusses available and theoretical options for clinical management of variations in facial form and dental occlusion.

ORTH 656. Current Literature. 2 Hours.
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. 1.5 Hour.
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 effected in patients. Delineates changes resulting from therapy from normal variations in craniofacial development.

ORTH 660. Orthognathic Conference. 1 Hour.
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. 1 Hour.
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 680. Orthodontic Clinic. 1-6.5 Hours.
Semester course; 195 clinic sessions. Variable for 1-6.5 credits. Must be taking both fall and spring of the first and second years of the program for 6.5 credits each semester. May be taken in additional semesters as needed to complete clinical training; credit will vary based on circumstances. Involves supervised experiences in treatment of a complete spectrum of normally occurring orthodontic problems in an environment simulating private practice. Graded P/F.

ORTH 700. Senior Selective in Orthodontics. 4 Hours.
Semester course; 4 clinical and 1 seminar hours per week. 4 credits. Prerequisites: successful completion of ORTH 623, ORTH 733, ORTH 739 and permission of the course director. A clinical and didactic course designed for students who wish to gain advanced knowledge of orthodontics in an environment simulating a practice setting. The course will include participation in seminars, clinical activities and hospital rotations for craniofacial patients. The course will extend over the fall and spring semesters and will provide an excellent preparation for students entering the private practice of dentistry or students seeking graduate education in the field of orthodontics. A maximum of four students will be chosen to participate in this selective each year. Graded CO for the fall semester and P/F for the spring.

ORTH 733. Orthodontic Therapy. 1 Hour.
Semester course; 1 lecture contact hour. 1 credit. Consists of didactic lectures, a continuation of ORTH 623.

PAINTING AND PRINTMAKING (PAPR)

PAPR 201. Painting From Observation. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. Prerequisites: ARTF 131, ARTF 132, ARTF 133 and ARTF 134. Introduction to the materials of oil and/or acrylic paint through a practice of painting from observation. Students will practice fundamental concepts in the medium and gain understanding of the context of contemporary and historic painting.

PAPR 205. Painting, Basic. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. May be repeated for a maximum of 8 credits. An introduction to the use of paints with an emphasis on the organization of the artistic image, through the use of plastic form and color, coupled with analysis of historical and contemporary work.

PAPR 209. Materials: Printmaking. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. An introduction to three principal printmaking techniques: etching, lithography and digital imaging.

PAPR 210. Painting for Non-majors. 3 Hours.
Semester course; 1 lecture and 6 studio hours. 3 credits. Open to non-art majors only. The course will offer an opportunity for students to work with some of the ideas and materials of painting through lecture and studio involvement.

PAPR 211. Print Media I. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. Prerequisites: ARTF 131, ARTF 132, ARTF 133 and ARTF 134. Designed for students beginning to explore the development of their visual vocabulary utilizing the multiple. This course is meant to be taken as part of a year-long module including etching, lithography, screen printing and digital imaging.

PAPR 221. Drawing, Basic. 3 Hours.
Semester course; 9 studio hours. 3 credits. May be repeated for a maximum of 6 credits. Drawing instruction with attention to extension of the student's knowledge of the tools of drawing. Materials and techniques will be related to pictorial organization.

PAPR 231. Drawing from Observation. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. Prerequisites: ARTF 131, ARTF 132, ARTF 133 and ARTF 134. This course continues the development of students' proficiencies in drawing through an emphasis on representation, illusion and mimesis. Students will gain an understanding of fundamental concepts in drawing, including figure/ground relationships, planes and volumes, and formal and expressive approaches to mark-making.

PAPR 290. Concepts and Issues. 2 Hours.
Semester course; 2 lecture hours. 2 credits. A lecture course that familiarizes students with contemporary artworks, as well as modern and postmodern concepts. Students will be introduced to contemporary issues in art through the presentation of slides, films and visiting speakers. Visits to outside events and lectures will be required.

PAPR 301. Painting Strategies. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. Prerequisite: PAPR 201. This course will explore contemporary ideas in painting through studio practice, critique, lecture, reading and discussion. Students will be exposed to relevant contemporary theory and will pursue issues such as abstraction, installation, site specificity and process, as well as systemic and conceptual approaches to painting.

PAPR 303. Painting, Intermediate. 3 Hours.
Semester courses; 1 lecture and 6 studio hours. 3, 3 credits. Prerequisites: 3 credits of basic painting or permission of instructor. Primary emphasis on the development of an individual direction in the context of contemporary ideas and images in painting.

PAPR 304. Paint Practice and Theory. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. Prerequisites: PAPR 211, PAPR 231 and PAPR 301. This course utilizes the group critique as its principle teaching methodology and explores critical issues in the field of painting. Each student will pursue a studio practice, complete assigned reading and participate in discussion.

PAPR 305. Painting, Intermediate. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. May be repeated for a maximum of 8 credits. Prerequisites: 4 credits of basic painting or permission of instructor. Primary emphasis on the development of an individual direction in the context of contemporary ideas and images in painting.

PAPR 309. Electronic Strategies. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. A digital media course designed to acclimatize students with the use of computers in the context of fine art. As opposed to common perceptions of "computer art," students will learn to use the computer as they would any other tool -- to articulate their ideas and add to their artistic practice. Through in-class exercises and homework assignments emphasizing problem-solving, students will learn to express their ideas through this emerging medium.

PAPR 311. Print Media II. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. Prerequisites: ARTF 131, ARTF 132, ARTF 133 and ARTF 134. Further studies for students exploring the development of their visual vocabulary utilizing the multiple. This course is meant to be taken as part of a year-long module including etching, lithography, screen printing and digital imaging.

PAPR 314. Print Practice and Theory. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. Prerequisites: PAPR 201, PAPR 211, PAPR 231, and PAPR 311. This course utilizes the group critique as its principle teaching methodology. It builds advanced printmaking skill and is a seminar on critical issues in the field. Each student will pursue a studio practice, complete assigned reading and participate in discussion.

PAPR 315. Printmaking, Intermediate (Etching). 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. May be repeated for a maximum of 8 credits. Prerequisite: PAPR 209 or permission of instructor. Investigation of etching printmaking, drypoint, engraving, aquatint, soft grounds and related techniques.

PAPR 317. Printmaking, Intermediate (Lithography). 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. May be repeated for a maximum of 8 credits. Prerequisite: PAPR 209 or permission of instructor. Investigation of techniques and technical printing problems in lithographic printing process from stones and plates.

PAPR 319. Printmaking, Intermediate (Screenprinting). 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. May be repeated for a maximum of 8 credits. Prerequisite: PAPR 209 or permission of instructor. An investigation of cut, hand-drawn and photographic stencil techniques and printing on a variety of surfaces.

PAPR 321. Drawing, Intermediate. 3 Hours.
Semester course; 9 studio hours. 3 credits. May be repeated for a maximum of 6 credits. Prerequisites: UNIV 200 or HONR 200 and 3 credits of basic drawing, or permission of instructor. Drawing for advanced students with special emphasis on creative response to the drawing as a work of art.

PAPR 324. Drawing, Intermediate. 3 Hours.
Semester course; 9 studio hours. 3 credits. Prerequisites: 3 credits of basic drawing or permission of instructor. Drawing for intermediate students with emphasis on problematic thinking and dealing with drawing as an aesthetic form.

PAPR 326. Color. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A course examining the concepts governing the use of color. Historical and contemporary concepts and methods of application will be explored.

PAPR 329. Life Drawing. 3 Hours.
Semester course; 6 studio hours. 3 credits. May be repeated for a maximum of 9 credits. Prerequisite: foundation drawing. Explores the structural and muscular systems of the human body with emphasis upon proportional relationships, chiaroscuro, contour, volume and foreshortening.

PAPR 330. Figure Painting. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. Prerequisite: PAPR 205 or permission of instructor. Designed to allow advanced painting students to work on a continuous basis with the life model in painting. The first half of the semester is focused on old master techniques and styles from earlier periods in art. The second half of the semester examines the work of contemporary figurative painters in the context of developing each student's individual approach to technique, style and content.

PAPR 331. Experiments in Drawing. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. Prerequisite: PAPR 231. Lecture, studio practice and historical context. Students will practice exploratory notions of drawing and be provided with relevant examples of contemporary approaches to drawing.

PAPR 355. Drawing and Painting, Intermediate. 3 Hours.
Semester course; 9 studio hours. 3, 3 credits. Prerequisites: 3 credits of basic drawing or painting or permission of instructor. Intermediate instruction in drawing and painting. Models, both nude and clothed, and still lifes are used.

PAPR 356. Drawing and Painting, Intermediate. 3 Hours.
Semester course; 9 studio hours. 3, 3 credits. Prerequisites: 3 credits of basic drawing or painting or permission of instructor. Intermediate instruction in drawing and painting. Models, both nude and clothed, and still lifes are used.

PAPR 392. Independent Study in Painting and Printmaking. 1-4 Hours.
Semester course; variable hours. 1-3 credits. May be repeated for a maximum total of six credits. Prerequisites: junior standing as a major in painting and printmaking and approval of department chair and instructor. Individual instruction and supervision of a special project. Learning experiences should be designed with the supervising faculty member in the form of a contract between student and instructor. This course is limited to those students who have demonstrated an exceptional level of ability and intense commitment to their discipline.

PAPR 401. Painting Investigations. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. Prerequisite: PAPR 301. With the emphasis on the exploration of an individual direction, this course continues the development of a student's technical and conceptual proficiencies in the context of contemporary painting practices.

PAPR 402. Senior Degree Project. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. Prerequisite: PAPR 304 or PAPR 314. In this course the student will pursue an independent studio practice toward the development of a personal and informed body of advanced work.

PAPR 403. Painting, Advanced. 3 Hours.
Semester courses; 1 lecture and 6 studio hours. 3, 3 credits. Prerequisites: 3 credits of intermediate painting or permission of instructor. More ambitious projects with the aim of developing in the senior student a highly professional approach and achievement in his or her work. Individual as well as group discussions.

PAPR 404. Painting, Advanced. 3 Hours.
Semester courses; 1 lecture and 6 studio hours. 3, 3 credits. Prerequisites: 3 credits of intermediate painting or permission of instructor. More ambitious projects with the aim of developing in the senior student a highly professional approach and achievement in his or her work. Individual as well as group discussions.

PAPR 405. Painting, Advanced. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. May be repeated for a maximum of 20 credits. Prerequisites: 4 credits of intermediate printmaking or permission of instructor. More ambitious projects with the aim of developing in senior students a highly professional approach and achievement in their work. Individual as well as group discussions.

PAPR 409. Large Format Digital Printing. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. Prerequisite: PAPR 209. Engages students in the use of digital tools in printmaking. Students will investigate developments in digital culture in relation to print's history and future. Creative applications of digital tools, with an emphasis on the digital print, form the heart of this course.

PAPR 412. Printmaking, Advanced (Lithography). 3 Hours.
Semester course; 9 studio hours. 3 credits. Prerequisites: 3 credits of intermediate printmaking or permission of instructor. Specialization in one medium. Aesthetic suitability of the design to a particular medium is emphasized.

PAPR 413. Printmaking, Advanced (Etching). 3 Hours.
Semester course; 9 studio hours. 3 credits. Prerequisites: 3 credits of intermediate printmaking or permission of instructor. Concentration on one medium with emphasis on creative techniques.

PAPR 415. Printmaking, Advanced (Etching). 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. May be repeated for a maximum of 20 credits. Prerequisites: 4 credits of intermediate printmaking or permission of instructor. Specialization in one medium with emphasis upon technical research and aesthetic suitability of the design to the particular medium used.

PAPR 417. Printmaking, Advanced (Lithography). 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. May be repeated for a maximum of 20 credits. Prerequisites: 4 credits of intermediate printmaking or permission of instructor. Further investigation of techniques and technical printing problems in the lithographic printing process from stones and plates.

PAPR 419. Printmaking, Advanced (Screenprinting). 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. May be repeated for a maximum of 20 credits. Prerequisites: 4 credits of intermediate printmaking or permission of instructor. Further exploration of cut, hand-drawn and photographic stencil techniques and printing on a variety of surfaces.

PAPR 421. Drawing, Advanced. 3 Hours.
Semester course; 9 studio hours. 3 credits. May be repeated for a maximum of 15 credits. Prerequisites: 3 credits of intermediate drawing or permission of instructor. A studio for drawing with individual criticism. Special attention is given to contemporary concepts.

PAPR 423. Experimental Printmaking. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. May be repeated for a maximum of 8 credits. Prerequisites: 3 credits of intermediate printmaking or permission of instructor. Relief printing, collographs, monoprints, photoengraving and mixed media will be investigated.

PAPR 431. Drawing and the Model. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. Prerequisites: PAPR 331. Historical and contemporary figure drawing will be explored with an emphasis on developing the student's individual approach to the figure.

PAPR 455. Drawing and Painting, Advanced. 3 Hours.
Continuous courses; 9 studio hours. 3-3 credits. Prerequisites: 3 credits of intermediate drawing or painting or permission of instructor; completion of PAPR 455 to enroll in PAPR 456. Advanced instruction in drawing and painting. Models, both nude and clothed, and still lifes are used.

PAPR 456. Drawing and Painting, Advanced. 3 Hours.
Continuous courses; 9 studio hours. 3-3 credits. Prerequisites: 3 credits of intermediate drawing or painting or permission of instructor; completion of PAPR 455 to enroll in PAPR 456. Advanced instruction in drawing and painting. Models, both nude and clothed, and still lifes are used.

PAPR 490. Senior Seminar. 2 Hours.
Semester course; 3 lecture hours. 2 credits. Information to help graduating seniors in the department of painting and printmaking meet the professional requirements involved in exhibiting and promoting their creative work and in functioning as an artist. Writing intensive.

PAPR 491. Topics in Painting and Printmaking. 1-4 Hours.
Semester course; 1-4 credits. May be repeated with different topics for a maximum of 12 credits. Topical course focusing on creative expression and research in the areas of painting and printmaking. See the Schedule of Classes for specific topics to be offered.

PAPR 492. Independent Study in Painting and Printmaking. 1-4 Hours.
Semester course; variable hours. 1-3 credits. May be repeated for a maximum total of six credits. Prerequisites: senior status as a major in painting and printmaking and approval of department chair and instructor. Individual instruction and supervision of a special project. Learning experiences should be designed with the supervising faculty member in the form of a contract between student and instructor. This course is limited to those students who have demonstrated an exceptional level of ability and intense commitment to their discipline.

PAPR 525. Issues in Contemporary Visual Arts. 3 Hours.
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. Art and Critical Theory. 3 Hours.
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 528. Art and Critical Theory. 3 Hours.
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. 1-4 Hours.
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 Schedule of Classes for specific topics to be offered each semester.

PAPR 605. Graduate Painting. 3,6 Hours.
Semester course; 6 or 12 studio hours. 3 or 6 credits. May be repeated. A studio class in which primary emphasis is placed on the creative disciplines of contemporary painting. Special attention is given to the development of personal expression through individual criticism.

PAPR 615. Graduate Printmaking. 3,6 Hours.
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.

PAPR 621. Graduate Drawing. 3 Hours.
Semester course; 6 studio hours. 3 credits. May be repeated. A studio class with individual criticism. Special attention is given to contemporary concepts. Permission of instructor required for non-painting and printmaking majors.

PAPR 690. Graduate Seminar. 1-3 Hours.
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.

PATHOLOGY (PATH)

PATH 445. Forensic Toxicology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CHEM 301, CHEM 302 and CHEZ 301, each with a minimum grade of C. Provides a comprehensive overview of the basic principles of toxicology and the practical aspects of forensic toxicology. 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 investigation. Crosslisted as: FRSC 445.

PATH 521. Laboratory Techniques in Diagnostic Pathology. 3 Hours.
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 540. Pathology for Allied Health Sciences. 2 Hours.
Semester course; 1.5 lecture and 1 laboratory hours. 2 credits. Explores morbid tissue 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 590. Experimental Pathology Seminar. 1 Hour.
Semester course; 1 lecture hour. 1 credit.

PATH 601. General Pathology (Dentistry). 6 Hours.
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. 2 Hours.
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 experience with the technique concomitant with discussions with faculty. The student writes a comprehensive review of the technique studies.

PATH 670. Experimental Approaches to Tumor Biology. 3 Hours.
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 presentations skills in critical review and interpretation of research reports.

PATH 690. Clinical Chemistry Seminar. 1 Hour.
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. 2 Hours.
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. 1-15 Hours.
Semester course; 1-15 credits. Research leading to Ph.D. degree and elective research projects for other students.

PATIENT COUNSELING (PATC)

PATC 410. Basic Patient Counseling. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides an intensive course of study toward the development of pastoral skills in the hospital context. Assigns students to selected clinical areas with faculty supervision. Utilizes group process and individual supervision for the review of clinical material.

PATC 501. Introduction to Health Care Ministry. 1 Hour.
Semester course; 1 lecture and 1 practicum hours. 1 credit. Introduces the student to the hospital environment through observation, reading and reflection. Taught jointly with seminary faculty. Required course for dual degree program.

PATC 510. Introduction to Patient Counseling. 3-5 Hours.
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 review and peer interaction. Assignment to the hospital is available to those seeking clinical pastoral education credit. Designed for the nonspecialist.

PATC 511. The Professional Caregiver. 4 Hours.
Semester course; 3 lecture hours and 150 clocked clinical hours. 4 credits. Prerequisite: PATC 510. 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. 9 Hours.
7 lecture and 300 clinical clocked hours. 9 credits. Provides an intensive 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. 1 Hour.
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 592. Independent Study in Patient Counseling. 1-4 Hours.
Semester course; variable hours. 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 611. Theory and Practice of Patient Counseling I. 5 Hours.
Semester course; 3 lecture and 300 clocked clinical hours. 5 credits. Prerequisite: 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 612. Theory and Practice of Patient Counseling II. 5 Hours.
Semester course; 3 lecture and 300 clocked clinical hours. 5 credits. Prerequisite: PATC 515 or equivalent. Emphasizes psychological foundations of pastoral care and counseling. Provides an in-depth examination of clinical material in a seminar setting.

PATC 613. Group Process I. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: 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 614. Group Process II. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: 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 615. Theory of Group Leadership. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: PATC 613 or 614. Explores various theories of group leadership. Provides opportunity to test skill development within a peer context.

PATC 617. Supervised Clinical Practice I. 5 Hours.
Semester course; 3 lecture and 300 clocked clinical hours. 5 credits. Prerequisites: PATC 611 and 612. 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 618. Supervised Clinical Practice II. 5 Hours.
Semester course; 3 lecture and 300 clocked clinical hours. 5 credits. May be repeated for a total of 10 credits. Prerequisites: PATC 611 and PATC 612. 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. 1 Hour.
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. 2 Hours.
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. 2 Hours.
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 627. Living Well. 2-3 Hours.
Semester course; 2 or 3 lecture hours. 2 or 3 credits. Focuses on the development, facilitation and leadership of support groups for bereaved families. Provides students the opportunity to increase interpersonal and clinical skills in supporting families who have experienced a significant death. Special attention is offered to the needs of children. Requires participation in "Living Well," a contracted component of VCU Health System's bereavement program that utilizes art and group discussion.

PATC 629. Spirituality and Aging. 2-3 Hours.
Semester course; 2 or 3 lecture hours. 2 or 3 credits. Explores the spiritual, psychological and social dynamics associated with aging. Provides special attention to the spiritual and emotional impact on caregivers who work with aging patients. Crosslisted as: GRTY 629.

PATC 635. Clinical Ethics. 2-3 Hours.
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. 2 Hours.
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. 2 Hours.
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 640. Research Basics for Hospital Chaplains. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Provides an overview of research basics within the context of hospital chaplaincy. Emphasizes the methodological issues in health services research that involve hospital chaplains.

PATC 641. Evidence-based Inquiry for Hospital Chaplains. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: PATC 640. Provides an overview of data collection, data quality and data usage within the context of hospital chaplaincy. Emphasizes an understanding of the use of data by health services administrators in operational and strategic decisions and for performance improvement.

PATC 642. Developing and Presenting Chaplaincy Research. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: PATC 640. Provides an overview of how to analyze and present evidence-based project findings and recommendations within a hospital or academic environment. Emphasizes understanding different objectives and dissemination routes for evidence-based chaplaincy projects as well as demonstrating an understanding of dissemination of evidence-based project results to relevant audiences.

PATC 653. Patient Counseling Evaluation I. 4 Hours.
Semester course; 2 lecture and 6 practicum hours. 4 credits. Focuses upon 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. 4 Hours.
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. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Focuses on the literature in pastoral supervision. Emphasizes the applicability of educational and personality theory relevant for clinical pastoral education.

PATC 664. Theory of Pastoral Supervision II. 2 Hours.
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. 2 Hours.
2 lecture hours. 2 credits. May be repeated for a total of 4 credits. Presents a variety of topics on supervisory theory and practice for persons seeking certification by the ACPE. Utilizes ACPE supervisors as well as university and local seminary faculty.

PATC 692. Independent Study in Pastoral Supervision. 1-4 Hours.
Semester course; 1-4 credits. May be repeated for a total of 4 credits. Provides individual focus and direction of student readings in theories of pastoral supervision. Readings are selected from bibliography of the ACPE Certification Commission.

PATC 694. Advanced Clinical Pastoral Supervision. 7 Hours.
Semester course; 2 lecture and 15 practicum hours. 7 credits. Prerequisite: PATC 654. Advanced attention to integration of education and personality theories with theology. Includes the actual practice of supervision under faculty guidance. Restricted to individuals admitted to candidacy status in ACPE, Inc. May be repeated.

PATC 696. Intensive Supervisory Practicum. 9 Hours.
Semester course; 3 lecture and 18 practicum hours. 9 credits. Prerequisite: PATC 694. 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 697. Clinical Research. 1-5 Hours.
Semester course; 1-5 credits. May be repeated for a total of 5 credits. Provides the opportunity to test the practical application of research and process improvement methods within the clinical context. Encourages the development of collaborative and interdisciplinary project development.

PEDIATRIC DENTISTRY (PEDD)

PEDD 511. General Anesthesia Rotation. 3 Hours.
Semester course; 40 clinical sessions. 3 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, airway management, general anesthetic induction and intubation, administration of anesthetic agents, patient monitoring, prevention and management of anesthetic emergencies, recovery room management, postoperative appraisal and follow-up.

PEDD 512. Growth and Development. 1 Hour.
Semester course; 16 lecture/seminar hours. 1 credit. Lecture format provides foundational knowledge on the growth and development of the head and neck to include oral embryology and development of the dentition.

PEDD 514. Introduction to Pediatric Dentistry. 2 Hours.
Semester course; 30 lecture hours. 2 credits. Introduces material in pediatric dentistry. Involves didactic, clinical and laboratory portions.

PEDD 572. Pediatric Dental Emergency Service. 2.5 Hours.
Semester course; 30 clinical sessions. 2.5 credits. Must be taken for two consecutive semesters. Graduate students are scheduled for emergency services on a weekly basis. Offers experience in the assessment and management of orofacial trauma, dental pain and infections.

PEDD 612. Seminar Series: Pediatric Dentistry and Medicine. 2 Hours.
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 him/her with information related to clinical subject area(s) with medical conditions about which pediatric dentists should be knowledgeable.

PEDD 620. Pediatric Medicine Rotation. 1.5 Hour.
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 data, evaluation of physical, motor and sensory development, genetic implications of childhood diseases, the use of drug therapy in the management of diseases and parental management through discussions and explanations.

PEDD 640. Clinical Teaching. 2 Hours.
Semester course; 25 clinical sessions. 2 credits. May be repeated for credit. Must be taken every semester of the program. Lectures and clinical instruction involving contact with third and forth-year dental students. Provides teaching experience in diagnosis and treatment planning, restorative preparations and management of children's behavior.

PEDD 650. Literature Review. 2 Hours.
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. 1 Hour.
Semester course; 16 lecture/seminar hours. 1 credit. May be repeated for a total of four 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. 1 Hour.
Semester course; 16 lecture/seminar hours. 1 credit. May be repeated for credit. Discusses articles from recent publications relating to all aspects of pediatric dentistry. Covers and critically reviews the Policies and Guidelines of the American Academy of Pediatric Dentistry.

PEDD 680. Pediatric Dental Clinic. 1-4 Hours.
Semester course; 120 clinical sessions. Variable for 1-4 credits. Must be taking both fall and spring of the first and second years of the program for 4 credits each semester. May be taken in additional semesters as needed to complete clinical training; credit will vary based on circumstances. 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.

PEDD 700. Senior Selective in Pediatric Dentistry. 1 Hour.
Semester course; 4 clinical hours per week. 1 credit. Prerequisites: successful completion of PEDD 611 and PEDD 733 and permission of the course director. This is a clinical course that provides students with more advanced experiences and techniques in pediatric dentistry.

PEDD 701. Selective in Special Care Dentistry. 1 Hour.
Semester course; 4 clinical hours/week. 1 credit. Prerequisites: D4 standing and selection by course faculty. This course is designed to give the interested student clinical exposure to the comprehensive dental care of individuals who have special health care needs. Graded as pass/fail.

PEDD 730. Special Care Dentistry. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Enrollment restricted to dental students with D3 standing. This course is designed to enhance the dental student's understanding of the complexities of providing care for individuals with special health care needs.

PEDD 733. Advanced Pediatric Dentistry. 1 Hour.
Semester course; 1 lecture contact hour. 1 credit. Designed to supplement and reinforce the student's knowledge of diagnosis, treatment planning and basic skills for management of the pediatric dental patient. This includes a review of basic pediatric clinical procedures and introduction to the treatment of pediatric patients with special needs.

PEDD 739. Clinical Pediatric Dentistry III. 1 Hour.
Yearlong course; 48 clinical hours. 1 credit. Clinical rotation course designed to introduce the student to the basics of clinical pediatric dentistry and to prepare the student for PEDD 749. Students receive CO grading in the fall semester and a letter grade upon completion.

PEDD 749. Clinical Pediatric Dentistry IV. 0.5 Hours.
Semester course; 29 clinical hours. 0.5 credits. Prerequisites: successful completion of all prior courses in pediatric dentistry and D4 class standing. This course is offered as a one-week clinical rotation during the senior year of the dental curriculum. Students will build upon and refine the skills developed during the D3 clinical experience. Pediatric dentistry is a unique experience because of the young patient population and psychological skills are centrally important to delivering patient care. The course has a strong emphasis on developing behavioral, communication and patient-management skills.

PERIODONTICS (PERI)

PERI 326. Periodontics I. 1 Hour.
16 lecture, 2 seminar and 2 clinical hours. 1 credit. Corequisites: ANAT 302, BIOL 209 or equivalent, MICR 365. This course introduces the fundamental concepts of periodontal disease necessary for proper patient assessment, diagnosis, prognosis and treatment planning. This course stresses the rationale and technical aspects of examination of the periodontal patient. Emphasis will be placed on the etiology of periodontal diseases, rationale and outcomes of treatment. This course features small-group exercises in lectures, seminars and clinical patient-based instruction.

PERI 329. Periodontics II. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Second in the series of periodontics courses for dental hygiene students, this course provides the scientific basis to understand the pathology and etiological factors of periodontal diseases. In addition, topics related to periodontal therapy not provided elsewhere in the dental hygiene curriculum are addressed, including periodontal risk assessment and advanced periodontal therapy procedures.

PERI 508. Physical Diagnosis. 2 Hours.
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. 1.5 Hour.
Semester course; 45 clinical sessions. 1.5 credits. Provides students with experience in general anesthesia under the direction of the dental anesthesiologist. Emphasizes operating room procedures, airway management, intravenous technique, anesthetics and resuscitative procedures. Includes clinical management of conscious sedation cases.

PERI 512. Conscious Sedation. 2 Hours.
Semester course; 30 lecture/seminar hours. 2 credits. Reviews concepts of parental conscious sedation 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. 3 Hours.
Semester course; 48 lecture/seminar hours. 3 credits. Provides students with an introduction to the clinical practice of periodontics. Emphasizes diagnosis, etiology, prognosis, treatment planning, initial therapy, therapeutic approaches, suturing techniques, oral hygiene and dental photography.

PERI 515. Internal Medicine Rotation. 1.5 Hour.
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. 2 Hours.
Semester course; 30 lecture/seminar hours. 2 credits. Must be taken for two consecutive semesters. Reviews the principles of the basic science of periodontology, including anatomy of the periodontium, classification, etiology, 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 525. Diagnosis of Periodontal Diseases. 1 Hour.
The first in a four-part series of didactic courses designed to prepare the dental student for the clinical diagnosis and management of periodontal diseases. Through this course, students will develop a fundamental understanding of how to assess patients for periodontal disease and how to develop a specific diagnosis. Enrollment is restricted to admitted dental students.

PERI 526. Etiology and Pathogenesis of Periodontal Diseases. 1.5 Hour.
1.5 credits. The second in a four-part series of didactic courses designed to prepare the dental student for the clinical diagnosis and management of periodontal diseases. Through this course, students will build upon their knowledge of diagnosis and develop their understanding of the causes, mechanisms and development of periodontal disease. Enrollment is restricted to admitted dental students.

PERI 552. Implantology. 1,2 Hour.
Semester course; 16 lecture/seminar hours. 1 credit. Covers the 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. 0.5 Hours.
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 627. Non-Surgical Periodontal Therapy. 1.5 Hour.
The third in a four-part series of didactic courses designed to prepare the dental student for the clinical diagnosis and management of periodontal diseases. Through this course, students will add to their skill set a conceptual knowledge of non-surgical treatment options for periodontal disease. Enrollment is restricted to admitted dental students.

PERI 630. Medicine: Oral Medicine Seminar. 1.5 Hour.
Semester course; 26 seminar hours. 1.5 credits May be repeated for 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 reviews of the cardiovascular, respiratory, endocrine and neurologic systems. Discusses and critically evaluates medical and oral medicine topics relative to management of the periodontal patient.

PERI 650. Periodontal Literature Review. 3 Hours.
Semester course; 48 seminar hours. 3 credits. Must be taken every semester of the program. Reviews the periodontal literature from early classic articles to current publications pertaining to the scientific basis for periodontal procedures. Reviews the concepts of diagnosis, etiology, epidemiology, pathogenesis, therapy, maintenance of periodontal diseases and implantology. Discusses content of the literature by means of abstracts and study questions.

PERI 654. Treatment Plan: Case Presentations. 1 Hour.
Semester course; 12 seminar hours. 1 credit. Must be taken every semester of the program. Emphasizes the interpretation 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. 3 Hours.
Semester course; 36 seminar hours. 3 credits. May be repeated for credit. 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 680. Clinical Periodontics. 1-5 Hours.
Semester course; 160 clinic sessions. Variable for 1-5 credits. Must be taking both fall and spring of the first, second and third years of the program for 5 credits each semester. May be taken in additional semesters as needed to complete clinical training; credit will vary based on circumstances. Provides supervised training in periodontics. Provides the student with the experience in the treatment and management of patients with various types and severities of periodontal diseases. Emphasizes diagnosis, treatment planning, prognosis, scaling and root planning, non-surgical and 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. Graded P/F.

PERI 700. Advanced Periodontal Selective. 1.5 Hour.
Yearlong course; 15 seminar and 25 clinical hours. 1.5 credits. Prerequisites: successful completion of all prior courses in periodontics and permission of the course director. This course is offered to dental students who demonstrate high academic achievement and are interested in expanding their practical knowledge and experience in periodontal surgical procedures. It is designed to enhance the general dentist's knowledge regarding indications, diagnosis and treatment planning of periodontal surgical procedures and to provide hands-on experience in applying techniques of surgical periodontal procedures suitable for judicious use in general dental practice. Students receive CO grading in the fall and a pass or fail grade and earned credit in the spring.

PERI 719. Specialty Practice Management. 0.5 Hours.
Semester course; 22 seminar hours. 0.5 credit. Must be taken for two consecutive semesters. Provides the student with experience in office management. Requires visits to specialty offices to familiarize the student with contemporary modes of practice administration and patient management.

PERI 733. Surgical Periodontal Therapy. 1 Hour.
1 credit. The fourth in a four-part series of didactic courses designed to prepare the dental student for the clinical diagnosis and management of periodontal diseases. Through this course, students will complete their didactic exploration of periodontal diseases with a conceptual knowledge of surgical treatment options for periodontal diseases. Enrollment is restricted to admitted dental students.

PERI 739. Clinical Periodontics III. 5 Hours.
Yearlong course; clinical contact hours. 5 credits. The primary objective of the department is to provide an educational experience that will enable the dental student to meet the periodontal needs of present and future patients. These objectives necessitate student awareness of the biology of the periodontium and pathology of gingival and periodontal diseases; the ability to examine, diagnose and develop a treatment plan for the patient with significant periodontal disease; and an understanding of the implications of periodontal diagnosis and treatment on the oral and general health of the patient. The student should also be competent in plaque control, scaling, root planing and other procedures ordinarily included in presurgical phases of therapy. The student should be familiar with the entire scope of periodontal therapy, understanding the rationale and indications for surgical treatment and anticipated results.

PERI 749. Clinical Periodontics IV. 1 Hour.
Yearlong course; 1 clinic session per week. 1 credit. This final clinical course in periodontics provides competency assessment of the dental student as an entry-level dentist in the diagnosis and management of patients with periodontal diseases. Students receive CO grading in the fall and a pass or fail grade and earned credit in the spring.

PHARMACEUTICAL SCIENCES (PSCI)

PSCI 607. Introduction to Pharmaceutical Sciences From Bench to Shelf. 1 Hour.
Continuous courses; 2 credits offered: 1 credit hour each in fall and spring. These two courses will be run as if they were a single 2-credit course spanning two semesters. Students will be introduced to the drug discovery process, both conventional and contemporary, and learn about all the aspects of drug development from drug design to drug approval, production and marketing. Each topic will be introduced by either a faculty member or an expert from the pharmaceutical industry. Active discussion will be encouraged during each session. PSCI 607 graded as PR; PSCI 608 graded S/U/F upon completion.

PSCI 608. Introduction to Pharmaceutical Sciences From Bench to Shelf. 1 Hour.
Continuous courses; 2 credits offered: 1 credit hour each in fall and spring. These two courses will be run as if they were a single 2-credit course spanning two semesters. Students will be introduced to the drug discovery process, both conventional and contemporary, and learn about all the aspects of drug development from drug design to drug approval, production and marketing. Each topic will be introduced by either a faculty member or an expert from the pharmaceutical industry. Active discussion will be encouraged during each session. PSCI 607 graded as PR; PSCI 608 graded S/U/F upon completion.

PSCI 691. Special Topics in Pharmaceutical Sciences I. 0.5-5 Hours.
Semester course. 0.5-5 lecture hours. 0.5-5 credits. Subject matter is presented by lecture, tutorial studies and/or library assignments in selected areas of advanced study not available in other courses or as part of the research training. Graded S/U/F.

PSCI 692. Special Topics in Pharmaceutical Sciences II. 0.5-5 Hours.
Semester course; 0.5-5 lecture hours. 0.5-5 credits. Subject matter is presented by lecture, tutorial studies and/or library assignments in selected areas of advanced study not available in other courses or as part of the research training.

PHARMACEUTICS (PCEU)

PCEU 501. Pharmaceutical Calculations. 1 Hour.
Semester course; 1 lecture hour. 1 credit. This course is designed in a student-centered learning format that supports self-directed learning. The course will help students develop the skill set needed to screen out the distractors from the determinant variables in a statement problem and guide their thought processes in sequential use of information to solve calculation problems seen in pharmacy practice.

PCEU 507. Pharmaceutics and Biopharmaceutics I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Designed to describe the physico-chemical and biopharmaceutical principles fundamental to the development of pharmaceutical dosage forms. Topics will include pharmaceutical calculations, solid-state properties, solubility, partitioning, solution properties, disperse systems, micromeritics, diffusion, dissolution and release rates, drug and dosage form stability and degradation, pharmaceutical manufacture, and compounding.

PCEU 508. Pharmacokinetics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PCEU 507. Corequisite: PCEU 509. Major topics include the mathematical and physiological principles of pharmacokinetics related to the development and use of pharmaceutical dosage forms. Discussions will include compartmental modeling, physiological concepts of pharmacokinetics, and clearance and absorption concepts. Also includes material related to statistics.

PCEU 509. Pharmaceutics and Biopharmaceutics II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PCEU 507. Designed to describe the biopharmaceutical principles fundamental to the development of pharmaceutical dosage forms, including parenteral products, solutions, disperse systems, semisolids, solids and novel drug delivery systems. The formulation, manufacture, control, biopharmaceutics and relevant patient-pharmacist interactions of the major dosage forms will be addressed and presented by route of administration.

PCEU 604. Molecular Pharmaceutics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: permission of course coordinator. The student's basic biochemistry and pharmacy education will be expanded with emerging molecular concepts in enzyme and transporter structure and function, roles in drug disposition, pharmacogenomics, biochemistry, molecular biology, and experimental techniques.

PCEU 612. Advanced Physical Pharmacy and Biopharmaceutics. 3-5 Hours.
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. Research Techniques. 1-4 Hours.
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. Crosslisted as: MEDC 614/PHAR 614.

PCEU 615. Applied Pharmacokinetics. 2.5 Hours.
Semester course; 2.5 lecture hours. 2.5 credits. Extends the concepts of pharmacokinetics as applied to dosage regimen design, pharmacokinetic variability, drug interactions and statistical strategies for individualization of drug therapy. Lectures and conferences take place throughout the semester.

PCEU 621. Advanced Pharmaceutics and Drug Disposition. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Study at the advanced level of the relationships between the physiochemical properties of a drug and dosage form and the absorption, distribution, elimination and pharmacological effects of the drug. Current theory and methodology involved in solving problems at the research level are emphasized.

PCEU 622. Clinical Pharmacokinetics. 3 Hours.
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. Advanced Pharmacokinetics. 3 Hours.
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. 2 Hours.
Semester course; 1 lecture and 1 laboratory hours. 2 credits. Theory and practice of selected analytical techniques for the quantitative analysis 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 Hour.
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. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Required of all graduate students in pharmaceutics. Research Seminar.

PCEU 691. Special Topics in Pharmaceutics. 1-5 Hours.
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. 1-15 Hours.
Semester course; 1-15 credits. Research leading to the M.S., Pharm.D., or Ph.D. degree.

PHARMACOLOGY AND TOXICOLOGY (PHTX)

PHTX 400. Drugs and Their Actions. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: junior or senior standing, or permission of instructor. This course is a general survey of pharmacology and related disciplines. The history and basic principles are presented followed by discussions of neuropharmacology, psychoactive drugs, drugs of abuse, immunopharmacology, basic toxicology, drug design, drug development, autonomic pharmacology, cardiovascular pharmacology and endocrine pharmacology, as well as selected topics including scientific ethics, molecular pharmacology and behavioral pharmacology.

PHTX 441. Pharmacology (Dental Hygiene). 5 Hours.
Semester course; 5 lecture hours. 5 credits. A didactic course designed to emphasize the principles of pharmacology and pain control, drug actions and uses, and adverse effects to provide the rationale for the effective and safe use of drugs in dental hygiene.

PHTX 515. Pharmacology for Nurse Anesthetists I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The basic principles of pharmacology including mechanisms of absorption, distribution, biotransformation, elimination, dose-response relationships, drug 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PHTX 515. Detailed presentation of the pharmacology of classes of drugs used or encountered by nurse anesthetists will be made with emphasis upon local anesthetics, cardiovascular, chemotherapeutic, and anti-inflammatory agents. Continuation of PHTX 515.

PHTX 535. Introduction to Toxicology. 4 Hours.
Semester course; 4 lecture hours. 4 credits. The basic principles of toxicology and toxicological evaluations; correlations of toxicological responses with biochemical, functional and morphological changes; environmental (including occupational and public health), forensic and regulatory concerns; and risk assessment and management are presented for graduate students in the biomedical sciences.

PHTX 536. Principles of Pharmacology and Toxicology. 5 Hours.
Semester course; 5 lecture hours. 5 credits. Prerequisite: 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. 5 Hours.
Semester course; 5 lecture hours. 5 credits. Prerequisite: PHTX 536 or with permission of instructor. Topics include receptor theory, autonomic, cardiovascular, and central nervous system pharmacology and toxicology. Continuation of PHTX 536.

PHTX 548. Drug Dependence. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: graduate or post-baccalaureate 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 methods, 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. 1-12 Hours.
Semester course; 1-12 credits. Prerequisite: permission of instructor. Rotation research in pharmacology and toxicology laboratories for beginning graduate students.

PHTX 606. Introduction to Pharmacology of Therapeutic Agents. 1 Hour.
Module course; 1 lecture hour. 1 credit. The basic principles of pharmacology and an in-depth consideration of the biodisposition and mechanisms of action of these agents. Drugs acting on the autonomic system are covered.

PHTX 609. General Pharmacology and Pain Control. 4 Hours.
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 drugs to control pain by parenteral, oral or inhalation routes.

PHTX 611. Dental Pharmacology and Pain Control. 2 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: at least one graduate-level course in immunocompetence, pharmacology, physiology, immunology, biochemistry or 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 steady-states essential to wellness. Theory and research drawn from neuroscience, immunology and psychology will be examined as a foundation for understanding mind-body relationships. Beginning at the cellular level, fundamental information underlying mutually interact neuroendocrine-immune system functions will be synthesized to inform an understanding of wellness as well as a variety of pathophysiological states related to the stress process.

PHTX 620. Ion Channels in Membranes. 3 Hours.
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. Crosslisted as: PHIS 620.

PHTX 625. Cell Signaling and Growth Control. 3 Hours.
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 630. Basic Concepts in Pharmacology for Graduate Students. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOC 503 or permission of instructor. This course provides basis for drug-receptor theory, quantitative understanding of drug-receptor interaction, drug-receptor-based signaling, in-vivo application of drug-receptor theory, pharmacokinetics and statistical treatment of drug-receptor interaction in pharmacology and toxicology.

PHTX 632. Neurochemical Pharmacology. 3 Hours.
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. 3 Hours.
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 behavioral toxicology. The course focuses primarily on laboratory research in 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 636. Principles of Pharmacology. 5 Hours.
Semester course; 5 lecture hours. 5 credits. Prerequisite: PHTX 630 or permission of instructor and graduate program director. Corequisite: PHTX 639. 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 autonomic and cardiovascular pharmacology; CNS pharmacology; pharmacology of antimicrobials and cancer; gastrointestinal and endocrine pharmacology.

PHTX 638. Cellular Mechanisms of Toxicology. 3 Hours.
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 these systems are presented. Kinetics and metabolism of toxic agents as well as statistical and analytical procedures are integrated into the discussions.

PHTX 639. Principles of Pharmacology Journal Club. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: PHTX 630 or permission of instructor. Corequisite: PHTX 636. This course will be in journal club format run in parallel with PHTX 636. Journal club articles pertaining to drug classes and their mechanism of action will be presented by students. Topics include autonomic, CNS, endocrine, cardiovascular and cancer pharmacology.

PHTX 644. Forensic Toxicology. 3 Hours.
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. Crosslisted as: FRSC 644.

PHTX 690. Pharmacology Research Seminar. 1 Hour.
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. 1-4 Hours.
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 692. Special Topics. 1-4 Hours.
Semester course; 1-4 variable hours. 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 the research training. Graded as S/U/F.

PHTX 697. Directed Research in Pharmacology. 1-15 Hours.
Semester course; 1-15 credits. Research leading to the M.S. or Ph.D. degree and elective projects for other students.

PHARMACY (PHAR)

PHAR 201. Introduction to Pharmacy. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Open to undergraduate students with an interest in pursuing pharmacy as a career. Consists of presentations related to the profession of pharmacy and the pharmaceutical sciences, preparing for admission to the School of Pharmacy and employment opportunities in the profession after graduation. Graded as pass/fail.

PHAR 509. Evidence-Based Pharmacy I: Introduction to Pharmacy Information Skills. 1.5 Hour.
Semester course; 1.5 lecture hours. 1.5 credits. This is the first of a three-course series introducing students to information skills necessary for the practice of evidence-based pharmacy. Lecture topics include drug information resources, efficient information retrieval, assessment of drug information sources, relationship of pharmaceutical industry to drug literature, and basic laws and regulations associated with prescription processing. Class exercises will be used to promote the appropriate use of drug information resources in pharmacy practice.

PHAR 512. Health Promotion and Disease Prevention. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Introduction to the role of the pharmacist in health promotion and disease prevention. Skills for pharmacist involvement in implementing aspects of Healthy People 2010, educating patients and addressing health care disparities will be emphasized.

PHAR 513. Contemporary Pharmacy Practice. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Introduction to foundational concepts of pharmacy practice, professionalism, evolving roles of pharmacists in U.S. health care and forces that influence the profession through discussions, debates and panel presentations. An introduction to state laws that affect pharmacy practice and the provision of pharmacy care are provided. Students will be introduced to the management of secure, innovative pharmacy services, including the medication use system, and integrated patient care.

PHAR 523. Foundations I. 1.5 Hour.
Semester course; 4.5 laboratory hours. 1.5 credits. This competency-based course is intended to give the first-year pharmacy student an introduction to the pharmacy profession, emphasizing the skills and values that are necessary to be a competent, caring pharmacist. It is the first in a six-semester practice-based course sequence that introduces the language and tools of contemporary pharmacy practice with an emphasis on calculations, communication, medical terminology, drug information, prescription processing, health promotion, patient assessment and problem solving.

PHAR 524. Foundations II. 1.5 Hour.
Semester course; 4.5 laboratory hours. 1.5 credits. This competency-based course is the second in a six-semester practice-based course sequence with an emphasis on the preparation and dispensing of selected extemporaneous compounds including liquid, solid and semisolid preparations and the appropriate use of selected OTC point-of-care devices.

PHAR 525. Communications in Pharmacy Practice. 2 Hours.
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 526. Community Pharmacy Practice. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Helps students develop the necessary foundation for the management of activities in community pharmacy practice settings with many of the skills developed in this course being equally applicable to other practice settings. Focuses on financial management and managed care as it affects community practice.

PHAR 529. Clinical Therapeutics Module: Introduction to Special Populations. 2 Hours.
Module course; 2 lecture hours. 2 credits. Introduction to issues affecting the pharmacotherapy of special populations such as pediatric and geriatric patients.

PHAR 530. Introductory Pharmacy Practice Experience: Community Practice. 4 Hours.
Semester course; daily for 4 weeks. 4 credits. Students will meet with an assigned community pharmacist 5 days per week for 8 hours for 4 consecutive weeks at the end of the P-1 year. Students will practice pharmacy under supervision while learning about the medication use system in community pharmacy practice. Students will demonstrate core practice skills: communication, pharmacy calculations, ethics, medication safety, wellness and health promotion, informatics and critical thinking. Graded as honors, high pass, pass, fail.

PHAR 532. Introductory Pharmacy Practice Experience: Hospital Practice. 3 Hours.
Semester course; 40 hours per week for three weeks. 3 credits. Students will meet with an assigned hospital pharmacist for a three-week (120 hours) experience at the end of the P-2 year to practice pharmacy in a hospital environment and learn about hospital pharmacy management and medication distribution systems. Students will demonstrate core practice skills: communication, calculations, ethics, medication safety, technology, informatics and critical thinking. Graded as honors, high pass, pass, fail.

PHAR 533. Introductory Pharmacy Practice Experience: Patient Care. 0.5 Hours.
Semester course; 0.5 laboratory hours. 0.5 credits. Students will complete 20 hours of approved experiences under supervision. An orientation, reading assignments, mandatory class time and assessments will be conducted. Students will also prepare a reflection describing the benefits to the community when pharmacists engage in the health and education needs of the community. Students will develop a sense of personal responsibility for addressing the problems and needs of society. Graded as Pass/Fail.

PHAR 534. Foundations III. 1 Hour.
Semester course; 3 laboratory hours. 1 credit. This competency-based course is the third in a six-semester practice-based course sequence with an emphasis on the clinical application of medications in the management of various disease states. The second-year pharmacy student will develop skills in the assessment and therapeutic monitoring of selected disease states and drug therapies. Topics include cardiovascular, endocrine and neurology therapeutics.

PHAR 535. Foundations IV. 1 Hour.
Semester course; 3 laboratory hours. 1 credit. This competency-based course is the fourth in a six-semester practice-based course sequence. Introduces students to the skills required to practice in institutional settings such as hospitals and long-term care facilities and in home health care.

PHAR 540. Self-Care and Alternative and Complementary Treatments. 2.5 Hours.
Module course; variable lecture and conference hours. 2.5 credits. Introduction to the concepts of self-care and alternative and complementary treatments. Students will learn to distinguish treatable signs and symptoms of common diseases and exclusions for care that require referral to appropriate health care practitioners. Non-medication methods to alleviate and prevent self-care problems are reviewed. Patient cases, self-care consultations, lectures and conferences will be used to facilitate learning.

PHAR 541. Patient Assessment in Pharmacy Practice. 2 Hours.
Semester course; variable lecture and laboratory hours. 2 credits. Provides students with an introduction to patient assessment skills necessary in patient-centered pharmacy practice. Course topics include basic physical assessment techniques, interpretation of findings from laboratory tests or physical examinations and documenting findings from patient assessments. Laboratory time will be used to practice various assessment skills. The course will also build on communication and information skills presented in previous courses.

PHAR 544. Clinical Therapeutics Module: Cardiovascular. 4.5 Hours.
Module course; variable hours. 4.5 credits. The principles of medicinal chemistry, pharmacology, pharmaceutics, pathophysiology and pharmacotherapy to the application of drug therapy in patients with cardiovascular diseases are integrated in this course. The clinical presentation, course of illness, prevention and treatment of diseases using prescription, non-prescription and complementary treatments will be reviewed.

PHAR 545. The U.S. Health Care System. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Open to professional students only. Designed to introduce the student to the components of the U.S. health care system and the interrelationships among health care consumers and providers. It also presents the organizational framework and regulatory and reimbursement mechanisms which are the foundations of the U.S. health care delivery system. A unique feature of this course is the interdisciplinary teaching team.

PHAR 547. Managing Professional Patient-centered Practice. 1.5 Hour.
Semester course; 1.5 lecture hours. 1.5 credits. Introduces pharmacy students to the basic principles of managing a professional pharmacy practice. Students will learn patient-centered practices associated with effective medication use and positive patient outcomes. Instruction will be through lectures, case discussions and portfolio assignments.

PHAR 549. Personalized Medicine. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Provides an introduction to personalized medicine as related to pharmacy practice. The course will be taught using lectures, individual work, small-group discussions and total classroom discussion using homework, in-class assignments and patient case scenarios.

PHAR 550. Pharmacy Practice Research. 3 Hours.
Yearlong course; 3 lecture hours. 3 credits. Focuses on the development of skills necessary for identifying issues and questions related to pharmacy practice, evaluating the literature to identify possible solutions, designing a feasible research project, developing a data analysis plan and a formal written proposal for the project. Students will ultimately present their research proposals to faculty and students. The course is graded as CO with no credit for fall semester with a letter grade and credit assigned for spring semester.

PHAR 555. Clinical Therapeutics Module: Endocrinology. 2.5 Hours.
Module course; variable hours. 2.5 credits. The principles of medicinal chemistry, pharmacology, pharmaceutics, pathophysiology and pharmacotherapy to the application of drug therapy in patients with endocrine diseases are integrated in this course. The clinical presentation, course of illness, prevention and treatment of diseases using prescription, non-prescription and complementary treatments will be reviewed.

PHAR 556. Clinical Therapeutics Module: Neurology. 4 Hours.
Module course; variable hours. 4 credits. The principles of medicinal chemistry, pharmacology, pharmaceutics, pathophysiology and pharmacotherapy to the application of drug therapy in patients with neurological diseases are integrated in this course. The clinical presentation, course of illness, prevention and treatment of diseases using prescription, non-prescription and complementary treatments will be reviewed.

PHAR 565. Evidence-based Pharmacy II: Research Methods and Statistics. 2.5 Hours.
Module course; variable hours. 2.5 credits. This is the second of a three-course series introducing students to the principles and practice of evidence-based pharmacy. Lecture topics include research methods, concepts and principles of study design, and appropriate use of statistics. Class exercises promote a working understanding of statistical principles and a general understanding of research methods.

PHAR 566. Evidence-based Pharmacy III: Drug Literature Evaluation. 2 Hours.
Module course; variable hours. 2 credits. This is the third of a three-course series introducing students to the principles and practice of evidence-based pharmacy. Lectures, outside readings, class discussions and exercises will be used to develop the skills necessary for the evaluation of biomedical literature and application to pharmacy practice.

PHAR 602. Clinical Therapeutics Module: Psychiatry. 3 Hours.
Module course; variable hours. 3 credits. The principles of medicinal chemistry, pharmacology, pharmaceutics, pathophysiology and pharmacotherapy to the application of drug therapy in patients with psychiatric illnesses are integrated in this course. The clinical presentation, course of illness, prevention and treatment of diseases using prescription, non-prescription and complementary treatments will be reviewed.

PHAR 603. Clinical Therapeutics Module: Respiratory/Immunology. 3 Hours.
Module course; variable hours. 3 credits. The principles of medicinal chemistry, pharmacology, pharmaceutics, pathophysiology and pharmacotherapy to the application of drug therapy in patients with respiratory and immunologic illnesses are integrated in this course. The clinical presentation, course of illness, prevention and treatment of diseases using prescription, non-prescription and complementary treatments will be reviewed.

PHAR 604. Clinical Therapeutics Module: Infectious Diseases. 4.5 Hours.
Module course; variable hours. 4.5 credits. The principles of medicinal chemistry, pharmacology, pharmaceutics, pathophysiology and pharmacotherapy to the application of drug therapy in patients with infectious diseases are integrated in this course. The clinical presentation, course of illness, prevention and treatment of diseases using prescription, non-prescription and complementary treatments will be reviewed.

PHAR 605. Clinical Therapeutics Module: Hematology/Oncology. 2.5 Hours.
Module course; variable hours. 2.5 credits. The principles of medicinal chemistry, pharmacology, pharmaceutics, pathophysiology and pharmacotherapy to the application of drug therapy in patients with hematologic diseases and cancer are integrated in this course. The clinical presentation, course of illness, prevention and treatment of diseases using prescription, non-prescription and complementary treatments will be reviewed.

PHAR 606. Clinical Therapeutics Module: Nephrology/Urology. 2 Hours.
Module course; variable hours. 2 credits. The principles of medicinal chemistry, pharmacology, pharmaceutics, pathophysiology and pharmacotherapy to the application of drug therapy in patients with kidney and urologic diseases are integrated in this course. The clinical presentation, course of illness, prevention and treatment of diseases using prescription, non-prescription and complementary treatments will be reviewed.

PHAR 607. Clinical Therapeutics Module: Dermatology/EENT and Joint. 2 Hours.
Module course; variable hours. 2 credits. The principles of medicinal chemistry, pharmacology, pharmaceutics, pathophysiology and pharmacotherapy to the application of drug therapy in patients with diseases of the bone, skin, ears, eyes, nose and throat are integrated in this course. The clinical presentation, course of illness, prevention and treatment of diseases using prescription, non-prescription and complementary treatments will be reviewed.

PHAR 614. Research Techniques. 1-4 Hours.
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. Crosslisted as: PCEU 614/MEDC 614.

PHAR 618. Clinical Therapeutics Module: Gastrointestinal/Nutrition. 2.5 Hours.
Module course; variable hours. 2.5 credits. The principles of medicinal chemistry, pharmacology, pharmaceutics, pathophysiology and pharmacotherapy to the application of drug therapy in patients with gastrointestinal diseases are integrated in this course. Nutrition will be covered. The clinical presentation, course of illness, prevention and treatment of diseases using prescription, non-prescription and complementary treatments will be reviewed.

PHAR 619. Clinical Therapeutics Module: Women's Health/Bone. 2 Hours.
Module course; variable hours. 2 credits. The principles of medicinal chemistry, pharmacology, pharmaceutics, pathophysiology and pharmacotherapy to the application of drug therapy in women's health issues and patients with bone diseases are integrated in this course. The clinical presentation, course of illness, prevention and treatment of diseases using prescription, non-prescription and complementary treatments will be reviewed.

PHAR 620. Clinical Therapeutics Module: Critical Care/Toxicology and Complex Patients. 2.5 Hours.
Module course; variable hours. 2.5 credits. The principles of medicinal chemistry, pharmacology, pharmaceutics, pathophysiology and pharmacotherapy to the application of drug therapy in patients in critical care units and in toxicology, including bioterrorism, are presented. Drug therapy use in the geriatric population will be used as a framework for complex patient care.

PHAR 621. Pharmacoeconomics. 2 Hours.
Module course; variable hours. 2 credits. Introduces the terms and processes of pharmaceutical economics and phamacoeconomics. Students learn to assess the impact of economics on phamaceutical use, evaluate pharmacoeconomic studies and make decisions on the cost effectiveness of therapeutic alternatives. Lectures, discussion and class assignments.

PHAR 622. Epidemiology and Pharmacy Practice. 2 Hours.
Module course; variable hours. 2 credits. Introduction to the principles of epidemiology and the relation to pharmacy practice. Emphasis on applications of epidemiologic principles in pharmacy. Lectures, outside readings, class discussions and exercises.

PHAR 623. Patient Medication Safety. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Provides the fundamental background necessary to understand patient medication safety, including multidisciplinary responsibilities for medication safety and approaches to the management and prevention of medication errors. Current issues in medication safety and actual medication error cases will be used in the class.

PHAR 626. Advanced Pharmacotherapy Research Methods. 3 Hours.
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 trails 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 631. Advanced Pharmacy Practice Management. 3 Hours.
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's work is discussed in detail. Design and operation of integrated drug information, drug distribution, and drug use control systems is explored. (Nontraditional program).

PHAR 637. Introduction to Research Methods in Pharmaceutical Sciences. 3 Hours.
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 developing salient 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. 3 Hours.
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 640. Foundations V. 1 Hour.
Semester course; 3 laboratory hours. 1 credit. This competency-based course is the fifth in a six-semester practice-based course sequence with an emphasis on the clinical application of medications in the management of various disease states. The third-year pharmacy student will develop skills in the assessment and therapeutic monitoring of selected disease states and drug therapies. Topics include infectious disease, oncology, nephrology and urology therapeutics.

PHAR 645. Foundations VI. 1 Hour.
Semester course; 3 laboratory hours. 1 credit. This competency-based course is the final installment in a six-semester, practice-based course sequence. It is intended to give the third-year pharmacy student opportunities to improve acquired skills and gain additional skills necessary to provide the highest level of patient-centered care by optimizing drug therapy outcomes.

PHAR 651. Medical Access and Care for Underserved Populations. 3 Hours.
Semester course; lecture and experiential hours. 3 credits. Provides an overview of the issues affecting medical access for underserved populations, with an emphasis on homeless patients. Topics covered include resources, unique barriers, health literacy, interdisciplinary models in safety net organizations and medication reconciliation. Students attend lectures and complete experiential exercises to reinforce these topics, as well as creating patient education materials.

PHAR 652. Health Promotion and Communication in Pharmacy Practice. 2.5 Hours.
Semester course; 2.5 lecture hours. 2.5 credits. An introduction to the role of the pharmacist in health promotion and disease prevention and building communication skills to help prepare students for practice. Supervised practice in developing basic communication skills. Skills for pharmacist involvement in implementing aspects of Healthy People 2020, educating patients and addressing health care disparities will be emphasized.

PHAR 660. Community Pharmacy Practice Management II. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Helps students develop the necessary foundation for the management of activities in community pharmacy practice settings with many of the skills developed in the course being equally applicable to other practice settings. This course focuses on developing and marketing community pharmacy services.

PHAR 661. Institutional Pharmacy Management. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Introduces students to the practice and management of pharmacy in institutional settings -- hospitals, long-term care facilities, managed care settings and home health care. Students will learn issues unique to institutional practice and best practices for improving medication therapy in institutions. Faculty presentations, guest lectures, class exercises and outside assignments.

PHAR 662. Leadership and Advocacy. 2 Hours.
Semester course; 2 credits. Provides leadership and political advocacy development for students, including the officers of student organizations and those who wish to become leaders in the profession. Students will examine leadership as they explore current health care issues and gain direct experience in community action and the political advocacy process. From a broad perspective, all health care professions need effective leadership, and in turn effective political advocacy, to deal with the numerous issues facing the health care system. Many students are seeking new ways to understand and solve local and national problems, to demystify politics and to make concrete changes by having direct contact with public individuals. To meet these needs, the goals of this course are to strengthen the leadership ability of students and to enhance their potential for future leadership and advocacy roles within their profession and their communities. Graded H/P/F.

PHAR 663. Advanced Diabetes Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An in-depth study of the care of patients with metabolic syndrome and diabetes. The etiology, pathophysiology, clinical course, clinical manifestations, prevention and management of diabetes will be reviewed through the use of online didactic presentations, patient cases, self-directed learning and active participation in classroom discussion. Emphasis is placed on the use of data to optimize pharmacotherapy for patient scenarios.

PHAR 666. Advanced Topics in Pharmacy. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Presentation of pharmacy subject matter by lectures, conferences or clinical site visits in selected areas of advanced study providing a discussion of topics beyond that provided in the required curriculum.

PHAR 670. Geriatric Pharmacy Practice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Students learn therapeutic aspects of providing health care to elderly people. Sociobehavioral aspects of aging related to pharmacotherapy outcomes also will be learned. Problems associated with drug use in the elderly and the importance of providing quality pharmaceutical care to ambulatory and institutionalized geriatric individuals will be emphasized.

PHAR 671. Applied Pharmacoeconomics and Outcomes Research. 3 Hours.
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. 2 Hours.
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 pharmacotherapy 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 Cardiovascular Pharmacotherapy. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: PHAR 544. Students will gain a broader knowledge and deeper understanding of the etiology, pathophysiology, clinical course, clinical manifestations, prevention and management of cardiovascular disorders through the use of online didactic presentations, videos, patient cases, self-directed learning and active participation in classroom discussion.

PHAR 674. Advances in Community Pharmacy Practice and Therapeutics. 3 Hours.
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 pertinent to community pharmacy practice. Students will visit community pharmacies for the practice component of this course.

PHAR 677. Infectious Diseases Pharmacotherapy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course is designed to familiarize the student with principles of the rational treatment of human infectious diseases. Emphasis will be placed on learning the pharmacology, toxicology and pharmacokinetics/pharmacodynamics of antimicrobial agents; problems of antimicrobial resistance and the role of the pharmacist in combating resistance; the methods of obtaining and evaluating culture and susceptibility reports; and familiarity with infectious diseases literature. Students will attend daily consultation rounds with the infectious diseases service and will meet with the preceptor to discuss patients and plan for contributions to patient care.

PHAR 678. Women's Health: Pharmacotherapeutic Issues and Controversies. 2.5 Hours.
Semester course; 2 lecture hours. 2.5 credits. This course addresses the prevention and management of disease in women. It is designed to expand upon the women's health topics presented in the pharmacotherapy course series. Problem-based learning, student presentations and clinical projects serve as the primary teaching methods.

PHAR 679. Critical Care Pharmacotherapy. 2 Hours.
Semester course; 2 lecture hours. 2 credits. This course consists of online recorded discussions and case presentations to familiarize the student with critical care pharmacotherapy. 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 a self-study, online format. Graded as H/P/F.

PHAR 685. Contemporary Topics in Pharmacy. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Explores how pharmacists prepare for and respond to the issues that affect the practice of pharmacy. Contemporary issues that relate to major health care needs, government health care activities, views by health professionals, health policies, health care economics, pharmacist attitudes and behaviors, pharmacy laws and regulations, pharmacy traditional views and opinions will be examined. Discussion and debate on these issues will help to prepare students for their future in pharmacy practice.

PHAR 686. Entrepreneurial Pharmacy and Independent Pharmacy Practice. 2 Hours.
Semester course; 3 lecture hours/10 weeks. 2 credits. Provides a practical review of independent pharmacy practice from starting to running a pharmacy. Topics include financing, marketing, niche markets, store design and merchandising, technology, business relations, and contracts. The course will be taught through presentations/discussions by guest lecturers and a project.

PHAR 687. Introduction to Research in Pharmacy. 1 Hour.
Semester course; 1 lecture hour. 1 credit. A broad overview of the types of research conducted in the profession of pharmacy with a focus on clinical research. Students will achieve a broad appreciation of the research opportunities available in pharmacy and guidance in pursuit of a career in research. Format will consist of lectures, interactive discussions and demonstrations. Graded P/R.

PHAR 688. Applied Pharmacoepidemiology Research Methods. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EPID 571 and BIOS 544 or permission of instructor. Provides an overview of the field of pharmacoepidemiology and its relationship to health care and research. Topics including selecting data sources, study design, data manipulation and analytical issues relevant to the conduct of pharmacoepidemiology research are covered. Students complete exercises to reinforce these topics, as well as prepare a formal project proposal. Research studies are also reviewed to help students develop skills in the critical evaluation of the pharmacoepidemiology literature.

PHAR 689. Pharmaceutical Policy Analysis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ECON 500 or ECON/HADM 624, or permission of instructor. Examines a breadth of pharmaceutical policy issues pertaining to stakeholders in health care including the federal government, state governments, the pharmaceutical industry, pharmacies and pharmacists, and consumers. Using an economic approach to policy analysis, various competing thoughts and challenges to health care will be presented. Special attention will be paid to theoretical foundations and scientific rigor in approaching policy analysis.

PHAR 690. Pharmacy Research Seminar. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Required of all graduate students in pharmacy. Research seminar.

PHAR 691. Special Topics in Pharmacy. 1-5 Hours.
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. Graded as honors, high pass, pass, fail.

PHAR 697. Directed Research in Pharmacy. 1-15 Hours.
Semester course; 1-15 credits. Research leading to the M.S., Pharm.D., or Ph.D. degree.

PHAR 724. Pharmacy Law. 2.5 Hours.
Semester course; 2.5 lecture hours. 2.5 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 760. Acute Care Pharmacy Practice I. 5 Hours.
Semester course; daily for 5 weeks. 5 credits. This course consists of 200 hours of advanced pharmacy practice experience in an acute care hospital setting. Students will actively participate in the delivery of patient care on a general medicine service. Students may participate in the following types of activities: rounding with a health care team, obtaining patient histories, identifying problems requiring therapeutic interventions, solving problems, consulting with physicians, monitoring patient outcomes and providing educational sessions for the professional staff. These services are expected to be integrated with the hospital pharmacy services. Graded as H/HP/P/F.

PHAR 761. Advanced Hospital Pharmacy Practice. 5 Hours.
Semester course; daily for 5 weeks. 5 credits. This course consists of 200 hours of advanced pharmacy practice experience in a hospital pharmacy department. Students will actively participate in pharmacy operations and services relating to systems for drug distribution and drug control, scope of clinical services provided by the department, management of the department, and department relationships within the institution and health system. Graded as H/HP/P/F.

PHAR 762. Geriatrics Pharmacy Practice. 5 Hours.
Semester course; daily for 5 weeks. 5 credits. This course consists of 200 hours of advanced pharmacy practice experience in a variety of settings with a predominately geriatric focus. These sites may include community pharmacies, specialty clinics, rehabilitation hospitals, skilled nursing facilities, home-based consult services and assisted living facilities. Students will focus on the unique medication-related needs of seniors and actively apply that special knowledge to provide quality pharmacy care to older adults. Graded as H/HP/P/F.

PHAR 763. Ambulatory Care Pharmacy Practice. 5 Hours.
Semester course; daily for 5 weeks. 5 credits. This course consists of 200 hours of advanced pharmacy practice experience in an ambulatory care, multidisciplinary practice setting. These sites may include hospital-based clinics, physician group practices, safety net clinics and managed care facilities that provide health care directly to patients. Students will actively participate in obtaining patient medical and medication histories, evaluating drug therapies, developing pharmacy care plans, monitoring patients' therapeutic outcomes, consulting with physicians and non-physician providers and providing education to patients and health care professionals. Graded as H/HP/P/F.

PHAR 764. Community Pharmacy Practice. 5 Hours.
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 counseling 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. Graded as H/HP/P/F.

PHAR 765. Elective I. 5 Hours.
Semester course; daily for 5 weeks. 5 credits. In this course, students will be able to participate in a variety of pharmacy practice settings. Graded as H/HP/P/F.

PHAR 766. Elective II. 5 Hours.
Semester course; daily for 5 weeks. 5 credits. In this course students participate in a variety of pharmacy practice settings. Graded as H/HP/P/F.

PHAR 767. Clinical Selective I. 5 Hours.
Semester course; daily for 5 weeks. 5 credits. Restricted to Pharm.D. dual-degree candidates. In this course students participate in a clinical rotation and may choose one of these pharmacy practice settings: ambulatory care, acute care, advanced community, institutional or geriatric. Graded as H/HP/P/F.

PHAR 768. Advanced Community Pharmacy Practice. 5 Hours.
Semester course; daily for 5 weeks. 5 credits. This course consists of 200 hours of advanced pharmacy practice experience in a community pharmacy setting. Students will focus primarily on patient care services and secondarily on patient-focused dispensing functions in these pharmacies. These services will focus on the identification, resolution and prevention of medication-related problems dealing with general medicine issues and medication therapy management. Students will actively participate in the following types of activities: interacting with patients, caregivers and prescribers; counseling, self-care consults and recommendations; administration of immunizations; and health and wellness screenings and information. Graded as H/HP/P/F.

PHAR 769. Clinical Selective II. 5 Hours.
Semester course; daily for 5 weeks (200 clinical hours). 5 credits. Restricted to Pharm.D. dual-degree candidates. In this course students participate in a clinical rotation and may choose one of these pharmacy practice settings: ambulatory care, acute care, advanced community, institutional or geriatric. Graded as H/HP/P/F.

PHAR 771. Student Pharmacist Professionalism. 1 Hour.
Continuing course; variable hours. 1 credit at end of four-year curriculum. Selected presentations and activities related to the development and enhancement of professional behavior in student pharmacists. Graded as CO until final semester, with pass/fail awarded on completion.

PHAR 773. Acute Care Pharmacy Practice II. 5 Hours.
Semester course; daily for 5 weeks. 5 credits. This course consists of 200 hours of advanced pharmacy practice experience in an acute care hospital setting. Students participate in the delivery of patient care in a general medicine or a medical specialty service. Students may participate in the following types of activities: rounding with a health care team, obtaining patient histories, identifying problems requiring therapeutic interventions, solving problems, consulting with physicians, monitoring patient outcomes and providing educational sessions for the professional staff. These services are expected to be integrated with the hospital pharmacy services. Graded as H/HP/P/F.

PHILOSOPHY (PHIL)

PHIL 101. Introduction to Philosophy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introduction to some of the main branches of philosophy. Some of the issues that might be addressed are: What is knowledge? Is reason or experience the basis for all knowledge? Can we have knowledge of the past or of the future? What is truth? Does God exist? Is there a mental realm separate from the material realm? Are the laws of nature deterministic? Do we have free will? What makes an action morally permissible? What is the proper role of the state in regulating our lives? This course is directed primarily at first- and second-year students.

PHIL 103. Ancient Greek and Medieval Western Philosophy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of Western philosophy from the ancient Greeks (e.g., Socrates, Plato and Aristotle) through the medieval period (e.g., Augustine and St. Thomas Aquinas).

PHIL 104. Modern Western Philosophy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of Western philosophy from the Renaissance to the 19th century (e.g., Hobbes, Descartes, Spinoza, Leibniz, Locke, Berkeley, Hume, Kant, Hegel and Marx).

PHIL 201. Critical Thinking About Moral Problems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 112 or both ENGL 295 and HONR 200. Focuses on the development of sound critical-thinking skills and their application to a range of topics in moral philosophy, including questions about the nature of morality and whether we have reason to be moral, and also to various topics in applied ethics such as the morality of abortion, animal rights, world hunger, pornography, capital punishment, sexual behavior, environmental ethics and reverse discrimination. Credit toward graduation may be received for only one of PHIL 201, 212, 213 or 214.

PHIL 211. History of Ethics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 112 or both ENGL 295 and HONR 200. A philosophical investigation of the main concepts and theories of ethics and their application to fundamental moral questions, as illustrated by the ethical systems of such historically important Western philosophers as Plato, Aristotle, Augustine, Hume, Mill and Kant.

PHIL 212. Ethics and Applications. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 112 or both ENGL 295 and HONR 200. A philosophical investigation of the main concepts and theories of ethics, with applications to fundamental moral questions as they arise in different areas. Such problems as abortion, the welfare of animals, world hunger, pornography, capital punishment, nuclear defense, sexual behavior, environmental ethics and reverse discrimination may be used as illustrations. Credit toward graduation may be received for only one of PHIL 201, 212, 213 or 214.

PHIL 213. Ethics and Health Care. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 112 or both ENGL 295 and HONR 200. A philosophical investigation of the main concepts and theories of ethics, with applications to fundamental moral questions as they arise in health care. The following issues may be used as illustrations: abortion, euthanasia and the right to die, human experimentation, treating mental illness, genetic technologies, the concepts of health and disease, and the funding of health care. Credit toward graduation may be received for only one of PHIL 201, 212, 213 or 214.

PHIL 214. Ethics and Business. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 112 or both ENGL 295 and HONR 200. A philosophical investigation of the main concepts and theories of ethics, with applications to fundamental moral questions as they arise in business. The following issues may be used as illustration: affirmative action, investment in unethical companies or countries, product safety, whistle blowing and advertising. Credit toward graduation may be received for only one of PHIL 201, 212, 213 or 214.

PHIL 221. Critical Thinking. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introduction to inductive and deductive reasoning, with emphasis on common errors and fallacies.

PHIL 222. Logic. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An evaluation of deductive arguments utilizing the methods of symbolic logic.

PHIL 230. Reason, Science and the Self. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Open to Honors College students only. The reasonableness of a belief often depends on the arguments that support it. One primary goal of this course is to sharpen the abilities to identify, analyze and assess arguments. Another primary goal is to show how to apply critical reasoning skills to philosophical explorations of the nature of science, knowledge and personal identity.

PHIL 250. Thinking About Thinking. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 112 or both ENGL 295 and HONR 200. An interdisciplinary course about thinking. Covers the development of the principles of reasoning, such questions as how thinking relates to behavior and brain activity and how to think about specific areas of our lives, such as science, morality, religion, the arts and the law.

PHIL 291. Topics in Philosophy. 1-4 Hours.
Semester course; variable hours. 1-4 credits. Prerequisite: as specified in the Schedule of Classes or written permission of instructor. An introductory 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 301. Mind and Reality. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: 9 credits in philosophy including PHIL 221 or PHIL 222, and one of PHIL 101, PHIL 103 or PHIL 104, or permission of instructor. An examination of central metaphysical issues, for example, the mind-body problem, free will, causality, action, realism and the problems of universals.

PHIL 302. Reason and Knowledge. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: 9 credits in philosophy including PHIL 221 or PHIL 222, and one of PHIL 101, PHIL 103 or PHIL 104, or permission of instructor. An examination of central epistemological issues, for example, the problem of justification, empirical knowledge, perception, rationality and truth.

PHIL 303. Philosophy of Language. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: 9 credits in philosophy including PHIL 222 and 6 additional credits, at least 3 of which must be from PHIL 101, PHIL 103 or PHIL 104, or permission of the instructor. An examination of central issues in the philosophy of language; for example, the nature of meaning and reference, reductionism, properties of languages and the character of artificial symbols systems.

PHIL 320. Philosophy of Law. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: 9 credits in philosophy, which must include PHIL 221 or PHIL 222, and one of PHIL 201, PHIL 211, PHIL 212, PHIL 213, or PHIL 214, or permission of instructor. A critical examination of the nature of law and criminal justice in the light of important human values. The following topics will be considered: the nature of law and legal reasoning, the legal enforcement of morality, and such controversies as punishment versus rehabilitation and the right to due process versus the need for public safety.

PHIL 322. Tibetan Buddhism. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A basic introduction to the history, development and mythology of the Buddhism of Tibet focusing on the Indian heritage and shared basis of all Buddhist practices, a clear identification of the three vehicles found in Buddhism, and a careful consideration of the path of the Bodhisattva, the hero of Great Vehicle Buddhism. Crosslisted as: RELS 322.

PHIL 326. Existentialism. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: three credits in philosophy (exclusive of PHIL 221 and PHIL 222) or permission of instructor. An examination of the nature of truth, freedom, responsibility, individuality and interpersonal relations as found in some principal writings of Kierkegaard, Nietzsche, Jaspers, Sartre, Heidegger, Camus, Buber and Marcel. Crosslisted as: RELS 326.

PHIL 327. Normative Ethics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: PHIL 221 or PHIL 222; PHIL 201, PHIL 211, PHIL 212, PHIL 213 or PHIL 214; and 3 additional credits of philosophy; or permission of instructor. A study of issues in systematic normative ethics, including such topics as egoism, consequentialism, utilitarianism, deontology and the theory of the virtues.

PHIL 328. Metaethics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: PHIL 221 or PHIL 222; PHIL 201, PHIL 211, PHIL 212, PHIL 213 or PHIL 214; and 3 additional credits of philosophy; or permission of instructor. A study of issues in the semantics and metaphysics of ethics. Such topics as the following will be discussed: the objectivity of ethical judgements, the semantic value of ethical judgements and the possibility of ethical knowledge.

PHIL 331. Philosophy of Science. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: 3 credits of philosophy and 6 credits of natural sciences courses. An examination of the bases of scientific inquiry in both the natural and social sciences; including a study of such topics as hypothesis formation and testing, and the nature of scientific laws, theories and explanations.

PHIL 335. Social and Political Philosophy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: 9 credits in philosophy, which must include PHIL 221 or PHIL 222, and one of PHIL 201, PHIL 211, PHIL 212, PHIL 213, or PHIL 214, or permission of instructor. A critical examination of political power and of the relationship between the individual and society. Possible topics include: anarchism and the justification of having a state at all; political views about what sort of state is justified (e.g., conservatism, liberalism, communitarianism, feminism, Marxism); private vs. collective property; market vs. planned economies; democracy vs. totalitarianism; and civil disobedience and revolution.

PHIL 340. Philosophy for Children. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: two philosophy courses, which must include at least one of PHIL 101, 103 or 104. A service-learning course requiring at least 15 hours of service in which students will be required to lead philosophical discussions with primary/secondary schoolchildren. An analysis of perennial philosophical questions and problems with the aim of introducing them to children. Some of the questions that might be addressed include: What is happiness? What is justice? What is a mind? Can a mind exist apart from a body? Can machines think? What is time? What is knowledge? What are the limits of human knowledge?.

PHIL 342. Buddhist Reasoning and Debate. 4 Hours.
Semester course; 4 lecture hours. 4 credits. Prerequisite: RELS/INTL 311. A basic introduction to perception, logic and epistemology in Buddhist thought. The course is designed to convey basic reasoning skills including formation of arguments, checking arguments for validity, and developing techniques and strategies for rational discourse. Crosslisted as: RELS 342.

PHIL 391. Topics in Philosophy. 1-4 Hours.
Semester course; variable hours. 1-4 credits. Prerequisite: as specified in the Schedule of Classes or permission of instructor. A 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 408. Indian Tradition. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: at least six credits from philosophy or religious studies courses. A systematic analysis of the major theories of Indian religious and philosophical thought: Vedas, Upanishads, Gita, Charvaka, Jainism, Buddhism, the six systems of Hinduism and contemporary developments. Crosslisted as: RELS 408.

PHIL 410. The Chinese Tradition in Philosophy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the development of Confucianism, of alternative ways of thought prior to the fall of the Han Dynasty and of neo-Confucianism. The systems of thought are examined in the light of their social, political and religious impact on China, Korea and Japan. Crosslisted as: RELS 410/INTL 410.

PHIL 412. Zen Buddhism. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 200 or HONR 200. A study of Zen Buddhism, including backgrounds in Indian philosophy and practice, development in China and Korea, and present-day Zen theory and practice in Japan and in Western countries. Crosslisted as: RELS 412/INTL 412.

PHIL 421. Aesthetics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: 3 credits in philosophy (exclusive of PHIL 221 and PHIL 222) or permission of instructor. A critical survey of philosophies of art from antiquity to the 20th century. Topics include: the nature of art, creativity, aesthetic experience and aesthetic judgments.

PHIL 430. Philosophy of Religion. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: three credits in philosophy (exclusive of PHIL 211 and PHIL 212) or permission of instructor. An introduction to the major problems and questions of religion and reason. Special reference will be made to the nature of God, the nature of man, the problem of evil, the source of good, immortality and the basis of authority. Crosslisted as: RELS 430.

PHIL 440. Mysticism. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 200 or HONR 200. A critical analysis of the varieties of mysticism in world religions. Arguments for and against mysticism will be emphasized. Mysticism will be related to art, psychology, science, philosophy, theology and magic. Crosslisted as: RELS 440.

PHIL 490. Seminar in Philosophy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with different topics for maximum of 6 credits. Prerequisite: one of PHIL 301, 302, 303, 320, 327, 335 or permission of instructor in exceptional cases. Research and analysis of selected philosophical topic in a seminar setting. Must be taken at least once as a senior (i.e., after the completion of at least 85 credit hours toward the degree) to satisfy the capstone requirement.

PHIL 492. Independent Study. 1-4 Hours.
Semester course; variable hours. Variable credit. Maximum of 6 credits per semester; maximum total of 12 credits for all independent study courses. Open generally to students of only junior or senior standing who have acquired at least 12 credits in the departmental discipline. Determination of the amount of credit and permission of instructor and department chair must be procured prior to registration of the course. An independent study course to allow interested majors in philosophy to do research, under the direction of a professor qualified in that field, in an area of major interest.

PHIL 496. Senior Research Project. 1-4 Hours.
Semester course; 1-4 credits. Prerequisites: Senior status; two courses from PHIL 301, 302, 303, 320, 327, 335, 391; and written approval by faculty supervisor. An individual research project to develop a polished journal-length research paper. This course is intended primarily for students who wish to develop a dossier paper for submission to a philosophy graduate program.

PHIL 521. Aesthetics. 3 Hours.
Semester courses; 3 lecture hours. 3, 3 credits. A critical survey of aesthetics from antiquity to the 20th century. 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 522. Aesthetics. 3 Hours.
Semester courses; 3 lecture hours. 3, 3 credits. A critical survey of aesthetics from antiquity to the 20th century. 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. 1-4 Hours.
Semester course; variable hours. 1-4 credits. Prerequisite: written permission of instructor or graduate standing. A graduate-level, in-department 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. 1-4 Hours.
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. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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. Administrative Ethics. 2,3 Hours.
Semester course; 2 or 3 lecture 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 interest. Crosslisted as: PADM 683/GVPA 683.

PHIL 691. Topics in Philosophy. 1-4 Hours.
Semester course; variable hours. 1-4 credits. Prerequisite: written permission of instructor or graduate standing. A graduate-level, in-depth 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. 1-4 Hours.
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. Ethics and Public Policy. 3 Hours.
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. Crosslisted as: PPAD 713.

PHOTOGRAPHY AND FILM (PHTO)

PHTO 201. Sophomore Photography Seminar. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: sophomore standing in Department of Photography and Film. Introduces various methods and means of exhibition.

PHTO 202. Sophomore Film Seminar. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: sophomore standing in the Department of Photography and Film. Students will learn all aspects of organizing a film festival that will be held at the end of the spring semester.

PHTO 233. Elements of the Moving Image. 4 Hours.
Semester course; 4 lecture hours. 4 credits. A survey of new media and their origins. An exploration of this visual phenomena and its relationship to modern society.

PHTO 243. Darkroom. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: sophomore standing in the department. Manual 35mm film camera is required. Study of fundamental camera techniques and photographic processes including darkroom printing. Emphasizes professional standards, technical proficiency and individual artistic expression.

PHTO 245. Design Photography I. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. For communication art and design majors only or permission of instructor. A comprehensive beginning class covering an introduction to the camera, the process of exposure, developing, and black-and-white printmaking.

PHTO 260. Experiments in Sequencing. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: PHTO 243 or PHTO 281. Explores the history, contexts and applications of sequencing as a unifying artistic practice. Emphasis is placed on sequencing as it relates to visual communication and contemporary multimedia.

PHTO 275. Film as Material. 3 Hours.
Semester course; 2 lecture and 3 studio hours. Prerequisite: sophomore standing in the department. Study of the fundamental techniques and processes of 16mm film production, including cameras, lighting and composition. Emphasizes technical proficiency and individual artistic expression.

PHTO 280. Moving Pixels. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: sophomore standing in the department. Introduction to digital video, computer imaging and interactive multimedia as tools of artistic expression and social inquiry.

PHTO 281. Digital Imaging I. 3 Hours.
Semester course; 2 lecture and 3 studio hours. Prerequisite: sophomore standing in the department. Digital still image camera is required. Study of fundamental techniques and processes of digital image-making, including image capture, manipulation and digital printing. Emphasizes professional standards, technical proficiency and individual artistic expression.

PHTO 289. Filmmaking for Non-majors. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May be repeated for a maximum of 6 credits. Digital motion picture camera is required. Study of fundamental techniques and processes of digital filmmaking, including image and audio recording, editing and exporting digital media. Emphasizes media as a tool of artistic expression and social inquiry.

PHTO 290. Photography for Non-majors. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May be repeated for a maximum of 6 credits. Digital still image camera is required. Study of fundamental techniques and processes of digital image-making, including image capture, manipulation and digital printing. Emphasizes professional standards, technical proficiency and individual artistic expression.

PHTO 295. Revolutionary Cinema. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PHTO 280. Investigates a range of experimental/underground/alternative moving image art forms and styles and covers key historical moments in the avant-garde. Emphasizes attentive viewing and critical analysis of works that challenge dominant media conventions.

PHTO 301. Junior Seminar. 1 Hour.
Semester course; 1 studio hour. 1 credit. Prerequisite: junior standing in the Department of Photography and Film. Instruction in how to make an artist website using current technology and 2-D design principles.

PHTO 307. Processes and Techniques. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: PHTO 243. Explores alternative photographic techniques with an emphasis on handmade printing. Places various photographic practices and aesthetics in a historical context. Students develop personal awareness of their creative process in the pursuit of a conceptually coherent body of work.

PHTO 340. Lighting I: Studio. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisites: PHTO 243 and PHTO 281. Introduces controlled lighting for still photography in the studio. Students use continuous light sources and professional grade strobe equipment to explore tabletop and portraiture photography through lectures and studio assignments. Emphasizes professional standards, technical proficiency and individual artistic expression.

PHTO 350. Concepts I. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisites: UNIV 200 or HONR 200 and PHTO 281. Students utilize the aesthetic and technical skills mastered in previous courses to explore photography as a conceptual tool. Emphasizes both historic and contemporary contextualizations of the medium and fosters development of a long-term, personal artistic project.

PHTO 351. Portrait Photography. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: PHTO 345 Design Photography or PHTO 350 Intermediate Photography. Students explore the various visual possibilities of the use of portrait photography.

PHTO 352. Concepts II: Junior Project. 3 Hours.
Semester course; 2 lecture and 3 studio hours. Prerequisite: PHTO 350. Students complete a conceptually coherent body of work that engages with photography as an artistic medium. Course emphasizes advanced understanding of historical perspectives and critical theory as they relate to the development of a personal project.

PHTO 361. Sound and Color. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisites: PHTO 280 and PHTO 281. Explores advanced concepts and techniques in sound design, editing, color grading and postproduction workflow for film, video and multimedia.

PHTO 377. The Film Image. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 9 credits. An examination of production techniques and problems encountered by the filmmaker in creating the motion picture image. A selected number of narrative, documentary, experimental and animated films are viewed as source material and dealt with from a production point of view. The films chosen for discussion vary from semester to semester.

PHTO 381. Digital Imaging II. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: PHTO 281. Digital still image camera is required. Study of advanced techniques and processes of digital image-making, including advanced manipulation and color control and advanced digital printing. Emphasizes professional standards, technical proficiency and individual artistic expression.

PHTO 382. Advanced Digital Printing. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisites: PHTO 380 and 381. How to manage a digital color workflow in order to produce desired colors and tonal values in the final output -- the print. Instruction in controlling image management, color calibration and printing through lectures, demonstration and hands-on experience. Discussion of student work in regular critiques.

PHTO 390. Writing for the Screen. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: UNIV 200 or HONR 200. Explores basic theory and formal aspects of story, structure and character through readings, workshops and writing exercises. Students develop skills specific to writing and pre-producing a short fiction, documentary or experimental film.

PHTO 391. Topics in Photography and Film. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May be repeated with different topics for a maximum of 6 credits. A lecture and/or studio course offered on a variety of photography or film issues. See the Schedule of Classes for specific topics covered each semester.

PHTO 392. Animation. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Explores various materials and processes, analog and digital, involved in creating animated moving image works. Emphasizes studio technique and artistic exploration.

PHTO 394. Documentary I. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: PHTO 390. Introduces strategies for developing, shooting and editing various types of documentary and nonfiction media including, but not limited to, the electronic essay, biography/portraiture, ethnographic film and new genres. Covers key historical moments and ethical issues related to the representation of the real world.

PHTO 420. Senior Thesis I. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: senior standing in the department. Critical analysis and development of a yearlong creative thesis project with emphasis on the completion of a conceptually coherent body of work. Course emphasizes professional standards, technical proficiency and individual artistic expression informed by historical perspectives and critical theory.

PHTO 421. Senior Thesis II. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: PHTO 420. Critical analysis and development of a yearlong creative thesis project with emphasis on the completion of a conceptually coherent body of work. Course emphasizes professional standards, technical mastery and individual artistic expression informed by historical perspectives and theory. This course is a capstone experience integrating effective oral, written and visual communication, critical thinking and advanced studio techniques.

PHTO 435. Professional Practice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines a range of business models, practices and tools applicable to building a career in photography and related artistic, commercial and media fields. Emphasizes practical skills, marketing, legal and ethical issues.

PHTO 436. Senior Suitcase. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines a range of professional practices and tools applicable to building a career in the media arts. Students develop ancillary materials related to their overall student film portfolio. Emphasizes practical skills, marketing and audience-engagement issues.

PHTO 442. Lighting II: Location. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: PHTO 340. Explores photography using lighting design on location. Students concentrate on balancing and matching available lighting with electronic flash and continuous lighting tools. Emphasis is on the technical, professional and logistical skills required of a photographer working on location assignments and on using creative approaches to lighting and image design.

PHTO 474. Contemporary Critical Perspectives. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PHTO 352. Explores and interrogates multiple theories of representation and the aesthetic, ideological, ethical and cultural issues raised by contemporary photography and related media. Students will view work, read contemporary criticism, engage in discussion and produce original, critical writing.

PHTO 475. Advanced Production Workshop. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: PHTO 390. A practical, intensive workshop in which students work collaboratively in standard industry crew positions to complete a single project. Students explore craft, aesthetics, storytelling and production issues at an advanced level.

PHTO 484. Thesis Film I. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: PHTO 475. Students complete writing, previsualization, preproduction and initial production on their thesis films. Students engage in workshops, screenings and critiques in order to further develop their professional identities and to advance their understanding of the methods and tools deployed by independent film and media artists.

PHTO 485. Thesis Film II. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: PHTO 484. Students complete all production, editing, sound design and outreach materials for their thesis films. Students engage in workshops, screenings and critiques in order to further develop their professional identities and to advance their understanding of the methods and tools deployed by independent film and media artists. This course is a capstone experience integrating effective oral, written and visual communication, critical thinking and advanced studio techniques.

PHTO 491. Topics in Photography and Film. 1-4 Hours.
Semester course; variable hours. 1-4 credits. May be repeated with different topics for a maximum of 12 credits. A seminar or workshop that intensively engages photography, film and related-media subjects, including, but not limited to, a range of historical and contemporary photographic/cinematic practices, trends, theories and concerns within a wider artistic and art historical context. See the Schedule of Classes for specific topics covered each semester.

PHTO 492. Independent Study in Photography and Film. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May be repeated for a maximum total of 6 credits. Prerequisites: junior or senior standing as a major in photography and film, and approval of department chair and instructor. Individual instruction and supervision of a special project. Learning experiences should be designed with the supervising faculty member in the form of a contract between student and instructor. This course is limited to those students who have demonstrated an exceptional level of ability and intense commitment to their discipline.

PHTO 493. Teaching Practicum in Photography and Film. 1-3 Hours.
Semester course; variable hours. 1-3 credits. Repeatable for a maximum of 6 credits. Prerequisites: senior standing in the department and a minimum GPA of 3.0. Advanced students in photography and film are mentored in the classroom while serving as teaching apprentices. Specific duties are negotiated between the student and the mentor and approved by the department chair. Duties will typically include regular classroom attendance, peer tutoring and assistance in technical demonstrations of equipment and/or software.

PHTO 494. Documentary II. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: PHTO 394. Students will explore advanced concepts and techniques in documentary and nonfiction media creation through in-class exercises, screenings, independent productions and group critiques.

PHTO 495. Photography and Film Internship. 3 Hours.
Semester course; 10 hours per week for a total of 150 hours of professional work experience. 3 credits. May be repeated. Prerequisite: consent of internship supervisor and academic adviser. Practical work experiences are coordinated with professionals in the field of photography, film and related media.

PHTO 500. Photographic Studio and Seminar. 3 Hours.
Semester course; 1 lecture and 6 studio hours. 3 credits. Prerequisite: Permission of instructor. A seminar that examines the technical and aesthetic components of photography and filmmaking processes and the language and theories of photography and film criticism.

PHTO 601. Photographic Studio. 3,6 Hours.
Semester course; 6 or 12 studio hours. 3 or 6 credits. May be repeated. Prerequisite: Nonmajors may enroll with permission of instructor. Student will work on specific problems relating to the areas of their major interests. Options will be available in black and white photography, color photography, and motion picture photography.

PHTO 621. Research in Photography and Film. 3,6 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated. An 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 692. Independent Study in Photography and Film. 1-3 Hours.
Semester course; variable lecture hours. 1 to 3 credits. May be repeated for a maximum of six credits. Individual instruction and supervision of a special project. Learning experiences should be designed with the supervising faculty member in the form of a contract between student and instructor.

PHTO 693. Fieldwork, Internship. 3,6 Hours.
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. Formal arrangements will be made with state agencies, industries, community organizations, and professionals in the field.

PHTO 699. Graduate Exhibition. 1,3 Hour.
Semester course; 1 or 3 lecture hours. 1 or 3 credits. May be repeated. To be taken after M.F.A. candidacy with the approval of the graduate director and department chair and review of the student's record. Students prepare and execute a public exhibit of their creative work and provide complete documentation of the sources and ideas presented.

PHYSICAL THERAPY (PHTY)

PHTY 501. Gross Anatomy (Physical Therapy). 7 Hours.
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. 4 Hours.
3 lecture and 2 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 for Wellness and Health Promotion. 3 Hours.
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, health promotion, wellness and adult fitness. Emphasizes the underlying physiology with assessing physical fitness and developing therapeutic exercise prescriptions which meet recommended guidelines for achieving and maintaining optimal physical fitness and health.

PHTY 505. Applied Microscopic Anatomy for Physical Therapy. 4 Hours.
Semester course; 4 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. 4 Hours.
Semester course; 3 lecture and 2 laboratory hours. 4 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. Musculoskeletal Physical Therapy I. 6 Hours.
Semester course; 4 lecture and 4 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 of body parts, manual and mechanical muscle testing, joint range of motion, accessory motion testing, and palpation.

PHTY 510. Rehabilitation I. 3 Hours.
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 medical documentation, record keeping and professional communication. Introduces communication methods and skills appropriate for interaction with patients, families and colleagues.

PHTY 512. Health Care Systems. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Restricted to students in the professional Doctor of Physical Therapy program. Introduces students to issues in health care related to organization, finance, access and regulation of services for individuals, groups and communities. Provides a general overview of inter-relationships among health care consumers, providers, organizations, regulators and third-party payers. Discusses implications for public policy and legislative action. Critically reviews supplemental readings to illustrate key concepts and their relevance to the practice of physical therapy.

PHTY 520. Clinical Education I. 3 Hours.
Semester course; 1 lecture hour and 80 clinic hours. 3 credits. Introduces the profession of physical therapy. Emphasizes professionalism, ethics, professional behaviors, physical therapy extenders role and individual differences that may impact patient care. Provides an introduction to the Guide to Physical Therapy Practice and educational concepts that are related to personal growth and patient management. Includes a part-time experience in local acute care hospitals and/or home health and long-term care facilities designed to introduce the student to physical therapy practice. Allows students to develop interpersonal skills with patients, peers and other health care professionals while applying and practicing skills learned in the first professional year of education in a clinical setting.

PHTY 531. Evidence-based Practice Concepts. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Introduces concepts and principles of the research process including question, theory and hypothesis development, research design and methodology, and statistical reasoning and analysis. Discusses the basis of 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 537. Rehabilitation II. 3 Hours.
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 for different patient diagnoses. Provides interprofessional opportunities with other health care professional students.

PHTY 540. Psychosocial Aspects of Physical Therapy. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Introduces the student to sociocultural and psychosocial characteristics of patient populations that impact the rehabilitation process. Addresses the patient and family in the health care system, including sexuality, impact of disability, grief processes, death and dying, and selected counseling techniques.

PHTY 601. Advanced Measurement Concepts. 3 Hours.
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 603. Evidence-based Practice I. 4 Hours.
Semester course; 4 lecture hours. 4 credits. Introduces concepts and principles of the research process including question, theory and hypothesis development, research design and methodology, and statistical reasoning and analysis. Introduces 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 physical therapy practice. Teaches how to access and implement electronic search engines to locate and retrieve professional literature. Twelve lecture hours will be provided on site at the beginning of the semester; the remainder of the course will be distance-based.

PHTY 604. Evidence-based Practice II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PHTY 603. Continuation of PHTY 603. Provides an advanced review of the concepts and principles of the research process and evidence-based practice. Focuses on skills needed to develop relevant clinical questions for specific patient scenarios, perform a critical appraisal of professional literature and determine the applicability of the research findings for patient management. Includes preparation of a publication-ready paper on a topic relevant to the student's practice interests. Course is entirely distance-based.

PHTY 605. Foundations for Pathokinesiology. 3,4 Hours.
Semester course; 3-4 lecture hours. 3-4 credits. A study of the principles that form a foundation for understanding 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. 2-4 Hours.
Semester course; 1-3 lecture and 3 clinical hours. 2-4 credits. A study of motor behavior in both normal and pathological conditions. Reading and discussion of the basic literature of current neurologic approaches to therapeutic exercises and an integration of these concepts into a comprehensive model of human movement.

PHTY 608. Advanced Musculoskeletal Sciences. 3 Hours.
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. Crosslisted as: REMS 608.

PHTY 609. Clinical Biomechanics. 3 Hours.
Semester course; 2 lecture and 2 laboratory 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 610. Physical Therapy Evaluation in the Direct Access Setting. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Covers critical physical therapy evaluation skills necessary for autonomous practice in the adult outpatient orthopaedic setting; recognition of the clinical manifestations of medical problems that may mimic mechanical neuromusculoskeletal seen by physical therapists and screening for medical referral. Through topic discussions, case presentations and self-paced tutorials, develops skills to screen for conditions that merit physician referral when practicing in the direct access setting. Eight lecture hours will be provided on site; the remainder of the course will be distance-based.

PHTY 611. Research Process. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Readings, discussions and reports on the current status of professional literature and validation of clinical practice, clinical administration and professional education. A model for professional development, the role of research in the validation process and 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. Advanced Biomechanics. 3 Hours.
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. Crosslisted as: REMS 612.

PHTY 613. Evidence for Orthopaedic Practice. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: PHTY 603. Evidence-based medicine course for orthopedic physical therapy. Through presentations, topic discussions and case presentations students will acquired evidence on selected topics of the evaluation and treatment of musculoskeletal dysfunctions in physical therapy practice. Promotes development of skills needed for the acquisition, reading and interpretation of published studies in the area of orthopaedic physical therapy. The entire course is distance-based.

PHTY 614. Evidence for Neurologic Practice. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: PHTY 603. Evidence-based medicine course for neurologic physical therapy. Through Web-based presentations, topic discussions and case presentations, students will acquire evidence for selected topics related to the evaluation and treatment of neurologic dysfunctions in physical therapy practice. Promotes the development of skills in the acquisition, reading and interpretation of published studies in the area of neurologic physical therapy. The entire course is distance-based.

PHTY 615. Pharmacology (Physical Therapy). 1 Hour.
Semester course; 1 lecture hour. 1 credit. Restricted to students in the Professional Doctor of Physical Therapy program. Series of lectures on the integrated approach to the study of human disease and pharmacotherapeutics. Covers the pharmacological management of common disease states affecting physical function. Emphasizes the utilization of subjective and objective patient data for the assessment, monitoring and optimization of pharmacotherapy.

PHTY 616. Evidence of Tissue Healing and Therapeutic Modalities. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: PHTY 603. Distance-based course that focuses on current trends and topics of tissue healing including the effects of physical therapy interventions on healing tissues using an evidence-based approach. Reviews histology and cytology concepts relevant to clinical practice or necessary for interpreting scientific literature on the topic.

PHTY 617. t-DPT Gross Anatomy. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Focuses on musculoskeletal anatomy with high clinical relevance for physical therapists. Incorporates introductory material on diagnostic imaging of the spine and extremities. Self-directed distance learning modules will be augmented with a series of on-campus cadaver dissection laboratories over a four-day visit to campus.

PHTY 621. Therapeutic Agents. 4 Hours.
Semester course; 3 lecture and 2 laboratory hours. 4 credits. Examines the theoretical bases for and therapeutic application of thermal, mechanical and electrical agents. Emphasizes the physical and physiological effects, indications and contraindications for electrical current, diathermy, superficial heat and cold, massage, ultraviolet, traction, ultrasound, laser and compression therapy. Analyzes relative current scientific literature and uses laboratories for practice and clinical problem-solving.

PHTY 623. Cardiopulmonary Physical Therapy. 3 Hours.
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. Clinical Problem-solving I. 2 Hours.
Semester course; 2 lecture hours. 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. Lifespan I. 6 Hours.
Semester course; 9 lecture and laboratory hours. 6 credits. Restricted to students in the professional Doctor of Physical Therapy program. Covers models of typical motor, psychosocial, neurological and musculoskeletal development from birth through adolescence; models of neurologic dysfunction in developmental disabilities; principles of examination and evaluation in pediatrics; commonly seen diagnoses; and treatment planning for a pediatric population.

PHTY 627. Lifespan II. 2 Hours.
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. Emphasizes the geriatric population and the physical therapy management of problems with the integumentary system. Highlights the role of the physical therapist in making program modifications based on age related changes.

PHTY 629. Special Topics in Physical Therapy. 1 Hour.
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 treatment.

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

PHTY 644. Orthotics and Prosthetics. 2 Hours.
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. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Covers topics in clinical medicine and the sciences relevant to the practice of physical therapy. Medical practitioners from the VCU Medical Center and surrounding areas participate.

PHTY 648. Musculoskeletal Physical Therapy II. 5 Hours.
Semester course; 4 lecture and 2 laboratory hours and 24 clinical 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. Provides opportunities for students to gain hands-on experiences with patients in a clinical setting.

PHTY 650. Clinical Education II. 8 Hours.
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. 2 Hours.
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 advancing skills in educational techniques, assertiveness skills, conflict resolution, as well as preparation for employment via resume and portfolio writing and interview skills.

PHTY 654. Clinical Problem-solving II. 1 Hour.
Semester course; 1 lecture hour. 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 and research to present an oral case study of a patient or patients from the clinical experience in the previous summer.

PHTY 660. Musculoskeletal Physical Therapy III. 2 Hours.
Semester course; 1 lecture and 2 laboratory hours. 2 credits. Prerequisites: PHTY 508 and PHTY 648. Synthesizes information from the prerequisite classes through case study examples, hands-on practice and lecture on the incorporation of musculoskeletal evaluation and treatment. Emphasizes clinical reasoning in determining individualized physical therapy interventions based off of a comprehensive physical therapy evaluation. Focuses on case study examples of complicated patient presentations to help better prepare students to treat patients with multiple co-morbidities and impairments. Highlights commonly seen movement pattern dysfunctions throughout the course to help students to both identify and treat regional interdependent impairments related to the patient's primary complaint.

PHTY 661. Administration and Management in Physical Therapy. 2 Hours.
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. 2 Hours.
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. Utilizes current literature to support treatment interventions. Includes topic areas: pediatrics, orthopaedics, neurology, oncology, cardiac rehabilitation, integumentary systems and acute care/ICU.

PHTY 674. Clinical Problem-solving III. 1 Hour.
Semester course; 1 lecture 1 credit. Restricted to students in the Professional Doctor of Physical Therapy program. Integrates material from D.P.T. courses with clinical research. Provides experience in writing individual case reports dealing in depth with the history, current status and problems in a given area of clinical specialization.

PHTY 676. Comprehensive Study of Physical Therapy Practice. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Reviews topics in practice patterns of neuromuscular, musculoskeletal, cardiovascular, integumentary and professionalism relative to physical therapy practice. Prepares students for the national physical therapy examination.

PHTY 680. Clinical Education III. 12 Hours.
Semester course; 480 clinical hours. 12 credits. Twelve-week full-time clinical experience designed to allow the student to develop entry-level competence in physical therapy evaluation and treatment techniques. 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. Graded P/F.

PHTY 690. Physical Therapy Graduate Seminar. 16 Hours.
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 Hours.
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. 0.5-3 Hours.
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. 1-9 Hours.
60 clock hours per credit. 1-9 credits. Concentrated clinical experience under the guidance of an approved preceptor.

PHTY 695. Clinical Education IV. 12 Hours.
Semester course; 480 clinical hours. 12 credits. Twelve-week full-time clinical experience designed to allow the student to develop entry-level competence in physical therapy evaluation and treatment techniques. 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. Graded P/F.

PHTY 798. Research in Physical Therapy. 1-15 Hours.
1-15 credits. Research in preparation for the advanced master of science degree thesis or doctoral dissertation.

PHYSICS (PHYS)

PHYS 101. Foundations of Physics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. For non-science majors. Introduction to the fundamental ideas of physics. The course covers selected topics in mechanics, heat, optics, electricity and magnetism and modern physics. Not applicable toward the physics major. An optional laboratory may be taken with this course. See PHYZ 101L.

PHYS 103. Elementary Astronomy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A descriptive approach to astronomy dealing with basic features of our solar system, our galaxy and the universe. Not applicable toward physics major. An optional laboratory may be taken with this course. See PHYZ 103L.

PHYS 107. Wonders of Technology. 4 Hours.
Semester course; 5 lecture/laboratory/recitation hours. 4 credits. Introduction to physics concepts involved in everyday technological applications. The course covers selected topics in mechanics, heat, optics, electricity and magnetism, and modern physics by depicting their role in common devices. The laboratory focuses on applications of physics principles to everyday real-life situations. Not applicable toward the physics major.

PHYS 201. General Physics. 4 Hours.
Continuous courses; 3 lecture and 3 laboratory hours. 4-4 credits. Prerequisite: MATH 151. Completion of PHYS 201 to enroll in PHYS 202. Designed primarily for life-science majors. First semester: basic concepts of motion, waves and heat. Second semester: basic concepts of electricity, magnetism, light and modern physics. Not applicable toward physics major.

PHYS 202. General Physics. 4 Hours.
Continuous courses; 3 lecture and 3 laboratory hours. 4-4 credits. Prerequisite: MATH 151. Completion of PHYS 201 to enroll in PHYS 202. Designed primarily for life-science majors. First semester: basic concepts of motion, waves and heat. Second semester: basic concepts of electricity, magnetism, light and modern physics. Not applicable toward physics major.

PHYS 207. University Physics I. 5 Hours.
Semester course; 3 lecture, 1 recitation and 3 laboratory hours. 5 credits. Prerequisite: MATH 200 or permission of instructor. A vector- and calculus-based introduction to the fundamental concepts of mechanics, heat and wave motion.

PHYS 208. University Physics II. 5 Hours.
Semester course; 3 lecture, 1 recitation and 3 laboratory hours. 5 credits. Prerequisite: PHYS 207. Corequisite: MATH 201. A vector- and calculus-based introduction to the fundamentals of electricity, magnetism and optics.

PHYS 215. Science, Technology and Society. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examination of scientific breakthroughs that have led to transformational technologies that are continuing to impact society today. Topics include a historical perspective, an understanding of scientific principles and technologies and an examination of how such discoveries have changed society. Not applicable toward physics major.

PHYS 291. Topics in Physical Science. 1-3 Hours.
Semester course; 1-3 lecture or laboratory hours. 1-3 credits per semester. A study of a selected topic in physics, astronomy, geology, meteorology or oceanography. Not applicable toward physics major. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

PHYS 301. Classical Mechanics I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: PHYS 208 and MATH 307. Corequisite: MATH 301. Review of vector calculus. Newtonian mechanics: single particle, oscillations, motion under central forces and dynamics of a systems of particles.

PHYS 302. Classical Mechanics II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: PHYS 301 and MATH 301. Motion in noninertial frames, dynamics of rigid bodies, coupled oscillators, continuous systems and wave equations in one dimension.

PHYS 307. The Physics of Sound and Music. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: A 100- or 200-level physics course or equivalent and the ability to read music or sing or play a musical instrument, or permission of instructor. Basics of the physics of waves and sound. Fourier synthesis, tone quality, human ear and voice, musical temperament and pitch, physics of musical instruments, electronic synthesizers, sound recording and reproduction, room and auditorium acoustics. Not applicable toward the physics major. Crosslisted as: MHIS 307.

PHYS 315. Energy and the Environment. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to non-physics majors with junior or senior standing; not applicable to the physics major. A study of society's demands for energy, how it is currently being met, the environmental consequences thereof and some discussion of alternatives. Crosslisted as: ENVS 315.

PHYS 320. Modern Physics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: PHYS 208 and MATH 307. Corequisite: MATH 301. Foundations of modern physics including special relativity, thermal radiation and quantization, wave-particle duality of radiation and matter, Schroedinger equation, atomic, nuclear and particle physics, and molecular structure and spectra. A continuation of PHYS 208.

PHYS 325. Visualization of Physics Using Mathematica. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PHYS 301, PHYS 320 or permission of instructor. Visualization of various areas of physics using the Mathematica language for performing numerical calculations and producing graphics and animations. Examples will be taken from classical mechanics, classical electromagnetism, modern physics, statistical mechanics and condensed matter physics.

PHYS 340. Statistical Mechanics and Thermodynamics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: PHYS 301 and MATH 301. Microscopic theory of temperature, heat and entropy, kinetic theory, multicomponent systems, and quantum statistics. Mathematical relationships of thermodynamics.

PHYS 351. Guided Inquiry for University Physics I. 1.5 Hour.
Semester course; 1 lecture and 1 recitation hour. 1.5 credits. Prerequisites: PHYS 207 and permission of instructor. Student learning assistants aid in recitation sections of PHYS 207 University Physics I using guided inquiry and group-based activities. Further develops the core skills of PHYS 207. Introduces students to the principles of active and collaborative learning in physics through practical, hands-on problem-solving, class discussions and demonstrations.

PHYS 352. Guided Inquiry for University Physics II. 1.5 Hour.
Semester course; 1 lecture and 1 recitation hour. 1.5 credits. Prerequisites: PHYS 208 and permission of instructor. Student learning assistants aid in recitation sections of PHYS 208 University Physics II using guided inquiry and group-based activities. Further develops the core skills of PHYS 208. Introduces students to the principles of active and collaborative learning in physics through practical, hands-on problem-solving, class discussions and demonstrations.

PHYS 376. Electromagnetism. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: PHYS 301 and MATH 301. Electrostatics, magnetism and electromagnetic properties of matter, Maxwell's equations, electromagnetic waves, boundary conditions, and polarization.

PHYS 380. Quantum Physics I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: PHYS 301, PHYS 320 and MATH 301, or permission of instructor. Brief introduction to the correspondence between classical and quantum mechanics, Schroedinger wave equation, operator methods in quantum mechanics, angular momentum and conservation laws, solution to harmonic oscillator and the hydrogen atom, magnetic dipole momentum and spin.

PHYS 391. Topics in Physics. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits per semester. Maximum total of 6 credits. In-depth study of a selected topic in physics or physics-related technology, usually at a level requiring only elementary algebra. Not applicable toward physics major. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

PHYS 397. Directed Study. 1-3 Hours.
Semester course; variable hours. 1-3 credits per semester. Maximum of 3 credits applicable toward physics major requirement; maximum total of 4 credits. Open to nonmajors. Determination of amount of credit and permission of instructor must be obtained before registration of course. Intended to allow nonmajors and majors to examine in detail an area of physics or physics-related technology not otherwise available in upper-level courses. May involve either directed readings or directed laboratory work.

PHYS 420. Quantum Physics II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PHYS 380 or permission of instructor. Transition rates, addition of angular momentum, multi-electron atoms-ground state, X-ray and optical excitations, time independent perturbation theory, relativistic hydrogen atom and the structure of atoms, collision theory, nuclear structure, elementary particles and their symmetries.

PHYS 422. Optics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PHYS 376 or permission of instructor. Comprehensive study of propagation of light, including geometrical optics, polarization, interference, diffraction, Fourier optics and quantum optics.

PHYS 440. Introduction to Condensed Matter Physics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: PHYS 340 and 380. Corequisite: PHYS 376. Structure and bonding in solids, phonons, free electron Fermi gas, energy bands, semiconductors, Fermi surface, optical properties and magnetism.

PHYS 450. Senior Physics Laboratory. 3 Hours.
Semester course; 1 lecture and 4 laboratory hours. 3 credits. Prerequisites: PHYS 301 and 320, and PHYZ 320. Experiments in condensed matter physics with an introduction to the instrumentation and data analysis used in the research laboratory.

PHYS 480. Particle Physics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: PHYS 340, PHYS 376 and PHYS 420. Basic concepts of particle physics, including the Dirac equation, lowest-order quantum electrodynamics calculations, scattering amplitudes and cross sections, the weak interaction, processes involving quarks and their symmetries, and quantum chromodynamics.

PHYS 483. Introduction to Astrophysics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: PHYS 320 and PHYS 340. Pre- or corequisites: PHYS 376 and PHYS 380. Basic concepts of star formation and evolution, galactic structures, and cosmology. Includes stellar atmospheres and interiors, the sun, the Milky Way and other galaxies, and black holes.

PHYS 490. Seminar in Conceptual Physics. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisites: PHYS 340, PHYS 376, PHYS 380 and PHYZ 320. Restricted to seniors in physics with at least 85 credit hours taken toward the degree. A senior capstone course in physics designed to help students formulate physics-related questions in such a way that they can obtain quantitative answers. Students will describe their results in a senior paper and in an oral presentation.

PHYS 491. Topics in Physics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Maximum of 3 credits applicable toward physics major requirement; maximum total of 6 credits. An in-depth study of a selected topic in physics. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

PHYS 492. Independent Study. 1-3 Hours.
Semester course; variable hours. 1-3 credits per semester. Maximum of 3 credits applicable toward physics major requirement; maximum total of 8 credits. Open generally to students of only junior or senior standing who have acquired at least 12 credits in the departmental discipline. Determination of the amount of credit and permission of instructor and department chair must be procured prior to registration of the course. Independent projects in experimental or theoretical physics.

PHYS 508. The Physical Science of Space for Teachers. 3 Hours.
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 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. 3 Hours.
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. 3 Hours.
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 experience in designing 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 514. Modeling Biocomplexity. 3 Hours.
Semester course; 2.5 lecture and .5 laboratory hours. 3 credits. Prerequisite: one year of calculus. Introduction to the modeling and simulation of the behavior of complex biological systems, including models in both continuous and discrete time. Numerical methods using mathematica, analytical methods using calculus and laboratory experiments using computer interfaces will be used to study population dynamics and the behavior of physiological systems exhibiting such properties as oscillations and chaotic biological dynamics. Crosslisted as: BNFO 514.

PHYS 522. Optics and Laser Physics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PHYS 376 or permission of instructor. The purpose of this course is to introduce a range of topics from optics and the principles of laser operation. Topics include waves, physical optics, geometric optics, superposition, interference, polarization, diffraction, Fourier optics, coherence, lasers, second quantization.

PHYS 550. Techniques in Material Research. 3 Hours.
Semester course; 4 laboratory and 2 lecture hours. 3 credits. Prerequisite: PHYS 450 or graduate standing. 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 571. Theoretical Mechanics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: PHYS 376 and PHYS 380, or graduate standing. An introduction to advanced dynamics involving the Lagrangian and Hamiltonian formalisms.

PHYS 573. Analytical Methods in Physics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: PHYS 376 and PHYS 380, or graduate standing. 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PHYS 571. Maxwell's equations of electromagnetism, vector and scalar potentials, electromagnetic waves and radiation theory.

PHYS 580. Quantum Mechanics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PHYS 571. Theoretical quantum descriptions with emphasis upon mathematical techniques. Schrodinger equation, hydrogen atom, eigenfunctions and eigenvalues, angular momentum and spin and perturbation theory.

PHYS 583. Geometrical Methods of Physics and Gravitation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: PHYS 571 and PHYS 573 or permission of instructor. Introduction to the language of differential geometry that is needed for research in gravitation and cosmology. Topics include tensors, connections on manifolds, gauge-invariant field theories and Einstein's theory of general relativity. Examples include black holes and cosmological solutions of Einstein's field equations.

PHYS 591. Topics in Physics. 1-3 Hours.
Semester course; 1-3 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 640. Equilibrium Statistical Physics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: PHYS 571 and PHYS 580. Fundamentals of equilibrium statistical physics. Topics include review of thermodynamics, canonical and grand canonical partition functions, mean-field theories, Ising and Bragg-Williams models, Landau theory, fluctuations about the mean field, critical phenomena, exact solution to the one-dimensional Ising model, two-dimensional Ising model and the renormalization group.

PHYS 641. Solid State Physics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: PHYS 571 and PHYS 580. Study of structure and electronic properties of materials in the solid phase.

PHYS 650. Subatomic Physics I. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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 II. 3 Hours.
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 experimental design at middle and high school level, concentrating on sound and acoustics, electromagnetism and classical mechanics.

PHYS 672. Conceptual Physics for Teachers III. 3 Hours.
Semester course; 4 studio hours. 3 credits. Prerequisite: PHYS 671 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 690. Research Seminar. 1 Hour.
Semester course; 1 credit. May be repeated for a maximum of 4 credits. Examines current problems and developments in physics.

PHYS 691. Special Topics. 3 Hours.
Semester course; 3 credits. Prerequisites: at least one graduate-level physics course and permission of instructor. Selected topics in physics from such areas as statistical physics, quantum field theory, semi-conductor device physics, general relativity, electronic structure of solids, thin-film fabrication techniques, superconductivity, nuclear magnetic resonance techniques, crystallography and nuclear physics.

PHYS 697. Directed Research. 1-15 Hours.
Semester course; 1-15 credits. May be repeated for credit. Prerequisites: at least one graduate-level physics course and permission of instructor. Research leading to the M.S. or Ph.D. degree.

PHYSICS LAB (PHYZ)

PHYZ 101. Foundations of Physics Laboratory. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Corequisite: PHYS 101. An optional laboratory consisting of experiments and activities correlated with PHYS 101.

PHYZ 103. Elementary Astronomy Laboratory. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Pre- or corequisite: PHYS 103. An optional laboratory course consisting of experiments and activities related to PHYS 103.

PHYZ 320. Modern Physics Laboratory. 1 Hour.
Semester course; 3 laboratory hours. 1 credit. Pre- or corequisite: PHYS 320. Experimental work correlated with PHYS 320.

PHYSIOLOGY AND BIOPHYSICS (PHIS)

PHIS 206. Human Physiology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 101 and BIOZ 101, BIOL 151 and BIOZ 151, or BIOL 152 and BIOZ 152, each with a minimum grade of C. Functioning of the human body with emphasis on experimental procedures.

PHIS 301. Engaging in Undergraduate Research. 1 Hour.
Semester course; 1 seminar hour. 1 credit. Prerequisite: PHIS 206, with a grade of A, or PHIS 309, with a minimum grade of B. This course will address the nature of research in the fields of physiology and biophysics and at the same time explore areas and laboratories at VCU that would offer undergraduate research opportunities.

PHIS 302. Engaging in Undergraduate Research II. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Prerequisite: PHIS 301. This course permits students to actively engage in scientific research of interest in physiology and biophysics or in other selected areas of research. Graded as Satisfactory/Unsatisfactory.

PHIS 309. Introductory Quantitative Physiology I. 4 Hours.
Semester course; 3 lecture hours and 3 laboratory hours. 4 credits. Prerequisite: calculus at the level of MATH 200 and MATH 201. The course is intended for majors in Biomedical Engineering. Other students may enroll with permission of the instructor. This course is a survey course in physiology with emphasis on physical principles. It is a systems analysis of cellular anatomy, physiology and biochemistry which leads into analysis of the nervous system, musculoskeletal system and the digestive system. It is meant to be taken as part of a two-semester series with PHIS 310.

PHIS 310. Introductory Quantitative Physiology II. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisites: calculus at the level of MATH 200 and MATH 201 and PHIS 309. The course is intended for majors in biomedical engineering. Other students may enroll with permission of the instructor. This course is the second semester of a survey course in physiology with emphasis on physical principles. It includes a systems analysis of the cardiovascular, respiratory, renal and endocrine systems. It is meant to be taken as part of a two-semester series with PHIS 309.

PHIS 461. Introduction to Human Physiology. 3 Hours.
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. 5 Hours.
Semester course; 5 lecture hours. 5 credits. A comprehensive study of the function of mammalian organ systems at the organ, cell and molecular level, designed for graduate and professional students. Successful students typically have high achievement in intermediate-level undergraduate biology, chemistry and physics.

PHIS 502. Physiology and Pathophysiology (Dentistry). 5 Hours.
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 512. Cardiac Function in Health and Disease. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PHIS 501 or permission of instructor. A comprehensive study of cell and system cardiovascular physiology with pathophysiological implications, primarily designed for professional students.

PHIS 514. Cardiovascular Hemodynamics. 2 Hours.
Semester course; 30 lecture/lab hours. 2 credits. Prerequisite: PHIS 501. Emphasizes the pathophysiological implications of cardiovascular hemodynamics. The rationale and principles of a variety of clinical and paraclinical examination methods used in cardiology will be studied and demonstrated. The pathophysiology of some of the major cardiovascular diseases will be explained by specialists.

PHIS 604. Cell Physiology: Cardiovascular and Respiratory. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PHIS 501. Enrollment restricted to Ph.D. and M.S. students. This research-oriented course covers topics such as the cellular, molecular and structural bases for cardiovascular and pulmonary function, including detailed analyses of the behavior and regulation of diverse types of transmembrane ion channels at the molecular and cellular level; detailed studies of oxygen delivery by microcirculation; mechanisms of ischemia-reperfusion injury, novel cardio-protection strategies and heart failures; cholesterol homeostasis by macrophages in coronary artery disease; and airway inflammation and mucus secretion as a model for drug development.

PHIS 606. Molecular Basis for Disease. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Topics covered include an introduction to structure of macromolecules and biophysical methods of protein determination. The second part of the course includes research topics such as gene regulation, protein folding and ribosome biogenesis. The third section includes ion channel structure and function. Each section includes problem sets that students are required to complete, three exams and a written mini-grant chosen from the topics discussed in class.

PHIS 607. Cell Physiology: GI and Endocrine. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PHIS 501. This course focuses on physiology at the levels of individual molecules, cells, organs and entire organisms. Molecular mechanisms, regulatory processes and diseases processes are considered. The course is designed for research-oriented students and focuses on taste, gut, intestines, endocrine and reproductive systems and is structured around the ongoing research activity of the participating faculty.

PHIS 612. Cardiovascular Physiology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PHIS 501. An in-depth study of the original literature in selected areas of cardiovascular physiology.

PHIS 615. Signal Detection in Sensory Systems. 3 Hours.
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 as 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 619. Mitochondrial Pathophysiology and Human Diseases. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Mitochondria are essential for eukaryotic life energy production in an oxygen environment, extensively modulate intracellular calcium signaling, are the major source of damaging oxygen free radicals, control activation of cell death pathways and are now known to be impaired in many human diseases of aging. For all these reasons, understanding mitochondrial physiology is essential for graduates of biomedical research programs in medical schools.

PHIS 620. Ion Channels in Membranes. 3 Hours.
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. Crosslisted as: PHTX 620.

PHIS 630. Methods in Molecular Biophysics: A Practical Approach. 2 Hours.
Semester course; 2 lecture hours. 2 credits. The course will cover the theoretical and practical aspects of several techniques that are used to study the structure and function of biological macromolecules. In each section the theoretical background and practical application will be covered. The design of the course is to provide a basic familiarity of biophysical techniques used in structural biology and biochemistry laboratories to understand biological phenomena. Graded S/U/F.

PHIS 631. Electrophysiology and Photonic Methods. 2 Hours.
Semester course; 2 lecture hours. 2 credits. This course elaborates on the fundamentals of bioelectrical activity (resting and action potentials, electrical propagation and synaptic transmission) guiding the student to the use of equivalent circuits to model the electrical properties of cells design and the use of basic operational amplifiers for electrophysiological studies. The course develops a similar approach to understand the basis for fluorescence and phosphorescence techniques and how they can be applied to biophysical research.

PHIS 650. Critical Thinking in Physiology. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Journal club format. Pre- or corequisite: PHIS 501. Enrollment restricted to students with graduate standing or by permission of instructor. This course introduces classical research papers and incorporates problem sets in areas that lend themselves to an analytical approach. Students read and present papers, contributing answers to questions about them.

PHIS 651. MD/PhD Journal Club. 1 Hour.
Semester course; 1 lecture hour. 1 credit. May be repeated for credit. Enrollment restricted to students in the MD/PhD program. This course is intended for first-year MD/PhD students as a complement to the ongoing medical curriculum and is designed to expose MD/PhD students to research literature related to their ongoing course work. The objectives are to introduce students to original research papers from the current and classical literature and to provide practice and training in effectively identifying and discussing key hypotheses, methods, results and conclusions, as well as in evaluating the strengths and weaknesses of papers. Graded as Satisfactory/Unsatisfactory.

PHIS 652. MD/PhD Science and Disease. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Enrollment restricted to students in the MD/PhD program. This course is intended for second-year MD/PhD students as a complement to the ongoing medical curriculum. Clinical faculty or physician-scientists present a patient and then either the physician-scientist or a basic science faculty member discusses the basic science underpinnings of the disease in question. The sessions are coordinated with the MS2B curriculum. Active student participation in the discussion of the case and scientific basis is expected and required. Faculty members are encouraged to present informal sessions designed to encourage student participation and engaged learning. Graded as Satisfactory/Unsatisfactory.

PHIS 689. Physiology Preseminar Highlights. 1 Hour.
Semester course; 1 lecture hour. 1 credit. May be repeated for credit. Designed to review research to be presented in the department's upcoming weekly seminar. Students present and discuss papers by that week's seminar speaker. Graded as Satisfactory/Unsatisfactory/Fail.

PHIS 690. Physiology Research Seminar. 1 Hour.
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. Special Topics in Physiology. 1-4 Hours.
Semester course; 1-4 credits. Prerequisite: PHIS 501 (or taken concurrently).

Special Topics in Physiology (Section 1)
 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.

 Special Topics: Student Seminar (Section 3)
 Semester course; 1 credit. Pre- or corequisite: PHIS 501. 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.

 Special Topics: Nutrition Research (Section 5)
 Semester course; 3 credits. Weekly discussion of selected topics in nutrition. Topics change yearly. Topics range from 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 692. Special Topics. 1-4 Hours.
Semester course; 1-4 variable hours. 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 the research training. Graded S/U/F.

PHIS 693. Methods in Molecular Biophysics: A Practical Approach. 2 Hours.
Semester course; 1 lecture and 2 laboratory hours. 2 credits. Covers the theoretical and practical aspects of several techniques that are used to study the structure and function of biological macromolecules. In each section, theoretical background and practical applications will be covered. The course will provide a basic familiarity of biophysical techniques used in structural biology and biochemistry laboratories to understand biological phenomena. Graded S/U/F.

PHIS 695. Research in Progress. 0.5 Hours.
Semester course; .5 lecture hour. .5 credit. Restricted to Ph.D. students or, with permission of instructor, master's students. Student presentations and discussion of research results and contemplated research projects base on research rotations, thesis proposals and ongoing thesis research. Graded S/U/F.

PHIS 697. Directed Research in Physiology. 1-15 Hours.
Semester course; 1-15 credits. Research Leading to the M.S. or Ph.D. degree and elective research projects for other students.

PHYSIOLOGY LAB (PHIZ)

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

POLICY AND LEADERSHIP (DPAL)

DPAL 701. Cross Sector Leadership. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to doctoral students. Concepts of leadership have largely emerged from the study of people in positions of authority in business and politics whose characteristics, behaviors and values tend to dominate leadership theory. Less well-developed are concepts of public leadership, though its failures have dire consequences. More recently, scholars have turned to the study of civic leadership, which recognizes the benefits and challenges of civic action in shaping action based on shared goals. The course will explore the benefits and challenges of citizens and institutions (government, nonprofit and business) working together to advance sustainable communities.

DPAL 702. Web Technologies and Digital Governance. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to doctoral students. This course emphasizes the importance of Web 2.0 technologies and digital governance. Students will learn about the nature of Web 2.0 technologies and their impacts on public policy and administration as well as how Web 2.0 applications can support the goals of government organizations.

DPAL 711. Theory and the Public Process. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to doctoral students. Applying a broad theoretical lens, students will critically examine issues surrounding an actual policy or leadership problem within a chosen concentration. Emphasis is placed upon critical analysis, developing a substantive level of knowledge within an existing literature, and developing and supporting an argument grounded in theory.

DPAL 712. Institutions and Organizations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to doctoral students. Organizational and institutional theories look to the political, organizational and cultural contexts that shape social life. Some theories conceptualize environments in terms of networks and resources, within which social actors are “embedded.” Others stress historically built-up structures (e.g., laws and governmental agencies) that shape and channel subsequent dynamics. More radical theories argue that the core features of modern social actors, themselves, are largely products of social constructs, rather than existing a priori as often assumed. This course explores theories of institutions and organizations to inform our thinking about the roles and behavior of public and nonprofit organizations in shaping democratic organizational life in societies.

DPAL 721. Systematic Inquiry. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to doctoral students. This course is designed to teach students how to design and assess research in the policy setting. The course focuses on problem structuring through logical methods, exploring problems through multiple methods of data collection, analysis and summarization of findings using qualitative, quantitative and mixed-method designs. Through interpretation and critique of various research reports students gain an understanding of the different purposes that research can serve in applied policy settings.

DPAL 722. Methods of Decision-making. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to doctoral students. This course examines qualitative, quantitative and mixed-methods approaches to decision-making with an emphasis on situation factors impacting the decision-maker. Students will be able to describe, understand, evaluate, apply and create synergistic methods for making decisions.

DPAL 780. Synthesizing Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to doctoral students. Policy is frequently a bridge between political aspiration and practice. Focuses on studies, reports, research and public initiatives demonstrating the cycle of “idea” to “implementation.” The Massengill Report (Virginia Tech tragedy), Richmond mayor’s anti-poverty task force and meals tax referenda are examples of case studies that could be reviewed.

DPAL 890. Capstone. 6 Hours.
Semester course; 6 lecture hours. 6 credits. Restricted to doctoral students. Advanced doctoral students will design a capstone project with the advice and under the supervision of selected faculty. The doctoral student is expected to develop a formal proposal designed to respond to a current problem situation relevant to policy and leadership in governance. Once the proposal is approved, the student is to carry out a regimen of research and project development based in professional practice and seeking an innovative solution or model to advance the practice of their chosen concentration.

POLITICAL SCIENCE (POLI)

POLI 103. U.S. Government. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of American national government focusing on its underlying political ideas, constitutional basis, major institutions and their interaction in the determination of public policy.

POLI 105. International Relations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introductory analysis of interstate relations and world affairs. Attention focuses on theories of international politics, military capabilities and their application, international organizations, global economic trends, domestic sources of state behavior and other selected issues as appropriate. Crosslisted as: INTL 105.

POLI 107. Political Theory. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Introduces students to the great thinkers and ideas of political theory. Provides an analysis of the relationship between ethics and politics in contemporary democracy and current challenges to traditional democratic theory. Topics discussed may include the nature of human existence and civilization; political obligations between the state and the citizen and among citizens; attempts to justify authority; the content and uses of power; and the right to disobedience and resistance, freedom, social justice, and equality.

POLI 109. Comparative Politics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Introduces students to the ways in which societies around the world govern themselves. Covers such topics as the historical evolution of the political system, political processes and institutions, and key issues in contemporary public policy for a globally representative group of 10 to 15 countries.

POLI 301. U.S. Parties and Elections. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An overview of U.S. political parties and elections. Topics will include the history, organization and methods of U.S. political parties, presidential nominations and elections; Congressional elections.

POLI 302. Politics of the Civil Rights Movement. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The main objectives of the course are to introduce and examine the personalities and activities of the modern Civil Rights Movement. The course provides the historical background leading up to the peak years of the struggle for racial equality in America. It has special focus on the events of the 1960s and particularly their implication for the current state of U.S. Civil Rights. Crosslisted as: AFAM 302.

POLI 303. Public Opinion, Polling and the Media. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Study of the interplay among the mass media, political campaigns and public opinion. Topics include public opinion and its measurement, how campaigns use public opinion polling and the impact of the media on public opinion.

POLI 304. Political Campaigns and Communication: New Hampshire Primary. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment requires permission of instructor. Introduces students to the historical and political contexts of presidential primary campaigning. Investigates candidate strategy and ways candidates seek out money, media coverage and grassroots organization. Includes a week-long trip to New Hampshire during the first-in-the-nation primary to provide students with hands-on experience. Offered as an intersession class during presidential election years.

POLI 305. Political Campaigns and Communication: Theory and Process. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An examination of political campaigns focusing on presidential elections. Analysis includes the study of electoral contexts, political mobilization, campaign organizational structures and strategies, campaign rhetoric, and the evolution of campaign-related technology such as polling and social media.

POLI 306. The Congress. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the behavior of legislators and the structures and processes of legislative decision making in the U.S. Congress. Analysis will include both the internal and external environment of congressional policy making, and an assessment of the impact of congressional policy.

POLI 308. U.S. Presidency. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A political and institutional study of the chief executive, focusing especially on the presidential personality and relations with Congress, the bureaucracy, the courts and the shaping of domestic and foreign policy.

POLI 309. Bureaucratic Politics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An analysis of the nature of bureaucracy and bureaucratic phenomena in American governments; the role and involvement of the bureaucracy in politics and the policy-making process. Primary focus on theories and approaches to understanding the central role of bureaucracy in modern society and its use and abuse of power.

POLI 310. Public Policy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An analytical survey of policy formulation and implementation in the United States, together with an examination of the impact of policy upon individuals and groups in American society.

POLI 311. Politics of the Environment. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An exploration of the current controversy about environmental politics and the issues and crises it centers on. Special attention will be given to the constitutional, political and geographical factors in the development of environmental policy and the organized effort to deal with governmental actions and inaction and its impact on policy outcomes. Crosslisted as: ENVS 311.

POLI 313. U.S. Constitutional Law: Civil Rights and Civil Liberties. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of the major provisions of the U.S. Constitution concerning civil rights and civil liberties as interpreted by the U.S. Supreme Court. Topics to be covered include how the federal courts enforce individual rights found in the Constitution, limitations on governmental actions and the use of the Constitution as a starting point for discussions of the nation's need to balance competing interests of individuals, government and societal values.

POLI 315. Courts and Politics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of theories and models of judicial decision-making in the Supreme Court, focusing on judicial structure and procedures, policy-making analysis, political ideology, and judicial activism.

POLI 316. Women and the Law. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course will introduce students to the history, politics and status of women under the American legal system. Topics to be covered may include equal protection, sexual violence, the particular rights of women of color and lesbians, reproductive rights of women of color and lesbians, reproductive rights, women criminals and women in the legal profession. Crosslisted as: GSWS 316.

POLI 318. Politics of Race, Class and Gender. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the racial, class and gender influences on the history and development of political values, conflicts, processes, structures and public policy in the United States. Crosslisted as: AFAM 318/GSWS 318.

POLI 319. Women and American Politics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course analyzes the participation of women in American politics. Attention is given to both women's historical and contemporary roles in politics, their participation as voters and citizens, and their behavior as candidates and office holders. Additional topics may include workplace, family and education issues and reproductive rights. Crosslisted as: GSWS 319.

POLI 320. Research Methods in the Social Sciences. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Current methods of research in the social sciences. Includes a brief introduction to the use of SPSS for storage, retrieval and exploration of social science data. Crosslisted as: SOCY 320.

POLI 321. City Politics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An examination of urban political power and influence, governance, and public policy. Topics include: power and influence, governmental structures and the political process, public policy, and service delivery.

POLI 322. State and Local Government and Politics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An examination of the politics and governance of states and localities. Attention is devoted to political culture, interest groups, political parties, the legislative, executive and judicial components of state government, along with the structure and political processes of local governments.

POLI 323. Virginia Government and Politics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An examination of Virginia state government and politics, with appropriate attention given to political culture, interest groups, political parties, the media and the legislative, executive and judicial branches of government.

POLI 329. Intergovernmental Relations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An examination of vertical and horizontal intergovernmental relations. Attention will be given to the major variants of federalism. The role of categorical and block grants in programmatic federalism will be assessed. Trends in intergovernmental relations will be advanced.

POLI 331. Public Administration. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the concepts and practices of public administration in the United States. Particular attention will be given to the administrative procedures and practices of the national government and of the government in Virginia.

POLI 341. History of Political Theory: Classical to Modern. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of leading political ideas of the ancient and medieval periods.

POLI 342. History of Political Theory: Modern to Contemporary. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of leading political ideas of modern and contemporary thought.

POLI 343. Black Political Thought. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An historical and sociological perspective on the political and social ideas of black thinkers from David Walker to the present. Crosslisted as: AFAM 343.

POLI 344. Contemporary Political Theory. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course provides a survey of recent trends in political theory. It examines updates of the major ideological traditions, arguments about the nature of modernity and recent developments in environment, feminist and non-Western thought.

POLI 345. African-American Politics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. In this course, students will discuss and analyze the dynamics of the black experience in the American political system. The status of African-Americans in the United States and the struggle for racial equality will be examined, as will the manner in which American institutions have responded to these phenomena. Students will examine the race/class metric in African-American politics, particularly policies of Affirmative Action as a black progress strategy. Crosslisted as: AFAM 345.

POLI 351. Governments and Politics of the Middle East. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A comparative analysis of political systems in the Middle East including the study of contemporary aspects of traditionalism, the political nature of transition, the instruments of political modernization, and evolution and revolution in the political process of Middle Eastern states. The course will explore the primary bases of cleavage and conflict and the principal forces that shape the policies and political dynamics of the region. Crosslisted as: INTL 351.

POLI 352. European Governments and Politics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A comparative study of the political systems of selected western and eastern European countries. Crosslisted as: INTL 352.

POLI 353. Latin American Governments and Politics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of politics characteristic of Latin American systems, including democratic reformism, military authoritarianism and revolutionary socialism. The course also examines the contemporary problems of fledgling democracies as they cope with economic and debt crises and various opposition challenges. Crosslisted as: INTL 353.

POLI 354. Russian and Post-Soviet Politics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the origins, institutions, processes and disintegration of the Soviet political system and the ongoing reform efforts during the post-Soviet period. Special emphasis is placed on the politics of the transition to a democratic political system and a market economy. Other topics include nationality issues, social problems and foreign policy. Crosslisted as: INTL 354.

POLI 355. Asian Governments and Politics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A comparative analysis of the politics and governments of major Asian states, with a focus on Japan, China and India. Crosslisted as: INTL 355.

POLI 356. Government and Politics of Africa. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course will introduce students to the basic outlines of government and politics in Africa. The course will consider such topics as colonialism, elitism, and nationalism and modernization strategies. Using the comparative approach, the course will primarily focus on West, East and Central Africa. Crosslisted as: AFAM 356/INTL 356.

POLI 357. Politics of Southern Africa. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An examination of racial and political developments in the southern tip of Africa. While South Africa will be the primary focus of analysis, other countries in the region such as Zimbabwe, Angola and Mozambique will be studied. Crosslisted as: AFAM 357/INTL 357.

POLI 358. Concepts of Comparative Government. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Comparative study of politics and governments. Introduces concepts and theories used in the study of political systems. Topics include democratization and democratic governance, the role of the state, one-party and military regimes, revolution, and economic and political development. Crosslisted as: INTL 358.

POLI 359. The Politics of Developing Areas. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Analysis of the processes of political and economic development. Includes a study of various challenges facing developing countries, such as economic inequalities, environmental degradation, mass political participation, military coups, revolution and civil war. Crosslisted as: INTL 452.

POLI 360. China in Transition. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Traces how China is making the transition from a planned to market economy, and what implications this transition has on the political, social and urban landscape. Class discussions are grounded on a basic understanding of China's modern history and regional geography. Crosslisted as: INTL 480.

POLI 361. Issues in World Politics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An exploration of several significant issues in world politics. Topics may include peacekeeping and collective security, international economic competitiveness, global environmental politics as well as selected others. Topics will vary with current events and trends in the international arena. Crosslisted as: INTL 361.

POLI 362. International Organizations and Institutions. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the background development structure and operations of organizations and institutions such as the United Nations, the European Community and the Organization of American States. Crosslisted as: INTL 362.

POLI 363. U.S. Foreign Policy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An analytical survey of processes and practices in the formulation of U.S. foreign policy, including an introduction to the goals, problems of implementation and current challenges faced by policy makers. Crosslisted as: INTL 363.

POLI 364. Vietnam. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An analysis of the complete record of the conflict in Vietnam. The primary focus will be on the period of U.S. involvement. The course will examine closely how and why the U.S. became involved in Vietnam and what impact the Vietnam War has had on political institutions and behavior. In particular, the course will examine what impact the period of U.S. involvement has had upon U.S. foreign policy. The course also will consider additional topics including public opinion and the war, the relationship between the president and Congress in light of the war, and contemporary U.S. politics as a backlash against the political movements of the 1960s. Crosslisted as: INTL 364.

POLI 365. International Political Economy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of both theoretical and current policy issues in international political economy. Theories to be covered include liberalism, mercantilism, Marxism, regionalism, world systems theory and others. Policy issues include differing styles of capitalism in the industrialized world, the political economy of development, the politics of international corporate alliances and others. Crosslisted as: INTL 365.

POLI 366. Women and Global Politics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of women and global politics, providing both a feminist re-examination of traditional international-relations theories and a comparative analysis of the political, legal and economic status of the world's women. The impact of women on global political institutions such as the United Nations will be addressed as well as other feminist and grass roots means of taking political action. Crosslisted as: GSWS 366/INTL 368.

POLI 367. Terrorism. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: HSEP 101, POLI 103 and INTL 105/POLI 105, or permission of instructor. A survey of the modern problem of terrorism with an emphasis on the political nature of terrorist acts. Examines the history of terrorism, domestically within the U.S. and internationally, the role of religion, the structures and operations of terrorist organizations, as well as counterterrorism policies and policy-making. Crosslisted as: HSEP 301.

POLI 368. Comparative National Security Policy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of national security policies and policy-making in a diverse set of nation-states. Emphasis is placed on comparing how threat perception, historical context, ideology, political structure and leadership impact national security policies of both powerful and weak nation-states. Crosslisted as: INTL 468.

POLI 369. U.S. National Security. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of key issues in U.S. national security including national security decision-making, the use of force, military intervention, nuclear strategy and strategic arms control, ballistic missile defense, the transformation of war due to technology and globalization, defense policy, planning and budgeting, the impact of technology on strategy from airpower to cyberspace and robotics, and critical regional issues.

POLI 370. Nonprofit Organizations and Society. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines the history and foundations of the nonprofit agency in the U.S. and abroad. Compares and contrasts relationships between business, government and the nonprofit sector. Discusses requirements for formalizing and managing nonprofit organizations from the perspectives of the volunteer board and employees. Examines issues of accountability, policy, research and resource development.

POLI 372. Ethics, Law and Governance. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines how legal, legislative and public policy issues affect the development and growth of nonprofit organizations. Examines ethical principals and legal issues related to personnel and employment, as well as the goals of advocacy and its importance to nonprofit practitioners.

POLI 374. Financial Management for Nonprofits. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines how nonprofit organizations are influenced by prices, distribution of goods and services and the distribution of income and wealth. Topics include financial-statement analysis, time-value of money, budgeting concepts and techniques, securities valuation, long- and short-term financial planning issues and working capital management. Designed to develop skills in decision-making in financial management of the nonprofit organization.

POLI 380. Human Security. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of the key elements of human security: the positive and negative impacts of globalization, the rise and impact of civil violence within many nations, the dilemmas of the aid industry, the impact of non-state actors, and issues related to chronic poverty, food security and water security.

POLI 381. The Politics of Genocide and Human Rights. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An examination of the history and causes of genocide and large-scale human rights violations of the 20th century and more recent examples. Using case studies, and focusing on the Holocaust as the paradigmatic genocide, the course studies historical events and theoretical explanations to understand why people have been so willing, in every historical era, to kill each other in large numbers.

POLI 382. International Health. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of the basic principles of international and comparative health, as well as the national and international institutional structures in place to address health challenges. Focuses on the political, economic, social and individual burdens of inadequate health to societies and the international community. The implementation of global health programs and methods used to evaluate them are studied in detail.

POLI 383. The Middle East and North Africa in Transition. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An examination of the political, social and economic aspects of the “new” Middle East and North Africa after what has come to be known as “The Arab Spring.” Topics addressed include a historical and geographical overview of the Arab world prior to the mass uprisings, an examination of the political and economic motivations for popular unrest in several Arab countries, the role of women and youth movements as well as social media in mass demonstrations that happened in several Arab countries, the wider regional and global impact of the uprisings, and an assessment of the Arab world today.

POLI 391. Topics in Political Science. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Maximum total of 9 credits in all departmental topics courses may be applied to the major. An intensive survey of a specialized field of political interest. See the Schedule of Classes for specific topics to be offered each semester.

POLI 448. Scope and Method of Political Science. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: POLI 103 or permission of instructor. A comprehensive and systematic study of the philosophy of political science, various theories seeking to explain political phenomena and some of the techniques of political analysis.

POLI 490. Senior Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: 24 credits in political science courses or permission of instructor. A capstone course examining the major ideas and debates in each of the four sub-fields of the discipline of political science: American government, political theory, comparative politics and international relations. Students are required to produce a research project on a critical issue in one of the sub-fields.

POLI 491. Topics in Political Science. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Maximum total of 9 credits in all departmental topics courses may be applied to the major. An intensive survey of a specialized field of political interest. See the Schedule of Classes for specific topics to be offered each semester.

POLI 492. Independent Study. 1-4 Hours.
Semester course; variable hours. Variable credit. Maximum of 4 credits per semester; maximum total of 6 credits for all independent study courses. Open generally to students of only junior or senior standing who have acquired at least 12 credits in political science. Determination of the amount of credit and permission of the instructor and department chair must be obtained prior to registration of the course. An independent study course that allows a political science major or other student who meets the requirement to do research, under the direction of an instructor qualified in that area, in a subject or field of major interest.

POLI 493. Political Science Internship. 1-6 Hours.
Semester course; variable hours. 1-6 credits. (50 hours per credit.) May be repeated for a maximum of 6 credits. Permission of internship coordinator required. Restricted to political science majors, nonprofit management and administration minors and public management minors. Provides an opportunity to relate theory to practice through observation and actual experience within the field of political science. Graded as pass/fail.

POLI 494. Political Science Mentorship. 1-3 Hours.
Semester course; variable hours. 1-3 credits. Prerequisites: 24 credits in political science courses including POLI 103, 105, 107 and 109, permission of instructor, and 3.3 GPA in POLI courses. May be repeated for a maximum of 6 credits. A mentorship course that allows students to develop advanced research skills, to experience managing a classroom and to present the results of their research in a classroom setting. Different sections of the course specialize in different subfields of political science: U.S. government, comparative politics, international relations and political theory.

POLI 591. Topics in Political Science. 3 Hours.
Semester course; 3 credits. An in-depth study of a selected topic in political science in a seminar environment. Intended for small groups of students interested in examining issues and problems related to aspects of the political processes.

PORTUGUESE (PORT)

PORT 101. Elementary Portuguese. 4 Hours.
Continuous courses; 5 lecture/recitation hours. 4, 4 credits. Prerequisite: completion of PORT 101 to enroll in PORT 102. Elementary grammar, reading and oral skills.

PORT 102. Elementary Portuguese. 4 Hours.
Continuous courses; 5 lecture/recitation hours. 4, 4 credits. Prerequisite: completion of PORT 101 to enroll in PORT 102. Elementary grammar, reading and oral skills.

PORT 201. Intermediate Portuguese. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Continuation of the essentials of grammar, with emphasis on achieving proficiency in aural comprehension, speaking, reading and writing skills.

PORT 202. Intermediate Portuguese Readings. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PORT 201. Designed to increase the student's proficiency through the study of selected cultural and literary texts.

PORT 391. Topics in Portuguese. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May be repeated with different topics for a maximum of 12 credits. Prerequisite: PORT 202. An in-depth study of selected topics in Portuguese. See the Schedule of Classes for specific topic to be offered each semester.

PROSTHODONTICS (PROS)

PROS 622. Preclinical Fixed Prosthodontics. 2 Hours.
Yearlong course; 1 lecture contact hours. 2 credits. Designed for the second-year dental student to introduce basic principles of fixed prosthodontics and gain experience with the fundamental steps necessary in rendering this type of care. This includes preparing teeth to receive fixed prosthodontic restorations, making impressions, making interim restorations and selected steps in fabricating a cast restoration. This course contains both a lecture and laboratory component with the skill development depending exclusively on the laboratory experience.

PROS 623. Preclinical Fixed Prosthodontics Laboratory. 4 Hours.
Yearlong course; 6 laboratory contact hours. 4 credits. Designed for the second-year dental student to introduce basic principles of fixed prosthodontics and gain experience with the fundamental steps necessary in rendering this type of care. This includes preparing teeth to receive fixed prosthodontic restorations, making impressions, making interim restorations and selected steps in fabricating a cast restoration. This course contains both a lecture and laboratory component with the skill development depending exclusively on the laboratory experience.

PROS 624. Preclinical Removable Prosthodontics. 2,4 Hours.
Yearlong course; 2 lecture and 4 laboratory contact hours. 2 lecture and 4 laboratory credits. An introductory course in removable prosthodontics, including complete dentures and removable partial dentures. Presents the basic information, which is prerequisite for understanding the laboratory procedures and the diagnosis and treatment planning of patients requiring CDs and RPDs. The laboratory component provides hands-on skill development of these same procedures.

PROS 626. Clinical Principles of Dental Implantology Lecture. 1 Hour.
Semester course. 1 credit. Enrollment restricted to admitted dental students. Offered in tandem with a laboratory course and providing didactic information on the same topic, this course is a preclinical experience for predoctoral students, designed to introduce necessary clinical skills for dental implantology.

PROS 628. Clinical Principles of Implantology Lab. 1 Hour.
Semester course; 48 lab contact hours. 1credit. Enrollment restricted to admitted dental students. Offered in tandem with a lecture course and providing didactic information on the same topic, this course is a preclinical laboratory experience for predoctoral students, designed to introduce necessary clinical skills for dental implantology. Simulated activities include diagnosis and treatment planning, fabrication of a surgical guide, implant surgery, implant prosthodontic impression making, master cast fabrication, implant crown provisionalization, and implant overdenture treatment skills. Students will see demonstrations of cone-beam CT scan technology, computer-based software for implant surgical treatment planning and computer-based CAD-CAM design for custom implant abutments.

PROS 700. Senior Selective in Advanced Clinical Prosthodontics. 4 Hours.
Semester course; 3 clinical and 1 didactic hours per week. 4 credits. Prerequisites: Successful completion of PROS 623, PROS 624, PROS 731, PROS 735, PROS 739 and permission of the course director. This class is a two-semester clinical course designed to develop advanced skills in treating prosthodontic cases beyond the level of basic clinical competency required for graduation. Graded CO in the first semester and P/F in the second.

PROS 731. Complete Denture Prosthodontics. 1,1.5 Hour.
Semester course; 1.5 lecture hours. 1.5 credits. Designed to present the current concepts, principles and diagnostic techniques required to diagnose, treatment plan and predict the outcome of the treatment of edentulous patients and patients requiring a single denture against natural teeth. Acceptable clinical procedures are presented for the management of patients that fall into the above categories. Correlation of basic and clinical science is emphasized, as well as the prosthodontic ramifications of the mechanical and behavioral sciences.

PROS 735. Removable Prosthodontics Diagnosis and Treatment. 1.5 Hour.
Semester course; 1.5 lecture contact hours. 1.5 credits. Designed to prepare students to apply their preclinical removable prosthodontic knowledge and skill in the clinical setting. Focuses on the diagnosis and treatment planning aspects of clinical care.

PROS 739. Clinical Fixed Prosthodontics III. 2 Hours.
Yearlong course; 2 clinical contact hours. 2 credits. This course builds on technical skills developed in PROS 622 (D2 year) and applies them to patient care in the clinical setting. Graded CO in the fall semester with a letter grade and credit awarded in spring.

PROS 740. Clinical Removable Prosthodontics. 3.5 Hours.
Yearlong course; 3.5 clinical contact hours. 3.5 credits. This course builds on technical skills developed in PROS 624 (D2 year) and applies them to patient care in the clinical setting. Graded CO in the fall semester with a letter grade and credit awarded in spring.

PROS 749. Clinical Prosthodontics IV. 7 Hours.
Yearlong course; 3-4 clinic sessions per week. 7 credits. This capstone course provides clinical experience in basic fundamental prosthodontic procedures, including diagnosis, management and treatment of patients in need of reconstructive fixed, removable or implant prosthodontic care. The course also includes both technical and competency assessment of the dental student's skills as an entry-level general dentist. Students receive CO grading in the fall and a letter grade and earned credit in the spring.

PSYCHOLOGY (PSYC)

PSYC 101. Introduction to Psychology. 4 Hours.
Semester course; 3 lecture and 1 computer-assisted instructional hours. 4 credits. A survey of the basic principles, methods of investigation and fields of study and application. Includes individualized application of principles and methods in computerized learning activities. This course is a prerequisite for upper-level work in the field of psychology.

PSYC 201. Career Development in Psychology. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: PSYC 101. Introduction to the discipline of psychology and the career alternatives available in various specialties. Self-assessment, career decision-making skills, educational program planning methods will be covered. Special topics will include graduate/professional school options, opportunities for minority students and job search strategies for the B.A. or B.S. psychology major.

PSYC 214. Applications of Statistics. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisites: PSYC 101 and STAT 210 both with a minimum grade of C. Frequency distributions, measures of central tendency and variability; sampling, probability, correlation and significance tests as applied in psychological data.

PSYC 301. Child Psychology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PSYC 101. A study is made of the growth and development of the child until puberty. Childlike is viewed in terms of physical, mental, social, emotional and educational factors. PSYC 304 Life Span Developmental Psychology also may not be taken for credit.

PSYC 302. Psychology of Adolescence. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: PSYC 101. A study of mental, moral, social and physical development from puberty to maturity viewed as in child psychology. Designed for secondary school teachers, youth leaders and professional psychologists.

PSYC 303. Personal Adjustment. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PSYC 101. Surveys major theories of personality as a basis for studying theory, research and intervention into areas that require personal adjustment. Such areas include sense of self, stress and coping, work and career and several varieties of interpersonal relationships. Positive adjustment and growth as well as problems are discussed.

PSYC 304. Life Span Developmental Psychology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PSYC 101. Reviews the basic concepts and principles of physical, cognitive and social development at each major stage of life-prenatal, infancy, toddlerhood, preschool, middle childhood, adolescence, adulthood and old age. Consideration is given to the study of development at each stage of life and to different theoretical explanations for development. PSYC 301 Child Psychology may not also be taken for credit.

PSYC 305. Educational Psychology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PSYC 101. The application of psychological principles to the teaching-learning process, with special emphasis on theories of learning and development. Crosslisted as: EDUS 305.

PSYC 306. Psychology of Adult Development. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PSYC 101. The life stages and transitions of the young adult, middle age and young-old phases of the life cycle are considered, following a review of methods of research within life-span development psychology. Topics include the impact of events such as birth of the first child, job relocation, mid-life re-evaluation and anticipated retirement.

PSYC 307. Community Solutions: Multiple Perspectives. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PSYC 101. Explores possibilities for addressing social concerns of the Richmond community by understanding the complex nature of social issues as essential to their successful amelioration via perspectives of life and social sciences. Toward this end, expertise from the social sciences, the life sciences and the community are integrated. Includes a service-learning experience (a 20-hour volunteer requirement). Crosslisted as: LFSC 307.

PSYC 308. Stress and its Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PSYC 101. Physiological and psychological aspects of stressors and the stress response. Review of principles, research and methods of stress management, such as relaxation, self-suggestions, meditation and biofeedback.

PSYC 309. Personality. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PSYC 101. The study of the various approaches to understanding human behavior in terms of personality theory. Various theories will be examined for commonality and uniqueness in assumptions, dynamics and development of personality.

PSYC 310. Industrial Psychology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PSYC 101. Application of psychological principles and techniques to problems in personnel management and human engineering; recruitment, selection, training and placement in industry; criteria in testing and test development; morale evaluation and improvement, employee counseling; work-management communications; human engineering in equipment design, quality control, working conditions and safety.

PSYC 317. Experimental Methods. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: PSYC 214 with a minimum grade of C. Introduction to experimental procedures and laboratory techniques in psychology. Demonstrations and experiments in sensation, perception, learning, emotion and motivation.

PSYC 318. Principles of Psychological Tests and Measurements. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: minimum grade of C in PSYC 101 and minimum grade of C in STAT 210. Concepts in psychological measurement and a survey of commonly used tests; testing procedures and rationale underlying these tests; tests of intelligence, aptitude, achievement, interest and personality critically examined, procedures described for selecting and evaluating specific group tests in these areas.

PSYC 321. Social Psychology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PSYC 101. Survey theory and research in social psychology. Topics include interpersonal and social influence processes, attitudes and social cognition, the impact of personality on social behavior, conformity, leadership and small group behavior.

PSYC 322. Personality and Behavior of the African American. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PSYC 101. A study of personality factors such as motivation, ego-functioning and the socialization processes, with special emphasis on living conditions of African-Americans. Crosslisted as: AFAM 322.

PSYC 323. Interpersonal Relations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PSYC 101. Analyzes human relations from various theoretical perspectives. Typical topics include the effects of attraction, friendship, love and dependency on relationships; the evolution of relationships from initiation through termination. Strategies for increasing effectiveness of communication between individuals also are addressed.

PSYC 333. Psychology and Religious Experience. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PSYC 101. Religious belief and experience as viewed by major psychological theorists. How psychological methodology has been used to study religious experience. Topics include personality factors and development, conversion experiences, religious experiences and mental health and human values. Crosslisted as: RELS 333.

PSYC 335. Psychology of Women. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PSYC 101. Overview of issues in psychology relevant to women. Topics include: research methods of women's issues; sex-role socialization; women and hormones; psychological androgyny; personality theory and counseling strategies for women; women and language; women and violence; and rape and abuse. Crosslisted as: GSWS 335.

PSYC 340. Introduction to the Helping Relationship. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PSYC 101. Overview to the dynamics of communication in a helping relationship. Didactic material includes the principles of empathy, nonverbal behavior, problem-solving, crisis intervention and interview techniques. Basic paraprofessional counselor skills will be demonstrated and practiced through structured exercises.

PSYC 341. Group Dynamics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PSYC 101. Social and psychological principles and research related to the individual in groups. Specific topics include motivation for individuals forming and joining groups, performance and productivity of group members, group leadership and majority and minority influence. The group will be examined in relation to the larger society and as a subculture in itself. Crosslisted as: SOCY 341.

PSYC 401. Physiological Psychology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PSYC 101. Data from the fields of anatomy and physiology are presented, and their implications for psychology are discussed. The central nervous system, internal environment, vision, audition, reflexes, emotion, learning behavior disorders and their physiological components. Behavior of the human organisms is studied from the biopsychological point of view.

PSYC 404. Social Psychology of Emotions. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: PSYC 101, SOCY 101. An examination of the social shaping of emotion as well as its function in maintaining the social process. Cross-cultural uniformities and diversity in basic emotions and their expression are addressed as well as selected social psychological theories of emotions.

PSYC 406. Perception. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PSYC 101. Perception of information from sensory systems with concentration on vision and hearing. Research and theories on how we learn and judge color, form, movement, depth and how individuals integrate these in object identification.

PSYC 407. Psychology of the Abnormal. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PSYC 101. Development of personality is discussed, with emphasis on factors leading to maladjustment. Lectures and reading cover the symptom groups of emotional disorders of both psychological and organic origin. Methods of assessing and treating these disorders are surveyed.

PSYC 410. Principles of Learning and Cognition. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PSYC 101. Comprehensive treatment of learning and cognition with emphasis on humans, from behavioral, cognitive, biological and developmental viewpoints. Topics include conditioning, information processing, memory, sociobiology and cognitive and moral development.

PSYC 412. Health Psychology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PSYC 101. Application of the principles and techniques of psychology to the field of medicine, to health maintenance and to illness. The integration of theoretical, research and applied issues is emphasized in the analysis of such topics as psychological/behavioral factors contributing to and protecting against physical illness (stress, smoking, exercise), factors relating to treatment and recovery (coping, treatment compliance), psychological problems resulting from illness and injury, and specific techniques and problem areas in health psychology (such as biofeedback, pain management, pediatric psychology, geropsychology, rehabilitation psychology and lifestyle change.).

PSYC 414. Psychology of Women's Health. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Overviews the psychological research on women's health. Topics include health behavior change, personality and individual differences, cognitive factors, disease-specific behaviors and interventions. Crosslisted as: GSWS 414.

PSYC 426. Child Psychopathology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: PSYC 101. Principal childhood behavioral abnormalities. A review of causes, assessment and diagnostic methods, and treatment, intervention and prevention approaches.

PSYC 451. History of Psychology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: PSYC 101 and senior standing. Traces the history of ideas about mind and behavior as they relate to the theory and practice of psychology.

PSYC 491. Topics in Psychology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Maximum total of 6 credits in topics courses. Prerequisite: PSYC 101. An in-depth study of selected topics and issues in psychology. See the Schedule of Classes for specific topics to be offered.

PSYC 492. Independent Study. 1-3 Hours.
Semester course; variable hours. 1, 2 or 3 credits per semester. Maximum of 6 credits for all independent study courses. PSYC 492, PSYC 493 or PSYC 494 may be repeated for a total of 6 credits but a maximum of 12 credits total for all three courses. Prerequisite: PSYC 101. Open only to students of junior or senior standing who have acquired at least 12 credits in the departmental discipline. Determination of the amount of credit and permission of instructor and department chair must be procured prior to registration of the course. Independent study is defined as student-conceived and initiated readings or research project which is supervised by a psychology faculty member. An oral examination or written, comprehensive paper is required at the end of the semester.

PSYC 493. Fieldwork: Human Services. 3 Hours.
Semester course; 3 credits. PSYC 492, PSYC 493 and PSYC 494 may be repeated for a total of 6 credits but a maximum of 12 credits total for all three courses is allowed. Prerequisite: permission of instructor. Students are placed in an agency, which will provide supervised work experience in various aspects of helping other people. The setting might be a government or private community agency, or a corporation, depending on the student's goals. The student works eight hours per week at the placement site, attends several group discussion sessions during the semester and completes written assignments. This course is designed to enhance the psychology major's career pursuits for either graduate-level training or post-baccalaureate employment.

PSYC 494. Research Internship in Psychology. 1-3 Hours.
Semester course; variable hours. 1, 2 or 3 credits per semester. May be repeated for a maximum of 6 credits with adviser's approval. PSYC 492, PSYC 493 or PSYC 494 may be repeated for a total of 6 credits but a maximum of 12 credits total for all three courses. Prerequisites: PSYC 101 and permission of faculty research supervisor must be obtained prior to registration. PSYC 214 and PSYC 317, or permission of supervisor. Students will work on various phases of a research project (design, data collection, data analysis, manuscript writing) under a psychology faculty member's close supervision. This course is designed to enhance the psychology major's career pursuits for either graduate-level training or post-baccalaureate employment.

PSYC 497. Honors in Psychology I. 3 Hours.
Semester course; variable hours. 3 credits. Prerequisites: PSYC 317 (co-requisite with permission) and admission to the honors in psychology program. First in a three course sequence to develop, execute and defend an empirically based thesis in psychology. Students will work with a mentor to develop ideas into a tangible research project, working toward a proposal.

PSYC 498. Honors in Psychology II. 3 Hours.
Semester course; variable hours. 3 credits. Prerequisite: PSYC 497 with a grade of A. Students will refine research ideas developed in PSYC 497 into a formal proposal document with introduction, method and proposed results. Students are expected to propose the thesis to their committee members no later than the second week of this course and begin data collection thereafter.

PSYC 499. Honors in Psychology III. 3 Hours.
Semester course; variable hours. 3 credits. Prerequisite: PSYC 498 with a grade of A. Students will complete the research project developed in PSYC 497 and 498 and generate the final thesis, including introduction, method, results and discussion. Students must orally defend the thesis to their committee members by the end of this course with time for revisions to be submitted within the semester's defined grading period.

PSYC 601. Foundations of Applied Developmental Psychology. 3 Hours.
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. Psychology of Aging. 3 Hours.
Semester course; 3 seminar hours. 3 credits. Enrollment requires 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. Crosslisted as: GRTY 602.

PSYC 603. Developmental Processes. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PSYC 630 or permission of instructor. The theme is the influence of organizational structure on behavior. Topics will include motivation, attitudes, job satisfaction, morale, leadership and supervision.

PSYC 605. Social Development. 3 Hours.
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, parenthood. Critical evaluation of theory and current research.

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

PSYC 607. Advanced Educational Psychology for Elementary Teachers. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Application of the principles of psychology to the teaching-learning process in the elementary classroom. Discussion will focus on the comprehensive development of individual learning experiences and educational programs from the point of view of the educator and administrator. Crosslisted as: EDUS 607.

PSYC 608. Research in Counseling Psychology. 3 Hours.
Semester course; 3 lecture/seminar 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. 3 Hours.
Semester course; 3 lecture/seminar 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 model and the requirements 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. 3 Hours.
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 Issues, Supervision and Leadership in Counseling Psychology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: permission of instructor. Contemporary issues, problems and research related to the practice of counseling psychology; their importance in developing a professional identity and sensitivity to major developments in the field; history, present status and future directions in the field of counseling psychology.

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

PSYC 613. Cognitive Development. 3 Hours.
Semester course; 3 lecture/discussion hours. 3 credits. Prerequisite: graduate 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. Development in Infancy and Early Childhood. 3 Hours.
Semester course; 3 seminar hours. 3 credits. Prerequisite: PSYC 603 or permission of instructor. An introduction to theory and research on children from birth to early childhood, including sensory and behavioral capacities; cognitive, social and emotional development; and contexts of development (especially the family). Emphasis on stage1salient tasks of development and the effects of early experience on function later in life. Consideration of the challenges associated with research and intervention with these age groups.

PSYC 615. Aging and Mental Disorders. 3 Hours.
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. Crosslisted as: GRTY 615.

PSYC 616. Psychopathology. 1,3 Hour.
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. 3 Hours.
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 variations in environmental energy to the psychological reactions of sensing and perceiving.

PSYC 618. Seminar in Personality. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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 622. Physiological Correlates of Emotion. 3 Hours.
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. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Enrollment requires permission of instructor. Overview of major trends in personality theory, techniques and current research in psychotherapies as they apply to counseling psychology. Includes descriptions of some brief psychoeducation and preventive interventions and stresses accountability in outcome of all interventions.

PSYC 624. Group Counseling and Psychotherapy. 3 Hours.
Semester course; 3 lecture/seminar hours. 3 credits. Prerequisite: permission of instructor. Historical perspective. Basic dynamics and processes of therapeutic groups. Role and technique of the group facilitator. Examination of different theoretical approaches.

PSYC 625. Career Development and Occupational Health. 3 Hours.
Semester course; 3 lecture/seminar hours. 3 credits. Prerequisite: permission of instructor. A review of major theories and current research in career development and topics in occupational health are presented. Theory, research and techniques associated with vocational assessment and intervention are reviewed. Emphasis on late adolescent and adult populations.

PSYC 626. Single-case Experimental Design for the Clinical Research Practitioner. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture/seminar hours. 3 credits. Prerequisite: PSYC 680 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. 3 Hours.
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. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture/seminar hours. 3 credits. Topics include attitudes, social influence processes, person perception, affiliation and attraction, group processes, cultural influences on behavior and conformity.

PSYC 631. Evaluation Research: Psychological Perspectives. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides the student with knowledge of and skills in evaluation research. Additionally, students will learn how to apply psychological theories and applied research methods in evaluating psychological interventions and treatment programs. The class covers several key aspects of evaluation: 1) use of psychological theory in evaluations, 2) defining the problem, 3) contextual issues surrounding the evaluation, 4) selecting the appropriate type and design of evaluation, 5) methodological issues and 6) steps involved in conducting an evaluation of process and outcome. Course will attend to: a) theoretical, b) political, social and contextual factors that impact an evaluation, c) cultural considerations when conducting an evaluation, d) practical and logistical considerations and e) effective collaboration with community partners. Course examples and materials will be drawn from the professor's experiences with evaluating community-based psychological interventions and prevention programs and the experiences of guest presenters.

PSYC 632. Research Methods in Social Psychology. 3 Hours.
Semester course; 3 lecture/seminar hours. 3 credits. Prerequisites: PSYC 680 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. 3 Hours.
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. 3 Hours.
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 events and the cognitive mechanisms that structure inferences about others' qualities.

PSYC 635. Psychology of Health and Health Care in the Elderly. 3 Hours.
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, and psychosocial issues in terminal care.

PSYC 636. Research Methods in Developmental Psychology. 3 Hours.
Semester course; 3 lecture/seminar hours. 3 credits. Prerequisite: PSYC 680. Research designs, methods, ethical issues and problems specific to developmental psychology. Cross-sectional, longitudinal and sequential strategies. Statistical issues, multivariate statistics 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. 3 Hours.
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. 3 Hours.
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. 3 Hours.
Semester course; 1 lecture and 4 laboratory hours. 3 credits. Prerequisite: 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 640. Parenting. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course is about parenting. Students review and discuss theories and literature on human parenting, including the history of parenting, contextual issues in parenting, parenting at different stages of children's lives (from pregnancy and infancy through having adult children) and parenting children with special needs (including disabilities and behavior problems). Also covers parent training and education, the journey to becoming a parent through adoption, parenting contributions to social, emotional and cognitive competence, child maltreatment and public policy around parenting. Students review parenting in different family structures including married, never married, divorced and separated families. This is not a course on how to parent, but practical issues in the lives of parents are discussed.

PSYC 641. Survey of Psychological Assessment and Treatment of the Older Adult. 3 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 paraprofessional delivery systems; evaluation of crisis intervention and consultation team approaches; lectures, demonstration and classroom practice of actual treatment techniques. Crosslisted as: GRTY 641.

PSYC 642. Practicum in Clinical Geropsychology. 3 Hours.
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 in the Richmond community; 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. Crosslisted as: GRTY 642.

PSYC 643. Principles of Psychological Measurement. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: graduate standing in psychology or permission of instructor. Basic psychometric concepts to prepare the student for subsequent evaluation instruments. Origins and logic of testing, criteria for judging tests, standardization and reliability, and validity and principles of test development and construction.

PSYC 644. Individual Tests of Intelligence. 3 Hours.
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. 2,3 Hours.
Semester course; variable hours. 2 or 3 credits. Prerequisite: graduate standing in clinical or counseling psychology, or permission of clinical or counseling psychology program and instructor. Examines use of objective and projective tests in assessment of personality. Emphasizes clinical interpretation of the Minnesota Multiphasic Personality Inventory (MMPI), and the administration and clinical interpretation of the Rorschach and Thematic Apperception Test (TAT). Stresses integrative report writing.

PSYC 646. Projective Techniques. 3 Hours.
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. 3 Hours.
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 neurosurgical 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 Clinical Problems. 3 Hours.
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. 3 Hours.
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. 1,3 Hour.
Semester course; variable hours. 1 or 3 credits. May be taken only one time for credit toward degree. Principal childhood behavioral abnormalities: mental retardation, psychosis, learning disabilities, speech and language problems, school-related behavioral problems, neurosis, psychosomatic disorders and juvenile delinquency. Genetic, prenatal, perinatal, postnatal and social-psychological factors related to etiology. Integration of assessment and treatment methods.

PSYC 651. Theories of Counseling and Interviewing. 1-3 Hours.
Semester course; variable hours. 1, 2 or 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 videotaping of simulated counseling/psychotherapy session, modeled and role-played interviewing situation, skill development and demonstration, and evaluative interpersonal feedback.

PSYC 652. Child and Adolescent Psychotherapy. 3 Hours.
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. 3 Hours.
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 theories and 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. 3 Hours.
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. 3 Hours.
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. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: permission of instructor. This course presents an introduction to the historical roots and basic assumptions of group training methods. The specific focus is on those structured, behavioral interventions that are designed to be time limited and emphasize staff development or training needs of clients. Needs assessment, screening, 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/experiential component of this course.

PSYC 657. Advanced Educational Psychology for Secondary Teachers. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Application of the principles of psychology to the teaching-learning process in the secondary classroom. Discussion will focus on the comprehensive development of individual learning experiences and educational programs from the point of view of the educator and administrator. Crosslisted as: EDUS 617.

PSYC 659. Seminar in Consultation Psychology. 3 Hours.
Semester course; 3 credits. Prerequisite: graduate standing in psychology or permission of instructor. Explores theory and practice of psychological consultation using case materials, readings and individualized projects. Covers conceptual models and role choices available to 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: PSYC 629 and graduate standing in psychology, or permission of instructor. Provides an overview of research in and applications of the principles of 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 adjustment to illness and pain, behavioral dentistry, pediatric psychology, cardiovascular risk reduction, eating and sleeping disorders, behavioral pharmacology and biofeedback. Explores roles of psychologists.

PSYC 661. Clinical Applications of Health Psychology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Clinical health psychology has emerged as a distinct practice area within professional psychology. It is best defined as the application of psychological assessment and intervention methods to various specialty areas within medicine. These areas include rehabilitation medicine, neurology, geriatrics, transplant medicine, bariatrics, oncology, cardiology, pain management, sleep medicine, reproductive health, pediatrics, gastroenterology and primary care. The course will survey the clinical roles of and intervention and assessment tools used within each of these specialty areas, and will include guest lectures provided by clinicians who work in these specialty areas from the VCU Health System or the larger community. In addition, students will conduct information-gathering telephone interviews with clinicians from around the nation and present their findings in a discussion format. Course evaluation will be based primarily on class discussion, student presentations of interviews and two take-home exams.

PSYC 662. Diagnostic and Behavioral Assessment. 2,3 Hours.
Semester course; variable hours. 2 or 3 credits. Designed to introduce students to the theory and practice of diagnostic and behavioral assessment. The course primarily focuses on the conceptual underpinnings and major methods associated with the diagnostic and behavioral assessment traditions. Emphasis is placed on how these assessment traditions can be used together to guide case conceptualization, monitor treatment progress and outcome, treatment planning, and treatment selection. The course covers psychometric theory, classics assessment controversies and the psychometric strengths and weaknesses of the diagnostic and behavioral assessment approaches. The course ends with a review of risk assessment. The goal of the course is to provide students with the knowledge and skills to critically apply the appropriate assessment strategies to guide clinical work from intake to termination.

PSYC 664. Psychological Needs of Military Service Members and Their Families. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: permission of instructor. Provides opportunities to understand the psychological needs of both service members and their families -- from pre-deployment through post-deployment -- through presentations by professionals from the Department of Defense, National Guard, VA Medical Center and other military organizations. Explores the impact of psychological trauma and physical injuries on service members' well-being. Emphasizes a review of different interventions and other sources of help available for returning service members and their families. Provides an opportunity to prepare an integrative review of a topic related to a military issue.

PSYC 665. Psychodynamic Approaches to Psychological Treatment. 3 Hours.
Semester course; 3 credits. Prerequisite: permission of instructor. Examines basic principles in conceptualizing 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. 3 Hours.
Semester course; 3 lecture/seminar hours. 3 credits. Prerequisite: graduate standing in psychology or 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. 3 Hours.
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 change techniques; behavioral feedback and cueing procedures.

PSYC 668. Interpersonal Psychotherapy: Social Psychological Analysis. 3 Hours.
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 experimental methods of studying change processes.

PSYC 669. Interpersonal Psychotherapy: Communication Analysis. 3 Hours.
Semester course; 3 lecture/seminar hours. 3 credits. Prerequisite: permission of instructor. Theory and research in nonverbal communication. Communication theories of psychotherapy and a communication analysis of key concepts in psychotherapy.

PSYC 670. Seminar in Gestalt Therapy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: permission of instructor. Philosophical basis, historical background, theoretical formulation, techniques and application of Gestalt therapy. Students will have the opportunity to practice and observe the techniques.

PSYC 671. Readings and Research. 1-3 Hours.
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. 2 Hours.
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. 3 Hours.
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 regarding 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. 3 Hours.
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 679. Culture, Ethnicity and Health. 3 Hours.
Semester course; 3 lecture/seminar hours. 3 credits. Enrollment restricted to graduate students in health psychology or by permission of instructor. This course is designed to provide students with a foundation for understanding and addressing health disparities from a psychological perspective. The class will focus on: (a) health disparities from a historical, political, economic, social and environmental perspective; (b) the intersection of race, ethnicity, gender, socio-economic status, sexual orientation and other social factors that may exacerbate disparities; (c) challenges in the measurement of minority health and health disparities; (d) the role of cultural competence in health promotion and disease prevention; and (e) barriers to health care that contribute to disparities.

PSYC 680. Statistics in Psychological Research I. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: an undergraduate psychological statistics course or equivalent within the past three years or successful passage (80 percent or greater) of an undergraduate psychological statistics equivalency test to be completed at VCU. Extensive coverage of multiple regression/correlation analysis with applications in psychology. Survey of applications of multivariate statistical analyses in psychology.

PSYC 681. Statistics in Psychological Research II. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: PSYC 680 or permission of instructor. Will build on PSYC 680 and provide extensive coverage of multiple regression/correlation analysis with applications in psychology. Will provide a survey of applications of multivariate statistical analyses in psychology and will introduce students to recent statistical develpments in the field.

PSYC 688. The Self and Identity. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: PSYC 630 and 680 or permission of instructor. Our sense of self provides meaning and coherence to our lives; it is the lens through which we interpret the world. This seminar will take a research-based approach, and almost all readings will be psychology journal articles. Class will focus on key topics in recent self research (e.g., self-regulation, self-esteem, the self and relationships, different cultural conceptions of self) as well as debate controversial issues in the literature (e.g., the cultural universality of self-enhancement, whether positive illusions are healthy). Students may choose some of the topics covered in the latter part of the semester. Evaluation will be based primarily on class discussion, student-led debates and discussions, and a research proposal and presentation at the end of the semester.

PSYC 690. Research Practicum. 1-3 Hours.
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. 1-3 Hours.
Semester course; 1-3 credits. May be repeated for credit. Prerequisite: permission of instructor. Theory, research and techniques in specialized topics of current interest are presented.

PSYC 693. Counseling Practicum. 1-3 Hours.
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. 1-3 Hours.
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 interviews 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. 2 Hours.
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 Hours.
0.5 credit. Prerequisite: approval of the director of the program involved. The internship is one-year, full-time assignment, under supervision, to an agency approved by the student's program committee. Graded S/U/F.

PSYC 700. Grant Writing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: two graduate courses in statistics or permission of instructor. Students are expected to enter course with a pre-approved topic identified and substantial background reading completed. Focuses on preparing an NIH grant application, using F31-F32 mechanism (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. Causal Analysis for Organizational Studies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: two 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. Crosslisted as: MGMT 702.

PSYC 795. Practicum in the Teaching of College Psychology. 3 Hours.
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 Hours.
1-6 credits. May be repeated.

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

PUBLIC ADMINISTRATION (PADM)

PADM 583. Effective Managerial Communications. 1 Hour.
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. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Describes and explains 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. 1 Hour.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Seminar in contemporary public administration issues.

PADM 601. Principles of Public Administration. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Dynamics of governmental administration including administrative principles, decision-making, communication, leadership, organizational models, and the social, economic, legal and political milieu of administration. Crosslisted as: GVPA 601.

PADM 602. Public Administration Theory. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines political and economic institutions and concepts as they affect and are affected by the practice of public administration. Topics include microeconomics and the public sector; the interrelationship between the private and public sectors; macroeconomics concepts and related institutions.

PADM 604. Comparative Public Institutions. 3 Hours.
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. Survey Research Methods. 3 Hours.
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. Crosslisted as: SOCY 605.

PADM 606. Government Management Models. 3 Hours.
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 explored 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. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The general concepts, principles and techniques of financial management as they are applied in governmental units and agencies. Students specializing in nonprofit organizations may substitute PADM 659 for this core course.

PADM 621. Organizational Behavior and Management in Government. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The general concepts, principles, and theories of management and organizational behavior as they relate to the administration of governmental units and agencies are dealt with in lecture, discussion and workshop formats.

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

PADM 623. Research Methods for Government and Public Affairs. 3 Hours.
Semester course; 3 lecture hours. 3 credits. 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. Crosslisted as: GVPA 623/CRJS 623/URSP 623.

PADM 624. Quantitative Methods for Public Administration. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PADM 623 or permission of the instructor. 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. 3 Hours.
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. Crosslisted as: GVPA 625.

PADM 626. Intergovernmental Relations. 3 Hours.
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. 3 Hours.
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 political environment and client relationships.

PADM 628. Environmental Policy and Administration. 3 Hours.
Semester course; 3 lecture hours. 3 credits. 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. Crosslisted as: ENVS 628.

PADM 630. Strategic Planning and Management in the Public Sector. 3 Hours.
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. Crosslisted as: URSP 630.

PADM 637. Organic Human Resources Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PADM 607 or equivalent. 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. 3 Hours.
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. 3 Hours.
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 enterprises in the delivery of services.

PADM 652. Administrative Law. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: PADM 623 and PADM 624, 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 theoretical, organizational, 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. 3 Hours.
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. 3 Hours.
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 and political 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. 3 Hours.
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 organization 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. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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 strategies of executive planning, analysis, and management of the financial sector of public organizations.

PADM 675. Comparative Public Administration. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Explores aspects of current interest in leadership style, skills and roles. This course allows participants 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. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PADM 607 or equivalent or permission of instructor. 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. Administrative Ethics. 2,3 Hours.
Semester course; 2 or 3 lecture 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 interest. Crosslisted as: PHIL 683/GVPA 683.

PADM 689. Seminar in Public Administration: Integration of Theory and Practice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: 24 credits in public administration or permission of instructor. Integration of public management and administration theory and practice; goal setting for professional growth and approaches to lifelong 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 Hours.
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 website forum for peer review and critique.

PADM 691. Topics in Public Administration. 1-3 Hours.
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 Hours.
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. 1-6 Hours.
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.

PUBLIC POLICY AND ADMINISTRATION (PPAD)

PPAD 711. Seminar in Public Policy I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to 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 II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to doctoral students only. This seminar aims to facilitate examination of public policy in its macro context. It will assist participants in gaining an overview of fundamental and contextual features of public policy as it has evolved. It will explore underlying and outlying perspectives that shape thinking and theorizing and action about public policy, and that suggest fresh ideas about public policy. This will include selected aspects of philosophy of public policy, philosophy of methodology relating to public policy and epistemic pluralism as it relates to public policy. Continuation of PPAD 711.

PPAD 715. U.S. Political Processes and Institutions. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course is designed to introduce students to a set of applied microeconomic 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. 3 Hours.
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 policymakers, courts and administrative implementers, and how the law may be used both to support the role of policymakers 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 720. Public Organization Design and Behavior. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to doctoral students only. Provides an intensive examination of the public (and nonprofit) organization design and behavior literature. Students will review theories, models and latest research findings as vehicles for understanding behavior in and the design of effective public organizations.

PPAD 721. Survey of Applied Research Methods in Public Policy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to 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 722. Survey of Data Analysis Techniques in Public Policy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to 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 723. Survey Research Methods. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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 741. Advanced Theory in Public Administration. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This seminar aims to contribute to understanding public policy by examining the public administration context. It will assist participants, first, in gaining an overview of fundamental features of varieties of traditional public administration. The categories of public administration theory are described by Harmon and Mayer as classical, neoclassical, systems, human relations, market, interpretive and critical theories. Elsewhere, they are described in terms of science, technology, enterprise and hermeneutics. Second, this overview will also include exploring underlying and outlying perspectives that shape thinking and theorizing about public administration. Perspectives include traditional, business, economic, political, critical theory, post-structural, psychoanalytic, neuroscience, feminist, ethical and data. Third, this overview will provide post-traditional examples that can assist students in developing their own view of how public policy and administration theory and practice should be shaped.

PPAD 742. Institutions and Organizations. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Organizational and institutional theories, in the broadest sense, look to the political, organizational and cultural contexts that shape social life. Some theories conceptualize environments in terms of networks and resources, within which social actors are “embedded.” Others stress historically built-up structures (e.g., laws and governmental agencies) that shape and channel subsequent dynamics. More radical theories argue that the core features of modern social actors, themselves, are largely products of social context, rather than existing a priori as many theories assume. This course explores theories of institutions and organizations to inform our thinking about the roles and responsibilities of the public, business and nonprofit organizations in shaping public life in a democratic society.

PPAD 750. Seminar in Urban Policy. 3 Hours.
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 760. Criminal Justice Policy and Program Evaluation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The purpose of this course is to familiarize students with the main concepts of program evaluation, including but not limited to goals and objectives, needs assessment, process evaluation, and outcome evaluation in criminal justice settings.

PPAD 761. Risk Assessment in Criminal Justice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A large portion of criminal justice policy, research and practice has been devoted to risk assessment at the individual, group, and community or environmental levels. This course will assess what is known about applying existing risk, classification and prediction methods in the criminal justice system, and how data can be used to test the efficacy of these methods in different settings.

PPAD 780. Synthesizing Seminar in Public Policy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This is a required course for the Ph.D. in Public Policy and Administration. It is designed to expose students to various areas within public policy, particularly those of the concentration areas within the program: public policy (e.g. health and education), public administration, criminal justice policy and urban and regional policy. The course is designed to acquaint advanced doctoral students with the academic profession with primary focus on research, teaching and service.

PPAD 791. Topical Seminar. 1-3 Hours.
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. 1-3 Hours.
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. 1-12 Hours.
Semester course; 1-12 hours. May be repeated for credit. Prerequisite: admittance to doctoral candidacy. Research on an approved dissertation subject.

READING (READ)

READ 600. Analysis and Correction of Reading Problems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: TEDU 561 or permission of instructor. 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An investigation of the psychological processes involved in language behavior and the relationship of these processes to the teaching of the basic communication skills.

READ 602. Literacy for Adults. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An examination of methods, strategies and techniques appropriate for teaching adult readers functioning at levels ranging from beginning to college level. Assessment issues, basic reading concepts, skills, and adult reading methods and materials are analyzed. Focus is on adapting teaching techniques for use with adults in various academic and life settings.

READ 605. Organizing and Implementing Reading Programs. 3 Hours.
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 reading specialist as related to program design, assessment, supervision, instruction, and resource responsibilities. Includes specific field-based requirements.

READ 672. Internship. 1-6 Hours.
Semester course; 1-6 credits. May be repeated for a maximum of 12 credits. Prerequisites: READ 600 and TEDU 561. 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: permission of instructor. Examines recent trends and topics within the field. Includes review of pertinent research, examination of policy issues and investigation of historical movements. Clinical application is included as appropriate.

READ 700. Externship. 1-6 Hours.
Semester course; 1-6 credits. May be repeated for a maximum of 9 credits. Prerequisite: READ 605. 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.

READING AND STUDY SKILLS (RDSS)

RDSS 100. Reading and College Study Skills. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of effective reading and study skills at the college-level. Emphasis is placed on vocabulary development as well as reading and study strategies.

RDSS 101. Advanced Reading, Study and Communication Skills. 3 Hours.
Semester course; 3 lecture and laboratory hours. 3 credits. Prerequisite: RDSS 100, adviser's recommendation, or instructor's permission. A study of advanced reading and study skills at the college-level. Students develop and apply critical reading-thinking skills, library research skills and advanced vocabulary.

REHABILITATION AND MOVEMENT SCIENCE (REMS)

REMS 540. Cardiovascular Pathophysiology and Pharmacology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: HPEX 375 and HPEX 440 or equivalents. Presents theoretical principles of electrocardiography and the effects of pharmacological intervention in the treatment of cardiovascular disease. Specific emphasis placed on myocardial ischemia, myocardial infarction and their treatment through exercise rehabilitation protocols. The impact of pharmacological agents on the ECG and on exercise are explored. Crosslisted as: HEMS 540.

REMS 608. Advanced Musculoskeletal Sciences. 3 Hours.
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. Crosslisted as: PHTY 608.

REMS 611. Biomechanics of Human Motion. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: BIOL 205 or equivalent. Recommended: PHYS 201, or HPEX 374 or 373, or equivalents. 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. Crosslisted as: HEMS 611.

REMS 612. Advanced Biomechanics. 3 Hours.
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. Crosslisted as: PHTY 612.

REMS 660. Neuromuscular Performance. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: HEMS/REMS 601 and HEMS 611. Examines the interrelationships between the musculoskeletal and neuromuscular systems. Includes examination of normal and abnormal biomechanics of the musculoskeletal system, biomechanical 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. Crosslisted as: HEMS 660.

REMS 665. Instrumentation in Motion Analysis. 3 Hours.
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. 0.5 Hours.
Seminar course; 0.5 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 692. Independent Study. 1-3 Hours.
Semester course; 1-3 hours. 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. Crosslisted as: HEMS 692.

REMS 701. Advanced Exercise Physiology I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PHIS 501 or other graduate-level mammalian physiology course or permission of instructor. Investigates the effect of acute and chronic exercise stimuli on human performance and select disease states. Topics to be addresses include exercise bioenergetics, metabolic responses to exercise, contributions to substrate selection and utilization during exercise, muscular performance and adaptations to exercise training, cardiovascular adaptation to exercise, aerobic and anaerobic training programs, and effects of training on fitness and performance.

REMS 702. Advanced Exercise Physiology II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: PHIS 501 or other graduate-level mammalian physiology course or permission of instructor, and REMS 701. Investigates the effect of physiological stressors on human performance and health through lecture and article discussion. Topics to be addressed include exercise in the heat and cold, effects of altitude on physical performance, acute and chronic endocrine responses to exercise, role of adipokines in chronic disease conditions, the use of ergogenic aids in sport.

REMS 703. Cardiovascular Exercise Physiology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment requires permission of instructor. Investigates the structural, functional and cellular principles of human cardiovascular physiology as applied to health and human performance. Emphasis will be placed on the metabolic, contractile and hemodynamic adaptations to acute and chronic exercise training.

REMS 704. Psychobiology of Physical Activity. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment requires permission of instructor. "Psychobiology" is defined as the integrative study of behavior from the social, cognitive and biological levels of analysis. This course will include an examination of the research that encompasses psychophysiology, psychoneuroendocrinology, psychoneuroimmunology, neuroscience, physiological psychology and behavioral genetics applied to exercise.

REMS 705. Metabolic Aspects of Physical Activity. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment requires permission of instructor. This course is designed to explore the thermic effects of physical activity in apparently healthy individuals, as well as those with increased risk for cardiovascular, metabolic or other inflammatory diseases. Additionally, the relationship between physical activity and food intake, resting metabolic rate and dietary-induced thermogenesis will be reviewed. The examination of gastrointestinal function during dietary manipulation will also be assessed to address performance enhancement in several types of physical activities. This course will emphasize the metabolic control of ATP synthesis, which includes carbohydrate, lipid and protein metabolism and their interaction with one another in response to biological needs during rest and physical activity.

REMS 710. Research Techniques in Rehabilitation and Movement Science. 1-3 Hours.
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 directors. Focuses on individual student learning needs. Graded as pass/fail.

REMS 793. Teaching Practicum in Higher Education. 1 Hour.
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 Hour.
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. 1-12 Hours.
Semester course; 1-12 credits. Research leading to the Ph.D. degree and elective research projects for students in the Rehabilitation and Movement Science doctoral program. May be repeated. Graded as "S," "U" or "F.

REHABILITATION COUNSELING (RHAB)

RHAB 201. Introduction to Rehabilitation Services. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course has been designed to expose the student to the history and development of the rehabilitation movement. Topics explored include basic concepts and philosophies of rehabilitation, psychological and vocational adjustments of the disabled, and an examination of selected rehabilitation methods.

RHAB 202. General Substance Abuse Studies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course is designed to help the student develop an appreciation of society's attitude about the use of drugs and alcohol, and each individual's responsibility in decisions about the use of drugs. Discussion is offered on specific characteristics of drugs, how addiction occurs and role of rehabilitation after addiction.

RHAB 321. Introduction to Substance Abuse. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: RHAB 202. Introduction to substance abuse as a progressive family disease with consideration of basic contributing factors (physiological, psychological and sociocultural builds on foundation established in RHAB 202); exposure to multidisciplinary rehabilitative approaches to arresting the disease, as well as some knowledge of intervention; brief mention of the highlights of the continuum of care available in the recovery process.

RHAB 452. Crisis Intervention with the Substance Abuser. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: RHAB 321, RHAB 322 and RHAB 523, or permission of instructor. Focus on the application of concepts discussed in theory in the recovery process course; sharing of difficulties and successes with crisis intervention by individuals already in the field; provision of new and more refined techniques under the direction of experts demonstrating their applicability.

RHAB 495. Practicum in Rehabilitation. 6,9 Hours.
Semester course; 3 credits. Prerequisite: permission of instructor. Designed to provide opportunities for observation and participation in rehabilitation and related settings. Experiences are systematically related to theoretical concepts.

RHAB 502. American Sign Language I. 3 Hours.
Semester course; 3 credits. Introduces the rules and 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. 3 Hours.
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. Addiction Counseling. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides a biopsychosocial overview of addiction and addictive disorders. Reviews contemporary theories of addiction, pharmacological classification of psychoactive substances and contemporary approaches toward assessment, diagnosis, treatment and community support. Reviews cultural, legal and historical factors regarding substance use and addictive processes.

RHAB 522. Clinical Evaluation, Assessment and Treatment Planning in Substance Abuse Rehabilitation. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: RHAB 521. Examines current issues and research in the field. Includes topics such as denial, social isolation, 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. 3 Hours.
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 526. Introduction to Mental Health Counseling. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides an overview of history, philosophy, legislation, organizational structure and trends in mental health counseling. Focuses on advocacy; professional identity, roles and functions; ethics; counseling certification and licensure; and career options.

RHAB 533. Directed Readings in Rehabilitation. 1-3 Hours.
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. Theories of Professional Counseling. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides a deep understanding of the major theoretical approaches, models and strategies to effective counseling, consultation, prevention, advocacy and wellness programs with an emphasis on common factors and evidence-based effectiveness. The intent is to assist students in developing an ethical and culturally relevant yet personal model of counseling.

RHAB 612. Group Counseling Theories and Techniques. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Reviews theoretical foundations of group work, group dynamics and processes, group therapeutic factors, and characteristics and functions of effective group leaders. Reviews ethical and culturally relevant strategies for designing, implementing and facilitating a variety of group approaches. Provides experience in group participation and development of group leadership skills.

RHAB 613. Advanced Rehabilitation Counseling Seminar. 3-9 Hours.
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. 3 Hours.
3 lecture hours. 3 credits. Prerequisite: RHAB 611 or permission of instructor. Explores 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 615. Human Growth and Development. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines the major themes of research on human development over the lifespan -- from conception through adulthood. Focuses on the physical, emotional, social and cognitive aspects across the lifespan. Emphasizes how developmental processes relate to persons with disabilities and impact the work of rehabilitation and other helping professions.

RHAB 616. Couples and Family Counseling. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides an overview of approaches to couples and family counseling. Instruction in the theoretical foundation and interventions in couples and family therapy will be examined.

RHAB 623. Career Counseling and Job Placement. 3 Hours.
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. Assessment and Evaluation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines principles of measurement, assessment and diagnosis in rehabilitation and mental health counseling; test selection, administration and interpretation; accommodating individuals with disabilities in the testing process. Includes an overview of the major domains in assessment.

RHAB 625. Research and Program Evaluation. 3 Hours.
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 and mental health counseling 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Explores history, theory, practice and ethics of case management as well as the full range of community resources as these contribute to successful outcomes. Reviews and critically analyzes benefit systems, treatment and life care planning, coordination and delivery of services, disability management, documentation, and case studies.

RHAB 640. Medical and Psychosocial Aspects of Disabilities. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides an overview of the major disabilities encountered by rehabilitation and mental health counselors. Focuses on functional limitations and the process of psychological adjustment.

RHAB 642. Diagnosis and Treatment of Mental Health Disorders. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines the major mental disorders and their etiology, prevalence, diagnosis and impact on individuals and society. Reviews the prevailing multiaxial classification systems and diagnostic processes, procedures and nomenclatures currently used in clinical practice. Provides an overview of rehabilitation and mental health treatment planning and interventions using a biopsychosocial framework.

RHAB 644. Alcohol and Human Behavior. 3 Hours.
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. 3 Hours.
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. Institutes and Workshops in Rehabilitation. 1-3 Hours.
Orientation institutes and other short-term training programs are offered for rehabilitation counselors newly 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 682. Institutes and Workshops in Rehabilitation. 1-3 Hours.
Orientation institutes and other short-term training programs are offered for rehabilitation counselors newly 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 683. Institutes and Workshops in Rehabilitation. 1-3 Hours.
Orientation institutes and other short-term training programs are offered for rehabilitation counselors newly 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 684. Institutes and Workshops in Rehabilitation. 1-3 Hours.
Orientation institutes and other short-term training programs are offered for rehabilitation counselors newly 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 685. Institutes and Workshops in Rehabilitation. 1-3 Hours.
Orientation institutes and other short-term training programs are offered for rehabilitation counselors newly 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 686. Institutes and Workshops in Rehabilitation. 1-3 Hours.
Orientation institutes and other short-term training programs are offered for rehabilitation counselors newly 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 687. Institutes and Workshops in Rehabilitation. 1-3 Hours.
Orientation institutes and other short-term training programs are offered for rehabilitation counselors newly 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 688. Institutes and Workshops in Rehabilitation. 1-3 Hours.
Orientation institutes and other short-term training programs are offered for rehabilitation counselors newly 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 689. Institutes and Workshops in Rehabilitation. 1-3 Hours.
Orientation institutes and other short-term training programs are offered for rehabilitation counselors newly 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. 3 Hours.
Semester course. 3 credits. 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 692. Advanced Professional Issues in Counseling. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: RHAB 691. Provides an advanced overview of professional identity, roles and functions; counseling practice issues; supervision; and specialized counseling techniques in rehabilitation and mental health counseling. Includes 100 hours of supervised rehabilitation and mental health counseling practicum.

RHAB 693. Introduction to Field Experiences for Rehabilitation Counselors. 3 Hours.
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. 3 Hours.
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. 1-6 Hours.
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 and Mental Health. 3-9 Hours.
Semester course; 3-9 credits (3 credits per 200 hours of supervised internship). Prerequisite: Completion of 36 graduate credits including RHAB 691. Emphasizes mastery of setting-specific roles and functions of the professional rehabilitation and mental health counselor. Stresses ethical decision-making in practice. Involves scheduled seminars and meetings with faculty and agency supervisor. Requires completion of Certified Rehabilitation Counselor examination and a total of 9 credits for degree completion.

RHAB 697. Supervised Clinical Practice in Counseling. 1-6 Hours.
Semester course; 1-6 credits. (1 credit per 100 hours of supervised internship.) May be repeated to a maximum of 9 credits. Prerequisite: 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.

RELIGIOUS STUDIES (RELS)

RELS 101. Introduction to Religious Studies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course examines the phenomenon of religion and religious experience. Through a phenomenological approach definitions and descriptions of the major features of the religious experience and of religious establishments, including concepts of the sacred, the numinous, religious language, texts, symbols, rituals and myths are reviewed. In addition, the social, political and spiritual dimensions of religion in human culture will be investigated.

RELS 108. Human Spirituality. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the manifestations of one or more of the themes of religious studies in a diverse group of religious communities. The themes may include such wide-ranging topics as the sacred and profane, the epistemology of faith and knowledge, creation stories, human identity, the nature of the divine, the possibility of liberation or salvation, mythology, ritual, ethics, religion and art, religion and law, and religion and politics.

RELS 201. Biblical Hebrew. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Vocabulary, elementary grammar, introduction to lexica and reading of biblical texts.

RELS 202. Biblical Hebrew. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: RELS 201. Vocabulary, elementary grammar, introduction to lexica and reading of biblical texts.

RELS 250. Death: Myth and Reality. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of intellectual and emotional responses to death and dying with emphasis upon their role in the development of religious thought and practice. Special attention will be paid to the death theme in literature, funeral practices and beliefs concerning the afterlife in selected world religions.

RELS 280. Introduction to Catholic Studies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course provides an introduction to Catholicism's major doctrines, figures, historical events, philosophy and ethics from its beginnings in the first centuries of the Common Era through contemporary debates over such issues as abortion, sexuality and war. Students will learn about scripture, doctrine, theology, the sacraments, art and architectures, saints, social justice and gender, and the history and role of the Church.

RELS 282. Introduction to Buddhism. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Introduces Buddhism from its origins in India and addresses its major schools of thought, practice, ritual and philosophy, in Asia and beyond, particularly the United States.

RELS 291. Topics in Religious Studies. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May be repeated with different topics for a maximum of six credits. Focused study of selected ideas, institutions, movements, time periods and/or thinkers. See Schedule of Classes for specific topic to be offered each semester.

RELS 301. Introduction to the Hebrew Bible. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of the Hebrew Bible from its beginning through the post-Exile period. Emphasis given to the literary and historical development of the text.

RELS 302. Introduction to the New Testament. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of the New Testament with particular emphasis given to the historical development of the Canon.

RELS 303. Intertestamental Literature and Thought. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The period between the Old and New Testaments as seen through the literature of the era, with emphasis on the writings of the Apocrypha, Pseudepigrapha and Josephus.

RELS 305. Hebrew Prophets. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of the literature and history of Israel as seen through the work of the writing prophets. Emphasis will be placed on the second part of the Hebrew Canon and the Book of Daniel.

RELS 306. Introduction to Judaism. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A general survey of the dynamics and characteristic patterns of Jewish civilization encompassing history, practices and beliefs. Crosslisted as: INTL 306.

RELS 307. Black Religion. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An analysis of the role of religion in the lives of blacks with an emphasis on African religions and philosophies, the black church in America, and the roles of the various faiths, sects and cults. Crosslisted as: AFAM 307/INTL 307.

RELS 308. High and Later Middle Ages. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A detailed historical overview of developments in Western Europe from the end of the first millennium through the end of the 15th century. Crosslisted as: HIST 311.

RELS 310. Mediterranean Religions. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Explores the earliest evidence of religious practice and belief in the Mediterranean region and probes the ways that the ancient traditions shaped the religions that still endure today. Also investigates the effect of religion in the Mediterranean region on related issues of intercultural relations, peace and conflict, and migration.

RELS 311. Religions of the World. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An investigation of the historical, cultural and theological foundations and development of major world religions including Hinduism, Buddhism, Confucianism, Taoism and Shinto. Crosslisted as: INTL 311.

RELS 312. Religions of the World. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An investigation of the historical, cultural and theological foundations and development of major world religions including Zoroastrianism, Judaism, Christianity and Islam. Crosslisted as: INTL 312.

RELS 313. Life and Literature of Paul. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of the life and literature of Paul as given in Acts and the Epistles, involving special consideration of Paul's contribution to the expansion of Christianity.

RELS 314. Jesus in the New Testament. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the Christ of faith and the Jesus of history as presented in New Testament literature and as interpreted in the works of selected scholars from the church fathers to the present.

RELS 315. The Ancient Near East. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the ancient Near Eastern civilizations from the preliterary period to the end of Kassite rule in Babylonia (c. 1160 B.C.). Crosslisted as: HIST 301.

RELS 317. Islam. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the emergence of Islam in Arabia in the seventh century and its subsequent developments, including a look at the Qur'an (the holy book), the Prophetic traditions, the concept of God, and mysticism (sufism) and law (shari'ah) and an overview of ritual practices, fundamental beliefs, theological principles and current issues in Islam and international relationship. Crosslisted as: INTL 317.

RELS 318. History of the Jewish People I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the Jewish people from the biblical period to the early modern period, including the Israelite conquest of Canaan, Judea in Hellenistic and Roman times, the Diaspora in Islam and in Europe, social and cultural trends, and Jewish settlement in the Ottoman Empire. Crosslisted as: HIST 333.

RELS 319. History of the Jewish People II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the Jewish people from the early modern to the present, including the impact of the Emancipation, the rise of the American Jewish community, the impact of modernism and growth of Reform, the beginnings and growth of Zionism, restoration in Palestine, the Holocaust, the creation of Israel, and the relations of Israel and world Jewry. Crosslisted as: HIST 334.

RELS 320. Taoism. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of one of the most fundamental and influential philosophies of life in Chinese culture, focusing on the theory and practice of the basic principles of Taoism as formulated by the legendary Lao Tzu and further developed by Chuang Tzu.

RELS 322. Tibetan Buddhism. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A basic introduction to the history, development and mythology of the Buddhism of Tibet focusing on the Indian heritage and shared basis of all Buddhist practices, a clear identification of the three vehicles found in Buddhism, and a careful consideration of the path of the Bodhisattva, the hero of Great Vehicle Buddhism. Crosslisted as: PHIL 322.

RELS 326. Existentialism. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: three credits in philosophy (exclusive of PHIL 221 and PHIL 222) or permission of instructor. An examination of the nature of truth, freedom, responsibility, individuality and interpersonal relations as found in some principal writings of Kierkegaard, Nietzsche, Jaspers, Sartre, Heidegger, Camus, Buber and Marcel. Crosslisted as: PHIL 326.

RELS 327. History of Christianity I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A historical and theological examination of Christianity from its origin to the early modern period, or the age of the Reformations. Emphasis is placed upon an understanding of leading events, ideas, movements and persons in their historical settings. Crosslisted as: HIST 335.

RELS 333. Psychology and Religious Experience. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PSYC 101. Religious belief and experience as viewed by major psychological theorists. How psychological methodology has been used to study religious experience. Topics include personality factors and development, conversion experiences, religious experiences and mental health and human values. Crosslisted as: PSYC 333.

RELS 334. Religion in Contemporary America. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course studies the history, literature, belief patterns and unique traits of religion in the United States. The evolution of religion and religious sentiment in a modern pluralistic, democratic society, including the varieties of religious experiences in contemporary America will be reviewed.

RELS 335. The American Jewish Experience. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The religious, social and cultural structure of American Jewry from the Colonial era to the present.

RELS 336. Religions in Latin America. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An interdisciplinary survey of the major religious groups of Latin America, with a focus on the development of Catholicism, Protestantism and the traditions of the African diaspora, such as Santeria and Voduo, during the 20th century.

RELS 337. Contemporary Cults and New Religious Movements. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An overview of contemporary religious movements. Focuses on new groups that have emerged in the context of globalization. Involves understanding of what gives rise to these movements, how they are distinctive and how they develop.

RELS 340. Global Ethics and the World's Religions. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A critical survey of ethical concepts and issues in the thought and practice of major religious traditions. Comparison of ethical perspectives on selected themes and attention to cooperative efforts toward a global ethic. Crosslisted as: INTL 341.

RELS 350. World Classics of Spirituality. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A critical reading of selected works from among the spiritual classics of Judaism, Christianity, Islam, Hinduism, Taoism and other religious traditions. Crosslisted as: INTL 360.

RELS 360. Sociology of Religion. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 101. A systematic review and assessment of major sociological theories of and empirical research on religious behavior and groups. Topics include the structure of religious organizations; social correlates and functions of religion; denominationalism; religion and social class, social change and population. Crosslisted as: SOCY 360.

RELS 361. The Bible as Literature. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Literary aspects of the Bible will be considered. Also, attention will be given to the history of the English Bible. Crosslisted as: ENGL 361.

RELS 362. Shakespeare and Religion. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An examination of the religious ideas in selected plays by William Shakespeare and their relevance to contemporary religious thought and experience. Topics include the nature of God, the meaning of life, the problem of evil, moral authority and the question of immortality as found in Shakespeare's plays.

RELS 363. Archaeology and Sacred Texts. 3 Hours.
Semester course; 3 lectures hours. 3 credits. Prerequisite: UNIV 200 or HONR 200. Explores past and present archaeological research as it relates to events, persons, and places described in ancient sacred texts of the Mediterranean.

RELS 371. Women in Islam. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 200 or HONR 200, RELS 108, GSWS 201 or ENGL 215. Critical study of the roles and rights of women in Islam. Crosslisted as: GSWS 371.

RELS 372. Global Women's Spirituality. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Explores the spiritual writings of women in various cultures and religious traditions. Crosslisted as: GSWS 372/INTL 372.

RELS 373. Gender and the Bible. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: RELS 108 or GSWS 201 or RELS 301 or RELS 302; and ENGL 215 or UNIV 200 or HONR 200. Studies the Hebrew and Christian scriptures with emphasis on gender. Attention to traditional, feminist, womanist and postcolonial interpretation. Crosslisted as: GSWS 373.

RELS 380. Contemporary Catholic Thought. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: RELS 280. A study of the contemporary Catholic Christian response to the questions, "Who is God?" and "Where/how do we experience the Sacred?" Methods of Catholic theology will be explicated and applied to the teachings of the Second Vatican Council and current responses to those teachings in such areas as sacramental worship and liturgy, and moral/ethical teachings of the Church.

RELS 391. Topics in Religious Studies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with different topics for a maximum of 6 credits. A study of a selected ideas or concepts, religious thinkers or significant movements in the field of religion. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

RELS 401. Faith and Life Sciences. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 200 or HONR 200. Open to students of any school or program. Explores the complex relationships between faith traditions and the life sciences. Topics include epistemology, impact of life sciences on ideas of fate and responsibility, limits of science and technology, and scientific and religious perspectives on human origins, consciousness, aggression, forgiveness, health, illness and death. Crosslisted as: LFSC 401.

RELS 407. Modern Jewish Thought. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 200 or HONR 200. A study of the writings of the leading Jewish thinkers of the 19th and 20th centuries. Special reference will be made to the issues arising from the encounter of Judaism with the modern world: the nature of revelation and the authority of the Torah, the nature of God, the impact of the Holocaust, the meaning of redemption and the significance of the state of Israel.

RELS 408. Indian Tradition. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: at least six credits from philosophy or religious studies courses. A systematic analysis of the major theories of Indian religious and philosophical thought: Vedas, Upanishads, Gita, Charvaka, Jainism, Buddhism, the six systems of Hinduism and contemporary developments. Crosslisted as: PHIL 408.

RELS 409. Modern Islamic Thought and Global Trends. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: INTL/RELS 312 or INTL/RELS 317; UNIV 200 or HONR 200. Introduces students to the integral relationship of Islam to major events of global concern and contextualizes these events into the wider modern and postmodern developments of Islamic thought and its intellectual and ideological self-interrogation. This course will provide students with the opportunity to study both the background of modern Islamic thought and selected contemporary events. Crosslisted as: INTL 409.

RELS 410. The Chinese Tradition in Philosophy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the development of Confucianism, of alternative ways of thought prior to the fall of the Han Dynasty and of neo-Confucianism. The systems of thought are examined in the light of their social, political and religious impact on China, Korea and Japan. Crosslisted as: PHIL 410/INTL 410.

RELS 412. Zen Buddhism. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 200 or HONR 200. A study of Zen Buddhism, including backgrounds in Indian philosophy and practice, development in China and Korea, and present-day Zen theory and practice in Japan and in Western countries. Crosslisted as: PHIL 412/INTL 412.

RELS 422. Religion and Film. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with different themes for a total of six credits. Prerequisite: UNIV 200 or HONR 200. Explores central themes present in all global religious traditions, such as ritual, faith, myth, suffering, redemption, the religious quest/pilgrimage, the nature of good and evil and perceptions of the sacred. Using readings from sacred texts and contemporary film critiques, the course juxtaposes ancient story and wisdom with contemporary narratives in film. Possible themes would include women and religion in world cinema, Christology in world cinema, and violence and redemption in film.

RELS 425. Religion, Magic and Witchcraft. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ANTH/INTL 103 and UNIV 200 or HONR 200 with a minimum grade of C. A survey of the nature and variety of beliefs outside of the major streams of religious thought. Among topics considered are myth, totemism, taboo and sorcery. Emphasis on understanding supernatural beliefs and practices in relation to culture and society. Crosslisted as: ANTH 425/INTL 425.

RELS 430. Philosophy of Religion. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: three credits in philosophy (exclusive of PHIL 211 and PHIL 212) or permission of instructor. An introduction to the major problems and questions of religion and reason. Special reference will be made to the nature of God, the nature of man, the problem of evil, the source of good, immortality and the basis of authority. Crosslisted as: PHIL 430.

RELS 440. Mysticism. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 200 or HONR 200. A critical analysis of the varieties of mysticism in world religions. Arguments for and against mysticism will be emphasized. Mysticism will be related to art, psychology, science, philosophy, theology and magic. Crosslisted as: PHIL 440.

RELS 441. Islamic Mysticism: the Sufis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: INTL/RELS 312 or INTL/RELS 317; UNIV 200 or HONR 200. Introduces students to the major Sufi masters and their works. It covers ideological and practical development of Islamic mysticism as compared to the developments within Islam itself. Crosslisted as: INTL 441.

RELS 442. Seminar in Hinduism. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of Hinduism, taking up the earliest origins of Hinduism, the Hindu creation myth, the various conceptions of the divine, the speculation regarding human nature, the stages of life, development of family and monastic codes, the great epics of Hinduism including the Bhagavad-Gita, the six schools of Hindu philosophy and modern Hinduism as it has developed in response to Western influences.

RELS 450. Religion, Globalization and Social Justice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: RELS 340/INTL 341, WLRD 210 or WRLD 220; UNIV 200 or HONR 200. Explores the role religions are playing in the work of building a socially just and environmentally sustainable world community. Crosslisted as: INTL 449.

RELS 451. Religion, Racism and Social Justice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: RELS 340/INTL 341, WLRD 210 or WRLD 220; UNIV 200 or HONR 200. Explores the complex history and contemporary relationships between religion, racism and social justice. Crosslisted as: AFAM 451/INTL 451.

RELS 453. Western Religions, Women and Social Justice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: UNIV 200 or HONR 200; and RELS 108, GSWS 201 or WRLD 210. Explores the experience and portrayal of women in the three Abrahamic traditions: Judaism, Islam and Christianity. Study focuses on how these religions and their texts bear upon the social, economic, political and spiritual lives of women. Special attention is given to the impact of globalization and religious fundamentalism on women. Crosslisted as: GSWS 453/INTL 453.

RELS 455. Catholic Ethics and Social Justice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: RELS 280 or 380, or RELS/INTL 312, or RELS 340/INTL 341; UNIV 200 or HONR 200. An exploration of the Catholic church's major theological, ethical, constitutional and strategic concerns, and an analysis of Catholic social teaching and its relation to current social issues such as abortion, peace and conflict, poverty, and human rights. Crosslisted as: INTL 456.

RELS 490. Senior Capstone Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: RELS 340/INTL 341; senior standing in religious studies major with a minimum of 85 credits earned toward the degree. Senior research project; written thesis and oral presentations using established concepts, theories and research methods in religious studies. Students will select the religious groups/traditions as the focus of their research, writing and oral presentations in consultation with the course instructor.

RELS 491. Topics in Religious Studies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with different topics for maximum of 6 credits. Prerequisite: written permission of instructor. An in-depth study of selected ideas or concepts, religious thinkers or significant movements in the field of religion. See the Schedule of Classes for specific topics to be offered each semester.

RELS 492. Independent Study. 1-4 Hours.
Semester course; variable hours. Variable credit. Maximum of 4 credits per semester; maximum total of 6 credits for all independent study courses. Open generally to students of only junior or senior standing who have acquired at least 12 credits in the departmental discipline. Determination of the amount of credit and permission of instructor and department chair must be procured prior to registration of the course. An independent study course to allow interested students in religious studies to do research in an area of major interest under the direction of a professor qualified in that field.

RELS 493. Religious Studies Internship. 1-3 Hours.
Semester course; variable hours. 1-3 credits (40 clock hours per credit). May be repeated for a maximum of 6 credits, however only 3 credits can count toward the major. Prerequisites: completion of 9 credits of upper-level (300- or above) course work in religious studies, and permission of the internship coordinator. Student must be in good academic standing with a minimum major GPA of 2.25. Designed for the advanced student to gain workplace experience in a local, national or international organization offering opportunities in religious studies.

RELS 499. Senior Seminar. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisites: RELS 340/INTL 341; senior standing in religious studies major with a minimum of 85 credits earned toward the degree. Pre- or corequisite: RELS 490. Focuses on self-assessment, compilation of a portfolio and curriculum vitae, career and graduate school preparation, and on the lifelong application of skills and knowledge acquired in the program. Students will critically assess their experience in the religious studies program.

RELS 592. Independent Study. 1-4 Hours.
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.

RESEARCH (OVPR)

OVPR 601. Scientific Integrity. 1 Hour.
Semester course; 1 lecture hour. 1 credit. A survey of contemporary issues relating to responsible conduct in research. Topics include academic integrity, mentoring, authorship and peer review, use of humans and animals in biomedical research, ownership of data, intellectual property, conflict of interest, scientific record keeping, collaborative research, research misconduct, and genetic technology. Graded as pass/fail.

OVPR 602. Responsible Scientific Conduct. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Priority registration to postdoctoral trainees and graduate students; others by permission of instructor. A survey of contemporary issues relating to responsible conduct in research. Topics include research integrity, mentoring, authorship and peer review, use of humans and animals in biomedical research, ownership of data, intellectual property, conflict of interest, scientific record keeping, collaborative research, research misconduct, and genetic technology. Graded pass/fail.

OVPR 603. Responsible Conduct of Research. 1 Hour.
Short course; 1 lecture hour. 1 credit. Restricted to graduate or professional students, with preference given to Preparing Future Faculty students. Registration requires permission of PFF Program office. This course is designed to provide a learning experience that will enable students to develop and refine skills needed to solve problems involving relevant topic areas of responsible scientific conduct and to clearly articulate ethically and legally acceptable solutions to problems posed about scientific conduct. Content of the course includes relevant guidelines, policies and laws bearing on the conduct of scientific research including those dealing with scientific authorship, use of humans and animals in research, conflict of interest, data ownership, scientific record keeping, collaborative research, and ownership, protection and use of intellectual property in the arena of scientific research. Conventions and normative behavior related to responsibilities in the scientific mentor-trainee relationship will also be covered. Graded as pass/fail.

RUSSIAN (RUSS)

RUSS 101. Elementary Russian. 4 Hours.
Continuous courses; 5 lecture/recitation hours. 4-4 credits. Prerequisite: completion of RUSS 101 to enroll in RUSS 102. Elementary grammar, reading and oral drill.

RUSS 102. Elementary Russian. 4 Hours.
Continuous courses; 5 lecture/recitation hours. 4-4 credits. Prerequisite: completion of RUSS 101 to enroll in RUSS 102. Elementary grammar, reading and oral drill.

RUSS 201. Intermediate Russian. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: RUSS 102. Continuation of the essentials of grammar with emphasis on achieving proficiency in aural comprehension, speaking, reading and writing skills.

RUSS 202. Intermediate Russian Readings. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: RUSS 201. Designed to increase the student's proficiency through the study of selected cultural and literary texts.

RUSS 205. Intermediate Russian Conversation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: RUSS 201. Designed to increase the student's proficiency in the spoken language through audio-oral exercises, dialogues and free conversation.

RUSS 311. Conversation and Media. 3 Hours.
Semester course; 3 semester hours. 3 credits. May be repeated for up to six credits with permission of the instructor. Prerequisite: RUSS 202 or 205. Conducted in Russian. An introduction to everyday life in Russia and topics of current interest. Students will explore diverse media to develop skills in listening, speaking, reading and writing.

RUSS 330. Literature and Culture: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated for up to six credits with different topics. Prerequisite: RUSS 202 or 205. Conducted in Russian. Students will examine salient themes in Russian culture as expressed in a range of classic and contemporary texts. This course develops skills in reading, writing, speaking and listening. See the Schedule of Classes for specific topic to be offered each semester.

RUSS 422. Russian Film. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of six credits with the permission of the instructor. Prerequisite: completion of six credits of Russian at the 300-level. Conducted in Russian. While the course is designed to develop the student's conversational skills in Russian, it will also provide practice in reading, listening and writing. Discussions will center on films from the Soviet and post-Soviet periods.

RUSS 491. Topics in Russian. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May be repeated with different topics for maximum of 9 credits. An in-depth study of selected topics in Russian. See the Schedule of Classes for specific topics to be offered each semester.

SCIENCE, TECHNOLOGY AND SOCIETY (SCTS)

SCTS 200. Science in Society: Values, Ethics and Politics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An interdisciplinary introduction to the ethical, social and political dimensions of science, technology and medicine examined through case studies and debates.

SCTS 300. Introduction to Science and Technology Studies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introduction to the study of science, technology and medicine from political, sociological and historical perspectives, focusing on case studies that illustrate the methods and theories used to examine the structure and behavior of the scientific community and the role of scientific knowledge in shaping public culture. Crosslisted as: GVPA 399/HIST 399.

SCTS 301. Illness Narratives. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An overview of the history, interpretations and practices of reading and writing illness narratives — through case studies and theoretical perspectives, in fictionalized and nonfiction accounts, from the viewpoint of various actors (doctors, patients, patient families and their caregivers). Students will further examine the role of narrative knowledge in health care. Crosslisted as: ENGL 369.

SCTS 305. Contemporary Issues in STEM Fields. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Repeatable for a maximum of 3 credits. Examines contemporary topics in STEM (science, technology, engineering and mathematics) fields through the available public lecture events which take place on the VCU campus during a given semester. Lecture topics will vary from semester to semester but all will discuss recent work and broader issues related to science, technology, engineering, mathematics and medicine.

SCTS 392. Revolutions in Science I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of the history of science from the ancient Greeks to 1800, focusing on the development of scientific ideas, practices and institutions in Western society. Crosslisted as: HIST 392.

SCTS 393. Revolutions in Science II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A survey of the history of science from 1800 to the present, focusing on the development of scientific ideas, practices and institutions in Western society. Crosslisted as: HIST 393.

SCTS 397. Genetics and Society: 1865 to the Present. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An investigation of the science and technology of heredity in its historical, cultural and political contexts, emphasizing the ways in which genetic theories have been applied in attempting to solve social and biological problems. Crosslisted as: HIST 397.

SCTS 398. History of Medicine and Public Health: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated with different thematic content for a maximum of six credits. Studies in selected topics in the history of medicine, medical science or public health. Includes introduction to the interdisciplinary approaches practiced in the history of medicine as well as the historical content and relevant analytical skills needed to examine the specific course theme. Crosslisted as: HIST 398.

SCULPTURE AND EXTENDED MEDIA (SCPT)

SCPT 209. Introduction to Sculpture. 3 Hours.
Semester courses; 2 lecture and 3 studio hours. 3, 3 credits. Open to non-art majors only. The course will offer an opportunity for students to work with some of the ideas and materials of sculpture through slides, lecture and studio involvement.

SCPT 210. Introduction to Sculpture. 3 Hours.
Semester courses; 2 lecture and 3 studio hours. 3, 3 credits. Open to non-art majors only. The course will offer an opportunity for students to work with some of the ideas and materials of sculpture through slides, lecture and studio involvement.

SCPT 211. Basic Sculpture I. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. The primary goal of this course is the effective expression of ideas. The student is introduced to the basic tools, materials and techniques with attention given to problem-solving.

SCPT 212. Basic Sculpture II. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. Prerequisite: SCPT 211. The primary goal of this course is the effective expression of ideas. The student uses advanced techniques that build upon the basic skills taught in Basic Sculpture I with attention given to problem-solving.

SCPT 215. Sophomore Seminar. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Open only to sculpture majors. Designed for sophomore sculpture majors as a supplement to studio courses in the department. Emphasis is placed on articulating and expanding upon individual interests in relation to studio practices.

SCPT 217. Sculptural Concepts. 4 Hours.
Semester courses; 3 lecture and 3 studio hours. 4, 4 credits. Prerequisite: permission of instructor. A study of contemporary technology, philosophy, criticism and their relation to material resources and technical practices.

SCPT 218. Sculptural Concepts. 4 Hours.
Semester courses; 3 lecture and 3 studio hours. 4, 4 credits. Prerequisite: permission of instructor. A study of contemporary technology, philosophy, criticism and their relation to material resources and technical practices.

SCPT 290. Concepts and Issues. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: completion of Art Foundation. A lecture course that familiarizes students with contemporary artworks, as well as modern and postmodern concepts. This class presents contemporary issues in art through the presentation of media and visiting speakers. Visits to outside events and lectures will be required.

SCPT 311. Intermediate Sculpture. 4 Hours.
Semester courses; 3 lecture and 6 studio hours. 4, 4 credits. May be repeated for a maximum of 8 credits. Prerequisite: SCPT 212. The emphasis in this course is on creative independence. The student is encouraged to utilize a variety of materials in order to express his ideas.

SCPT 312. Intermediate Sculpture. 4 Hours.
Semester courses; 3 lecture and 6 studio hours. 4, 4 credits. May be repeated for a maximum of 8 credits. Prerequisite: SCPT 212. The emphasis in this course is on creative independence. The student is encouraged to utilize a variety of materials in order to express his ideas.

SCPT 313. Dimensional Concepts. 4 Hours.
Semester courses; 2 lecture and 6 studio hours. 4, 4 credits. An opportunity for the sculpture student to extend and expand upon traditional methods of expression and to explore new areas.

SCPT 314. Dimensional Concepts. 4 Hours.
Semester courses; 2 lecture and 6 studio hours. 4, 4 credits. An opportunity for the sculpture student to extend and expand upon traditional methods of expression and to explore new areas.

SCPT 321. Figure Modeling. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: completion of Art Foundation. This course provides instruction in fundamental figure modeling skills working with clay and from live models.

SCPT 322. Flexible Molds. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: completion of Art Foundation. This course provides instruction on a variety of moldmaking techniques, including plaster and flexible moldmaking materials.

SCPT 323. Foundry. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. Prerequisite: SCPT 322. This course provides instruction in bronze and aluminum metal casting using the lost wax process, ceramic shell.

SCPT 324. Robotics for Sculpture. 4 Hours.
Semester course; 2 lecture and 6 studio hours. 4 credits. Prerequisite: completion of Art Foundation. This course provides instruction in the construction, programming and integration of microcontrollers in conjunction with the use of switches, motors and other devices.

SCPT 411. Advanced Sculpture. 4 Hours.
Semester courses; 2 lecture and 6 studio hours. 4, 4 credits. May be repeated for a maximum of 16 credits. Prerequisite: SCPT 212. The majority of the student's activities occur in the studio with emphasis on the development of a personal style.

SCPT 412. Advanced Sculpture. 4 Hours.
Semester courses; 2 lecture and 6 studio hours. 4, 4 credits. May be repeated for a maximum of 16 credits. Prerequisite: SCPT 212. The majority of the student's activities occur in the studio with emphasis on the development of a personal style.

SCPT 413. Dimensional Concepts. 4 Hours.
Semester courses; 2 lecture and 6 studio hours. 4, 4 credits. An opportunity for the sculpture student to extend and expand upon traditional methods of expression and to explore new areas.

SCPT 414. Dimensional Concepts. 4 Hours.
Semester courses; 2 lecture and 6 studio hours. 4, 4 credits. An opportunity for the sculpture student to extend and expand upon traditional methods of expression and to explore new areas.

SCPT 415. Senior Seminar. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Open only to sculpture majors. Designed for graduating sculpture students. Focus is on professional development and preparation for the possibility of graduate school.

SCPT 417. Seminar in Contemporary Sculpture. 4 Hours.
Semester course; 4 lecture hours. 4 credits. May be repeated for a maximum of 12 credits. Prerequisite: SCPT 212. A forum for consideration and discussion of recent developments.

SCPT 419. Professional Studio Practicum. 3 Hours.
Semester course; 9 studio hours. 3 credits. May be repeated for a total of 6 credits. Enrollment requires permission of departmental chair. A studio class that provides a continuation of the student's work in sculpture. This course will be recorded as an elective for a sculpture major.

SCPT 480. Critical Issues. 4 Hours.
Semester course; 4 lecture hours. 4 credits. Prerequisite: completion of Art Foundation. This advanced course examines diverse critical and aesthetic issues through the study of a select group of highly innovative international artists.

SCPT 491. Topics in Sculpture. 1-4 Hours.
Semester course; 1-4 credits. May be repeated for a maximum of 16 credits. Prerequisite: permission of instructor. A seminar or workshop on a selected issue or topic in the field of sculpture. See the Schedule of Classes for specific topics to be offered each semester.

SCPT 492. Independent Study in Sculpture. 1-4 Hours.
Semester course; variable hours. 1-4 credits. May be repeated for a maximum total of 8 credits. Prerequisites: senior standing as a major in sculpture and approval of department chair and instructor. Individual instruction and supervision of a special project. Learning experiences should be designed with the supervising faculty member in the form of a contract between student and instructor. This course is limited to those students who have demonstrated an exceptional level of ability and intense commitment to their discipline.

SCPT 493. Sculpture Internship. 1-6 Hours.
Semester course; 40 contact hours per credit. 1-6 credits. May be repeated for a maximum of 12 credits. Prerequisite: SCPT 311 or SCPT 312. Open to junior- and senior-level sculpture majors only. A practicum in which students work with professionals in the field.

SCPT 500. Graduate Sculpture. 2-6 Hours.
Semester course; 4, 8 or 12 studio hours. 2, 4 or 6 credits. May be repeated for a maximum of 20 credits. 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. 3 Hours.
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. 1-4 Hours.
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 600. Graduate Sculpture. 2-6 Hours.
Semester course; 4, 8 or 12 studio hours. 2, 4 or 6 credits. May be repeated for a maximum of 28 credits. 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 690. Graduate Seminar. 1,4 Hour.
Semester course; 4 lecture hours. 4 credits. May be repeated for a maximum of 16 credits. Degree requirement for graduate students in the department of sculpture. Weekly seminar for the purpose of exploring recent developments in sculpture and conducting critiques in which students can discuss the ideas and attitudes manifest in their work.

SCPT 692. Independent Study in Sculpture. 1-4 Hours.
Semester course; variable lecture hours. 1 to 4 credits. May be repeated for a maximum of 8 credits. This course will be limited to graduate students in sculpture in high standing within the program. Learning experiences will be designed with the supervising faculty member in the form of a contract between student and instructor.

SOCIAL AND BEHAVIORAL HEALTH (SBHD)

SBHD 605. Introduction to Social and Behavioral Health. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course addresses the influence of social and behavioral factors impacting public health, covering both historical perspectives and current issues. Topics covered include the theoretical foundations of social and behavioral health; the sociocultural context of health, health promotion and disease prevention interventions; and special populations and topics.

SBHD 608. Health Communication. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Basic course for students in public health with limited experience conducting public health research. Focuses on the history and theories of health communication, social marketing and media advocacy, audience research and segmentation, entertainment education, e-health, provider/patient communication, technology transfer to service providers, media relations and media monitoring, emergency risk communication, and evaluating communication campaigns. Students plan an entire social marketing campaign.

SBHD 609. Research Methods in Social and Behavioral Health. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Recommended preparation: SBHD 605. A didactic and experiential course that provides an introduction to applying social and behavioral qualitative, quantitative and evaluation research methods to public health issues.

SBHD 610. Behavioral Measurement. 3 Hours.
Semester course; 3 lecture hours. 3. credits. Recommended preparation: SBHD 605. Introduces students to theories and applications of measuring constructs in social and behavioral sciences. Examines test theories, processes involved in developing tests and the standards against which tests are compared.

SBHD 611. Health Literacy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Designed to provide doctoral students an overview of health literacy and its relationship to health outcomes and health disparities. Class material will cover the research and theories in contemporary literature in health literacy.

SBHD 630. Theoretical Foundations of Social and Behavioral Health. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course addresses the theoretical foundations of social and behavioral health, discussing both classic and emergent theories. The course begins with an overview of theoretical concepts, constructs and variables; how to construct theoretical statements; and how to evaluate social science theories. The majority of the course is spent describing theories and models at the individual, interpersonal and community level and evaluating their utility in changing health behavior. The course concludes with a discussion of the state of the discipline and future directions in health behavior change theory and research.

SBHD 631. Disseminating, Adopting and Adapting Evidence-based Prevention Programs. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Preventive interventions that have been evaluated and found to be effective should serve as the standard for community-based public health practice. This advanced seminar will examine theories relevant to the diffusion of these evidence-based interventions (EBI), EBI dissemination procedures and policy, and evaluation of EBI adoption, fidelity monitoring and adaptation.

SBHD 632. Health Disparities and Social Justice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This seminar is designed to provide students with an understanding of the concept of health disparities, reasons for disparities and how social factors contribute to disparities in health care and outcomes. The material will cover the research and theories in contemporary medical, epidemiologic and social justice literature.

SBHD 633. Structural Equation Modeling. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Introduces students to principles and applications of structural equation modeling for testing theories in social and behavioral sciences. Examines latent variables with continuous and discrete distributions, multimethod measurement modeling under the latent variable framework, latent variable modeling of longitudinal measurement designs and testing meditation and moderation using structural equation modeling.

SBHD 634. Patient-Provider Interaction. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: doctoral student or M.P.H. student in social and behavioral health or permission of instructor. Provides students with an advanced introduction to the current theoretical and practical approaches to researching patient-provider interaction. Through exploration of current theory and case studies in practical research, the course develops a comprehensive approach to conducting high-quality, theory-driven research exploring both physician- and patient-focused observational and interventional research. Students are provided with instruction on qualitative, quantitative and mixed-method approaches to such research.

SBHD 635. Anthropology and Public Health. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: doctoral student or M.P.H. student or permission of instructor. Provides students with an advanced introduction to anthropology as a means for exploring public health. Through ethnographic case studies (articles, books and films), the course examines cultural dimensions of illness experience and diverse models of healing and treatment, paying particular attention to political, economic, spiritual and other cultural factors that influence health inequalities, treatment and health behaviors. Approximately 80 percent of the course material focuses on international health. The course is a readings seminar rather than a methodological course; however, students will be asked to think critically about the ways that anthropological methods can contribute to public health practice.

SBHD 636. Community-based Participatory Research. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: doctoral student in social and behavioral health or permission of instructor. This seminar provides students with an understanding of the theories, principles and strategies of conducting CBPR. This class will meet once a week for approximately three hours. Although some lectures will be presented, the main format for the class will reflect the participatory as well as critical reflectiveness required to conduct CBPR. Co-learning will be emphasized against a backdrop of health research. The second major component of this class will be an interactive and hands-on field experience where students will experience the context and learn the methods to use when conducting participatory research for health. Students will work closely with a community partner and will use participatory research methods to address a community partner need.

SBHD 637. Program Evaluation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: doctoral student in social and behavioral health or permission of instructor. This course examines the methods frequently used to determine whether -- and how -- health-related programs are achieving their objectives. Several types of evaluations will be covered, with a focus on process and outcome evaluations. Skills and knowledge relevant to evaluation strategies will be addressed, including the fundamentals of framing evaluation questions, selecting a study design and result dissemination strategies. Students will learn how to judge the quality of evaluation designs, distinguish appropriate from inappropriate evaluations and be given the opportunity to apply the principles and techniques of evaluation science to the creation of a detailed evaluation plan. Materials will be presented in several ways, including lectures, guest lectures, in-class exercises, student presentations, classroom discussions and written assignments.

SBHD 638. Applications in Qualitative Research Methods. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: doctoral student in social and behavioral health or permission of instructor. This course will cover theories, principles and applications to enable high quality research using qualitative research methods. This course will educate students on theories of qualitative research, different methodologies used to gather qualitative data and practical applications of these theories and methods to guide research development in this area. Students will be given the opportunity to analyze published research, conduct qualitative analyses using previously collected data, code and quantify qualitative data, and develop their own plans for a research project.

SBHD 639. Intervention Development and Implementation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: doctoral-level course work in research methods and health behavior theory; permission of instructor. The goal of this course is to provide students with knowledge and applied skills in the development and implementation of behavioral interventions to promote health and prevent disease. Students will receive training in evidence-based behavioral medicine approaches and best practice methods for effectively promoting behavior change in individuals and families. The course takes a sequential and hands-on approach in which students will learn about each step of the intervention development and implementation process and will gain experience applying what they learn to the development of their own intervention. Relevant methodological issues will be covered, with an emphasis on design and methods for randomized controlled trials testing individual-level behavioral interventions across settings. Students will learn to think critically about how to balance theory, empirically supported strategies and pragmatic considerations in the development and execution of intervention trials, with an emphasis on achieving maximum impact in their work. Course objectives will be achieved through lectures, experiential in-class activities, informal Q&A with PIs about their experiences developing and implementing intervention trials, student presentations, classroom discussion and written assignments that map on to key sections of a grant proposal.

SBHD 640. Seminar in Mixed Methods Research. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisites: SBHD 638; and HCPR 732 or SBHD 609. This course provides an overview of best practices in mixed methods research in the social and behavioral sciences and serves as a methods capstone course for SBS doctoral students who have completed the foundational research methods and applications in qualitative research methods courses.

SBHD 690. Departmental Seminar. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Students will attend seminars presented by faculty and invited guests on topics and trends within health policy and health services research. Students and faculty will meet weekly to discuss the theoretical concepts and papers presented and other related topics. Graded as S/U/F. Crosslisted as: HCPR 699.

SBHD 691. Special Topics. 0.5-4 Hours.
Semester course; 0.5-4 lecture hours. 0.5-4 credits. Lectures, tutorial, workshops and/or library assignments in selected areas of advanced study which are not available in other courses or as part of the research training. Graded as S/U/F.

SBHD 692. Special Topics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This letter-graded course will include lectures and other activities in areas of advanced study which are not available in other courses or as part of research training.

SBHD 693. SBHD Internship. 1-3 Hours.
Semester course. variable hours (60 hours per credit). 1-3 credits. Students will spend 60 to 180 hours in a planned, supervised experience with a community agency. Such agencies might include a local free clinic or other nonprofit organization, such as the American Cancer Society, or a local, state or federal public health agency. Graded as S/U/F.

SBHD 694. MPH Project. 1-6 Hours.
Semester course; variable hours. 1-6 credits. Each student will complete a research project that demonstrates the application of the knowledge acquired in the M.P.H. 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/F.

SBHD 695. Independent Study. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Provides the opportunity for students to explore a special topic of interest under the direction of a faculty member. A proposal for a course of study must be submitted to and approved by the chair of the Department of Social and Behavioral Health; credits will be assigned commensurate with the complexity of the project. Arrangements are made directly with the appropriate faculty member and department chair. Graded as S/U/F.

SBHD 697. Directed Research in Social and Behavioral Health. 1-15 Hours.
Semester course; variable hours. 1-15 credits. Requires students to conduct and prepare a written dissertation under the guidance of a faculty committee. The dissertation is written in traditional academic style and must be orally defended. Students must be continually enrolled in this course until successfully completed and approved. A minimum of 9 credits of this course must be taken to complete the degree. Graded as Pass/Fail.

SOCIAL SCIENCE (SOCS)

SOCS 291. Issues in Social Science. 1-3 Hours.
Semester course; variable hours. 1-3 credits per semester. Maximum total of 6 credits. An interdisciplinary course structured around social issues pertinent to today's society. See the Schedule of Classes for specific topics to be offered each semester and the semester credit for which each course will be offered.

SOCS 302. Diverse Families and Children in the United States. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Focuses on the diversity of family life in the United States. Students are encouraged to analyze and appreciate the differences that emerge from such factors as socioeconomic status, race and ethnicity (language, religion, national origin). Attention is given to the variations and commonalities in how parents teach, guide and influence children and adolescents.

SOCS 303. Marriage and Family Relationships. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 101 or permission of instructor. Marriage and the family in contemporary society. Topics discussed will include the effects of masculine and feminine roles on marital and parent-child relationships, how role problems are resolved, sexual adjustments, financial adjustment, family planning and retirement.

SOCS 330. The Psychology and Sociology of Death. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PSYC 101 or SOCY 101. An interdisciplinary study of the encounter with death, death and personality, the organizational processing of death and demographic regularities of dying. Sociologists and psychologists jointly teach the course.

SOCS 340. Human Sexuality. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the variety of the forms, sources and consequences of human sexual behaviors and the attitudes, beliefs and values associated with them. The data and its analysis are directed to the significance of sex in human experience.

SOCS 350. The Construction of Culture. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An examination, using methods from several disciplines, of the ways in which human beings construct the shared meanings that constitute culture.

SOCS 389. AIDS: Myths and Realities. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 101. Presents the students with the fundamentals of infectious disease, immunology and virology as they apply to HIV disease. Students will trace the psychosocial impact the HIV pandemic has had on society since the early 1980s, and will explore the future possibilities for those who are HIV infected and/or HIV affected.

SOCIAL WORK (SLWK)

SLWK 200. Building a Just Society. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Course will introduce students to social justice issues in a local context with a focus on expanding and deepening their knowledge and skills to effect change through active engagement in the community. Course promotes an understanding and critical analysis of multiple forms of oppression in social systems and in personal experience using professional social work perspectives and theoretical frameworks. Selected reference materials and experiential learning activities are designed to enhance student understanding of what constitutes a just community and a just society. The course may be offered as service-learning.

SLWK 201. Introduction to Social Work. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Systematic overview of the social work profession. Knowledge of the nature of social work, the fields of social work practice, target populations, overview of social work methods.

SLWK 230. Communication in the Helping Process. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The study of the knowledge, skills and values of effective human communication and interpersonal relations. Includes observation, collection and description of data, verbal and nonverbal communication and the relevance of the above to social work practice. Integrates issues of human diversity in all course content. Emphasizes the demonstration and practice of communication through structured exercises.

SLWK 311. Social Work and Oppressed Groups. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Open only to majors or minors in social welfare with junior status or by permission of program director or course instructor. Examines forces leading to individual prejudice and institutional oppression. Focuses on impact of oppression. Provides students with an understanding of diversity and a general knowledge of social work strategies to alleviate oppression and to empower the oppressed.

SLWK 313. Person in Society I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: ANTH/INTL 103; BIOL 101, BIOL 151 or BIOL 152; PSYC 304; and SOCY 101. Open only to majors or minors in social welfare with junior status or by permission of program director or course instructor. First of a three-semester sequence on human behavior and the social environment. Uses theoretical concepts and research findings from the behavioral sciences as background for understanding and assessing the functioning of individuals and families in their social environment. Facilitates integration of theory and research with assessment skills associated with basic social work practice. Emphasizes the social systems approach for analyzing the impact of various social problems on individual and family dynamics.

SLWK 330. Person in Society II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SLWK 313 with a minimum grade of C. Open only to majors or minors in social welfare with junior status or by permission of program director or course instructor. Second of three courses on human behavior in the social environment. Uses theoretical concepts from the behavioral sciences to understand the family and small groups as social institutions and social groups as context for human behavior over the life cycle. Designed to provide a theoretical foundation for practice with families and small groups.

SLWK 332. Social Work Practice: Fundamentals. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SLWK 313 with a minimum grade of C. Corequisite: SLWK 393. Open only to social work majors with junior status. First of three semester practice sequence. Introduces students to basic concepts and skills of beginning-level professional generalist social work practice. Emphasizes application of concepts to the concurrent fieldwork experience.

SLWK 380. Foundations of Social Work Research I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Open only to majors or minors in social welfare with junior status or by permission of program director or course instructor. First of two semester research sequence. Designed to provide an understanding and appreciation of a scientific, analytic approach to building knowledge for practice and for evaluating multilevel service delivery. Provides an overview of the research process, including problem formulation, sampling, design, measurement, data collection, data analysis and dissemination of findings. Presents ethical standards of scientific inquiry with special attention to research with vulnerable and oppressed populations.

SLWK 381. Foundations of Social Work Research II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SLWK 380 with a minimum grade of C. Open only to social work majors or minors in social welfare with junior status or by permission of program director or course instructor. The content includes a review of basic statistical univariate and bivariate descriptive and inferential tools for analyzing, interpreting and presenting data for decision-making in generalist social work practice. It also introduces methods for analysis of quantitative and qualitative data and further develops critical-thinking skills in translating empirical research findings into generalist social work practice principles.

SLWK 391. Topics in Social Work. 1-3 Hours.
Semester course; variable hours. 1-3 credits. An in-depth study of a selected topic relevant for professional social work practice. See the Schedule of Classes for the specific topic to be offered each semester.

SLWK 393. Junior Field Instruction. 3 Hours.
Semester course; 3 credits. Prerequisite: SLWK 313 with a minimum grade of C. Corequisite: SLWK 332. Open only to majors with junior status. Fourteen hours per week (spring semester) or 20 hours per week (summer session) in a community agency under the supervision of an agency-based field instructor. Intended to facilitate student's understanding of agency structure and community context, ability to engage in professional relationships, to assess strengths, define problems, set goals and utilize beginning-level practice skills with individuals, families, groups, organizations and communities. Promotes identification as a professional social worker.

SLWK 422. Social Welfare Legislation and Services. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: completion of SLWK 311, 313, 332, 380, 381 and 393, each with a minimum grade of C. Enrollment restricted to majors or minors in social welfare with junior status or by permission of program director or course instructor. Analyzes social welfare policy as related to social values, social problems and social structures. Examines frameworks for policy analysis and for evaluation of programmatic outcomes of policy, with application to contemporary social service and income maintenance policies and delivery systems. Considers the economic, political and ideological factors and processes that affect social welfare legislation, financing and implementation.

SLWK 431. Person in Society III. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SLWK 313 with a minimum grade of C. Open only to majors or minors in social welfare with junior status or by permission of program director or course instructor. Third of three courses on human behavior in the social environment. Builds on the theoretical concepts from the behavioral sciences discussed in SLWK 230 and 313. Focus on understanding organizations and how their purposes, auspices, structure, processes and environment affect the delivery of social services to diverse groups. The community context of social services, including that of the consumer, is emphasized from an open systems theoretical perspective. Students will be expected to integrate course content with their field experience or other agency with which they are familiar. Required of all undergraduate social work majors.

SLWK 441. Social Work Practice I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: SLWK 332, 381 and 393, each with a minimum grade of C. Open only to majors with senior standing. Second of a three-semester practice sequence. Review of interviewing and problem-solving for generalist social work practice with diverse populations. Emphasis on agency structure and function, skills of engagement and problem definition, assessment, planning for intervention, and evaluation. Use of material from concurrent fieldwork practice to facilitate integration of learning.

SLWK 442. Social Work Practice II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: SLWK 441 and SLWK 494, each with a minimum grade of C. Open only to majors with senior standing. Third of a three-semester practice sequence. Emphasizes planning and implementing change with diverse populations, professional ethics, professional development, termination and evaluation of generalist social work practice. Use of case material from concurrent fieldwork practice to facilitate integration of learning.

SLWK 492. Independent Study. 1-3 Hours.
Semester course; 1, 2 or 3 lecture hours. 1, 2 or 3 credits. Prerequisites: junior or senior standing, and permission of instructor. Under supervision of a faculty adviser, whose consent is required to register, study of a topic of concern to the student. Each student must present his or her findings in writing or pass an oral examination.

SLWK 494. Senior Field Instruction I. 3 Hours.
Semester course. 3 credits. Prerequisite: completion of SLWK 332, 381 and 393, each with a minimum grade of C. Corequisite: SLWK 441. Open only to majors with senior status. Fourteen hours per week in a community agency under the supervision of an agency-based field instructor. Intended to develop knowledge, values and social work practice skills appropriate to entry-level generalist practice in human service agencies.

SLWK 495. Senior Field Instruction II. 3 Hours.
Semester course. 3 credits. Prerequisite: completion of SLWK 494 with a minimum grade of C. Corequisite: SLWK 442. Open only to majors with senior status. Fourteen hours per week in a community agency under the supervision of an agency-based field instructor. Intended to develop knowledge, values and social work practice skills appropriate to entry-level generalist practice in human service agencies.

SLWK 499. Senior Seminar. 1 Hour.
Semester course. 1 credit. Corequisites: SLWK 442 and 495. Typically to be taken in the last semester of the student's senior year. This course serves as an academic culmination of the undergraduate social work program. The student will compile a portfolio of B.S.W. program academic materials, complete a professional self-assessment and resume and participate in the development of a comprehensive generalist intervention plan with regard to a specified social problem.

SLWK 601. Human Behavior in the Social Environment I. 3 Hours.
Semester course; 3 credits. Provides a multidimensional theoretical and evidence-based approach to understanding the complex interactions of biological, psychological, spiritual, economic, political and sociocultural forces on the lives individuals, families and groups in a multicultural society. Required core curriculum course.

SLWK 602. Policy, Community and Organizational Practice I. 3 Hours.
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. 3 Hours.
Semester course; 3 credits. Enhances understanding of and appreciation for diversity in self and others. Addresses issues of power, inequality, privilege and resulting oppression. Analyzes 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 strengths, needs and responses. Uses a social justice perspective for the study of and practice with oppressed groups. Required direct practice core curriculum course.

SLWK 604. Social Work Practice with Individuals, Families and Groups I. 3 Hours.
Semester course; 3 credits. Pre- or corequisites: SLWK 601, 602, 603. Introduces basic knowledge, skills and values necessary to provide a range of restorative, rehabilitative, maintenance and enhancement services in social work practice with individuals, families and groups. Introduces selected practice theories and models to guide intervention. Emphasizes the multidimensional and diverse contexts in which problems and needs are assessed and in which intervention occurs. Required direct practice core curriculum course.

SLWK 605. Social Work Practice with Individuals, Families and Groups II. 3 Hours.
Semester course; 3 credits. Prerequisite: SLWK 604. Pre- or corequisites: SLWK 606 and SLWK 610. 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 additional selected theories and models for social work practice with individuals, families and groups with attention to special populations and practice evaluation. Required direct practice core curriculum course.

SLWK 606. Policy, Community and Organizational Practice II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SLWK 602. The 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 implications for social and economic justice.

SLWK 607. Social Work Practice with Individuals, Families and Groups for Advanced-standing Students. 3 Hours.
Semester course; 3 credits. Prerequisite: admission to the advanced standing program. Corequisites: SLWK 608, 611 and 612. Students review approaches, principles, techniques and theories of micro social work practice and human behavior. Emphasis is on commonalties and differences among practice modalities, including differential assessment, intervention and evaluation of outcomes. Course includes weekly field instruction integrating seminar. This course is offered during the summer only. Required advanced standing program core curriculum course.

SLWK 608. Social Work Practice in Organizations and Communities for Advanced-standing Students. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: admission to the Advanced Standing Program. Corequisites: SLWK 607, 611 and 612. Presents social work theory and practice focusing on social policy, communities, agencies and interventions in light of principles of social and economic justice. Introduces and analyzes the social work role of policy practitioner with its specific skills and tasks. Demonstrates the importance of understanding the community and the agency in social work practice. Provides skill building in advocacy, planned change, and policy and organizational analysis, as well as weekly field instruction seminar. This course is offered during the summer only.

SLWK 609. Foundations of Research in Social Work Practice. 3 Hours.
Semester course; 3 credits. Introduces the methods of social work research, including problem formulation, research designs, measurement, data collection and sampling. Focuses on the application of critical-thinking skills, diversity and research methods of clinical social work practice effectiveness. Covers evaluation of social work programs and services. Required direct practice core curriculum course.

SLWK 610. Human Behavior in the Social Environment II. 3 Hours.
Semester course; 3 credits. Prerequisite: SLWK 601. Covers the life course from conception through late adulthood and/or death. Focuses on the influences of biological, psychological, spiritual, economic, political and sociocultural forces on individual and family coping and adaptation. Provides a multidimensional, multicultural perspective on the behavior of individuals and families based on theory and research with identification of the risk and protective mechanisms that influence development. Required core curriculum course.

SLWK 611. Social Work Research for Advanced-standing Students. 3 Hours.
Semester course; 3 credits. Prerequisite: admission to the advanced standing program. Corequisites: SLWK 607, 608 and 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. Required advanced standing program core curriculum course.

SLWK 612. Advanced-standing Field Instruction. 3 Hours.
Summer course; four eight-hour days in field instruction, followed by two days per week for nine weeks and completed with a full five-day week at the field instruction agency. 3 credits. Prerequisites: admission to the Advanced Standing Program. Corequisites: SLWK 607, 608 and 611. Reviews foundation-level knowledge, attitudes and skills acquired through social work education at the undergraduate level. Requires application, refinement and the active use of content from the advanced standing curriculum in supervised social work practice in a social agency. Graded P/F. Grade of P required to continue in the program.

SLWK 692. Independent Study. 1-6 Hours.
Semester course; 1-6 credits. Maybe be repeated for credit. Prerequisites: M.S.W. foundation standing and permission of instructor and M.S.W. program director. The student will be required to submit a proposal for study in an identified practice area or for exploration of a specific problem in social work not ordinarily included in the Master of Social Work curriculum. The results of the student's study will be presented in a format determined by the instructor and student to be most effective for assessing study educational objectives/competencies and outcomes. A maximum of four independent study courses may be included in a student's educational program.

SLWK 693. Foundation Field Instruction I. 3 Hours.
Continuous course; two days/14 hours per week. 3 credits. Pre- or corequisite: SLWK 604. 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. Grade of PR required for continuation from SLWK 693 to SLWK 694; converts to P upon completion of SLWK 694.

SLWK 694. Foundation Field Instruction II. 3 Hours.
Continuous course; two days/14 hours per week. 3 credits. Prerequisite: SLWK 693. 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. Graded P/F. Final grade of P required to continue in the program.

SLWK 695. Block Foundation Field Instruction. 6 Hours.
Semester course; five days a week for one semester. 6 credits. Prerequisites: SLWK 605. Option for part-time students only. 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 the integration of content from all areas of the foundation curriculum. Graded P/F. Grade of P required to continue in the program.

SLWK 703. Mental, Emotional and Behavioral Disorders. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: SLWK 693 and 694; or SLWK 695; or SLWK 612. This course reviews the epidemiology, etiology, classification (using the Diagnostic and Statistical Manual of Mental Disorders V) and course of a range of mental, emotional and behavioral disorders and conditions across the life span and the relevance of this knowledge to social work across practice settings. It emphasizes a biopsychosocialspiritual assessment, a risk and protective factors framework, a critical analysis of existing and emerging theory, the impact of difference and diversity, an appreciation of the lived experience of these challenges for clients and their families, and the practical implications of this knowledge for relationship-building and treatment planning as well as interdisciplinary collaboration. Introduces knowledge of psychopharmacology. Required advanced clinical core curriculum course.

SLWK 704. Clinical Social Work Practice I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Pre- or corequisites: SLWK 703 and 706. Provides a multitheoretical orientation to intervention across fields of practice with individuals, families, couples and groups. Emphasizes contemporary psychodynamic and cognitive behavioral approaches and their empirical support. Focuses on multidimensional assessment and the differential application of therapeutic, supportive, educational and resource-management strategies to complex problems of children, youth and adults. Required advanced clinical core curriculum course.

SLWK 705. Clinical Social Work Practice II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SLWK 704; pre- or co-requisites: SLWK 707 and 710. 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 diverse populations. Introduces basic knowledge of pharmacology related to social work intervention. Required advanced clinical core curriculum course.

SLWK 706. Research for Clinical Social Work Practice I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: SLWK 693 and 694; or SLWK 695; or SLWK 612. Review of statistical inference and decision-making using univariate and bivariate techniques. Introduction to computer applications for quantitative data and methods of analysis of qualitative data. Application of ethical standards for research involving human participants. Further development of critical-thinking skills in using empirical literature. Required advanced clinical core curriculum course.

SLWK 707. Research for Clinical Social Work Practice II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SLWK 706. Further development of critical-thinking skills for translating research findings into practice principles and measuring outcomes of clinical practice. Focus on data collection, data analysis, presentation of visual and statistical techniques for qualitative and quantitative research methods, and utilization of findings for improving clinical social work practice. Continued application of statistical inference, integration of empirical research findings and decision-making. Required advanced clinical core curriculum course.

SLWK 710. Concentration Social Policy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite(s): SLWK 693 and 694; or SLWK 695; or SLWK 612. 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; value, 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 of social and economic justice. 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite(s): SLWK 693 and 694; or SLWK 694; or SLWK 612. 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 resources. Emphasizes planning context for diverse settings. Provides knowledge and skill for human and fiscal resource responsibilities, including fund raising. Examines ethical and justice implications of planning and administrative practice.

SLWK 712. Social Work Planning and Administrative Practice I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Pre- or co-requisites: SLWK 711 and SLWK 714. Presents knowledge and skills for social work leadership in administering, developing and advocating social service policies and programs that are socially and economically just. Examines underlying assumptions, political, value and ethical considerations in social service planning. Presents knowledge of organizational theories and analyzes the political context of problem solving in the internal and external environments of organizations and programs. Focuses on community and organizational planning theories and models of intervention in assessing needs, analyzing problems, determining feasibility and identifying 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SLWK 712. 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 understandings of policies, community, and organizational behavior and change, and leadership styles and skills. Analyzes feasibility of interorganizational partnerships and community relationships. Focuses on financial and human resource acquisition and mobilization, monitoring, accountability and evaluation.

SLWK 714. Research for Social Work Administration, Planning and Policy Practice I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite(s): SLWK 693 and 694; or SLWK 695; or SLWK 612. Focuses on social work program and service evaluation including needs assessment, social indicators analysis, evidence-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 quantitative data and methods for analysis of qualitative data. Application of ethical standards for evaluation involving human participants.

SLWK 715. Research for Social Work Administration, Planning and Policy Practice II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SLWK 714. 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 dissemination 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite(s): SLWK 693 and 694; or SLWK 695; or SLWK 612. Extends SLWK 602 through 606 content on policy practice, organizations, communities and advocacy. 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, policy formulation and place 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite(s): SLWK 693 and 694; or SLWK 695; or SLWK 612. Emphasizes knowledge and skills of school social work practice with diverse populations in urban and rural school settings. Uses an ecological explanatory theoretical perspective to conceptualize the interdependence of school, family and community as complex interdependent systems that guide evidence-based practice interventions. Integrates a strengths-based social justice perspective for school-based concerns related to violence, racism, sexism, poverty and their impact on children and youth in educational settings. Advanced clinical elective and core curriculum course for school social work practice certification.

SLWK 718. Social Work Practice in Child Welfare. 3 Hours.
Semester course; 3 credits. Prerequisite: foundation curriculum or permission of the instructor and M.S.W. program director. Identifies the major social, demographic and economic changes in child welfare services that impact children -- a vulnerable population -- and their families. Builds on explanatory theories and related skill sets required for effective service delivery. Primary service areas are intervention, family preservation, child protection and permanency planning. Advanced clinical elective course.

SLWK 719. Gender and Substance Abuse: Social Work Practice Issues. 3 Hours.
Semester course; content delivered online. 3 credits. Prerequisite(s): SLWK 693 and 694; or SLWK 695; or SLWK 612. Based on the social work person-in-environment explanatory multitheoretical perspective and current research to provide a multidimensional understanding of the influence of gender roles and biological sex in vulnerability to substance abuse and related problems. Evidence-based theory approaches are utilized to identify and address the effects of substance abuse and related problems for men, women and children. Advanced clinical elective course.

SLWK 726. Social Work Practice and Health Care. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite(s): SLWK 693 and 694; or SLWK 695; or SLWK 612. Focuses on social work practice in a variety of health care settings with a range of explanatory theories conceptualizing health care issues and identifies related 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. Advanced clinical elective course.

SLWK 727. Trauma and Social Work Practice: Theory, Assessment and Intervention. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite(s): SLWK 693 and 694; or SLWK 695; or SLWK 612. Provides advanced explanatory theoretical knowledge and skills to explain, identify, assess and provide effective and competent evidence-based trauma intervention services to survivors of complex traumatic experiences. Focuses on the evidence-based biopsychosocial consequences of childhood sexual and physical abuse and military/war trauma experiences in daily functioning on individuals, families and groups. Advanced clinical elective course.

SLWK 728. The Interdisciplinary Team in Social Work Practice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite(s): SLWK 693 and 694; or SLWK 695; or SLWK 612. 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite(s): SLWK 693 and 694; or SLWK 695; or SLWK 612.Overview of fundamental principles of Anglo-American law; structure and function of the legal system and its professional membership; lawyers and their working relationship with social workers. Emphasizes client-centered problems encountered in the legal community and the role social workers can play in helping clients deal with those encounters. Explores issues relative to client needs such as welfare rights, consumer protection, mental health treatment, family-related law and discrimination relative to education, housing, employment, health care. Discusses legal issues confronting social work, such as confidentiality, licensing, advocacy and witnessing.

SLWK 740. Social Work Crisis Intervention and Planned Short-term Treatment. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite(s): SLWK 693 and 694; or SLWK 695; or SLWK 612. Examines explanatory conceptual and theoretical aspects of the differential use of crisis intervention and planned short-term social work intervention. Explores evidence-based crisis models that guide direct interventions, consultation, collaboration and service-delivery issues. Advanced clinical elective course.

SLWK 741. Social Work Practice and the Neurosciences. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite(s): SLWK 693 and 694; or SLWK 695; or SLWK 612. The course introduces the social work student to the increasingly important field of neuroscience and the numerous explanatory theories which underlie this science (e.g. neuroplasticity, epigenetics, neurodevelopmental view of trauma, pharmacogenomics, neurobiology of addiction). Focus is placed on why neuroscience research is important for the discipline of social work and how specific neuroscience findings can be utilized by the social work practitioner to enhance practice interventions. Though the field of neuroscience is extensive, this course will focus on several areas that are of particular relevance to social work practice.

SLWK 742. Core Concepts of Child and Adolescent Trauma. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: SLWK 693 and SLWK 694; or SLWK 695. This course will introduce students to the core concepts (explanatory theory and foundational knowledge) that inform evidence-based assessment and intervention with traumatized children and adolescents. Strength-based practice will be highlighted along with a focus on the identification of protective and promotive factors that foster resiliency and post-traumatic growth. Trauma is broadly defined, and subjects include children and adolescents exposed to traumatic events including, but not limited to natural disasters, war, abuse and neglect, medical trauma, and witnessing interpersonal crime (e.g. domestic violence) and other traumatic events. The course will highlight the role of development, culture and empirical evidence in trauma-specific interventions with children, adolescents and their families. It will address the level of functioning of primary caregiving environments and assess the capacity of the community to facilitate restorative processes.

SLWK 743. Spirituality and Social Work Practice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite(s): SLWK 693 and 694; SLWK 695; or SLWK 612.. Designed to educate students for advanced social work practice with persons of diverse religious and nonreligious perspectives of spirituality. It provides a comprehensive introduction to spiritually sensitive social work and is intended to expand the explanatory theories that inform professional social work practice. The concepts of person-in-environment and strengths become vivid as the student in practicum assesses how individuals may use spirituality to establish meaning and purpose in relation to their goals of daily living.

SLWK 745. Social Work Practice in Community Mental Health. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite(s): SLWK 693 and 694; or SLWK 695; or SLWK 612. Provides the specialized knowledge, values and skills requisite in community mental health settings. Builds on the explanatory biopsychosocial model of mental health/illness. Focuses on current evidence-based psychotherapeutic, psychoeducational, and skill-training models and approaches used with individuals, families and groups experiencing or affected by a range of mental health problems. Examines interdisciplinary teamwork, case management, advocacy and medication management roles. Advanced clinical elective course.

SLWK 746. Social Work Practice and Psychopharmacology. 3 Hours.
Semester course; 3 credits. Prerequisite(s): SLWK 693 and 694; or SLWK 695; or SLWK 612. . Reviews the historical, political and ethical context of psychotropic medications in social work practice. Provides an explanatory theoretical overview of psychopharmacology and social work roles and skill sets in medication management for effective collaboration with clients, families and other mental health practitioners on medication-related issues. Advanced clinical elective course.

SLWK 747. Social Work Intervention with Children and Adolescents. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite(s): SLWK 693 and 694; or SLWK 695; or SLWK 612. . Provides students with the opportunity for concentrated study and application of a range of specific explanatory theoretical models and evidence-based intervention strategies with children, adolescents and their families. Special attention is given to multicultural theoretical approaches that guide approaches to providing services to children and adolescents from diverse racial, ethnic, social and sexual orientation backgrounds and diverse settings. Advanced clinical elective course.

SLWK 748. Group Methods in Social Work Practice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite(s): SLWK 693 and 694; or SLWK 695; or SLWK 612. Presents several conceptual models of therapeutic groups that explain group dynamics and processes, including evidence-based treatment, educational and mutual aid/self-help. Covers agency conditions affecting practice with groups, the planning of new groups, the multiple phases of group process, and related theory-based interventions and techniques of work with groups and group practice evaluation. Advanced clinical elective course.

SLWK 749. Social Work Intervention in Substance Abuse. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite(s): SLWK 693 and 694; or SLWK 695; or SLWK 612. . Provides students with the physiological, emotional and behavioral manifestations of substance abuse, DSM-IV-TR-based assessment, a range of relevant evidence-based intervention strategies and the role of social workers in evaluation and intervention. Covers explanatory theory models that guide substance abuse intervention and presents screening, assessment and interventional techniques. Current research and controversies in the field are also emphasized. Advanced clinical elective course.

SLWK 750. Ethics and Social Work Practice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite(s): SLWK 693 and 694; or SLWK 695; or SLWK 612. Examines the history and development of the values base and ethical principles of the social work profession. Investigates 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite(s): SLWK 693 and 694; or SLWK 694; or SLWK 612. . 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 753. Social Work Practice with Oppressed Racial and Ethnic Groups. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite(s): SLWK 693 and 694; or SLWK 695; or SLWK 612. Focuses on enhancing the student's micro and macro social work interventions with oppressed racial and ethnic groups. Addresses the social and economic context in which social work practice occurs. Examines history, ethics, values, attitudes and behaviors of the student and the profession as they relate to assessment and intervention with oppressed racial and ethnic groups. Assesses intervention frameworks and techniques for their appropriateness and effectiveness with these groups.

SLWK 755. Social Work Practice in Organizing for Social Change. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite(s): SLWK 693 and 694; or SLWK 695; or SLWK 612. An advanced practice course that recognizes the central role of social action in social work practice, no matter the context, and the value of social justice, no matter what client population. Built on the idea of multiple perspectives and using the Rothman model of organizing, it assumes students already possess basic policy practice and direct practice skills in order to focus on the dimensions of social action and locality development.

SLWK 757. Special Topics in Clinical Social Work Practice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: SLWK 703 and 704. Provides knowledge and skills for intervention across fields of practice with the use of up to three clinical practice theories or intervention modalities that are not emphasized in required clinical practice courses. Focuses on the differential application of intervention strategies to problems of children, youth and adults. Examines the impact of diversity in clinical practice.

SLWK 759. Art Therapy in Social Work Practice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite(s): SLWK 693 and 694; or SLWK 695; or SLWK 612. . Focuses on explanatory theory supporting art therapy as an evidence-based approach to clinical social work intervention. Explores the models, principles and techniques of art therapy in social work practice. Examines assessment, intervention, termination and evaluation strategies that supplement traditional social work treatment, including research and specific evidence-based practice strategies for individuals, families, groups and diverse populations.

SLWK 761. Interpersonal Violence. 3 Hours.
Semester course (hybrid course with both in-class and online sessions); 3 credits. Prerequisite(s): SLWK 693 and 694; or SLWK 695; or SLWK 612. Increases understanding of interpersonal violence explanatory theory and practice knowledge for a wide range of client systems throughout the lifespan. Included are prenatal exposure to interpersonal violence, child abuse and neglect, teen dating violence, intimate partner violence, children's experience with intimate partner violence, and elder abuse. Victim and perpetrator experiences related to interpersonal violence will be highlighted. Resiliency and experiences of diverse populations from an evidence-based person-in-environment theoretical perspective are emphasized. Prevention theory strategies and relevant interpersonal violence policy issues are also addressed.

SLWK 765. Supervision. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite(s): SLWK 693 and 694; or SLWK 695; or SLWK 612. . Explores task components and responsibilities in supervision of the social worker. Emphasizes a conceptual framework for supervision, including knowledge base, methods and skill in supervision. Attention to affirmative action programs in social service delivery systems.

SLWK 769. Women's Issues and Social Work Practice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite(s): SLWK 693 and 694; or SLWK 695; or SLWK 612. . 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, development of new life styles; 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 Study Abroad. 3 Hours.
Semester course (international study); 3 lecture hours. 3 credits. Prerequisite(s): SLWK 693 and 694; or SLWK 695; or SLWK 612. Examines social work 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 education; the social welfare system; selected social programs; social work clinical and policy practice; and comparisons of these topics between the country and the U.S. Requires completion of several course units before the study abroad program.

SLWK 773. Program Evaluation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite(s): SLWK 693 or 694; or SLWK 695; or SLWK 612. . Presents methods, problems and research findings related to the evaluation of social welfare 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. Presents data processing and the roles of data analysis and the computer in the evaluation of social welfare programs.

SLWK 791. Topical Seminar. 1-3 Hours.
Semester course. 1-3 lecture hours. 1-3 credits. Prerequisite(s): SLWK 693 and 694; or SLWK 695; or SLWK 612. Presents and analyzes current social work practice theories and/or issues in specialized areas of interest to social work. Advanced clinical curriculum elective course.

SLWK 792. Independent Study. 1-6 Hours.
Semester course; 1-6 lecture hours. 1-6 credits. Prerequisite(s): SLWK 693 and 694; or SLWK 695; or SLWK 612. The student is required to submit a proposal, guided by theory, for investigation in an identified practice area or problem in social work not ordinarily included in the regular M.S.W. curriculum. The topic is proposed by the student; the number of credit hours is determined by the instructor and approved by the M.S.W. program director. The results of the study are presented in a format determined by the instructor and student and approved by the M.S.W. program director. Concentration year elective course.

SLWK 793. Concentration Field Instruction I. 3 Hours.
Continuous course; 21 hours per week. 3 credits. Prerequisite: SLWK 704. First of a two-course sequence that provides opportunities to master advanced social work application of theory 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 concentration curriculum. Completion of two-course sequence requires 630 structured field hours. Practicum supervisor has LCSW credentials or clinical course of study M.S.W. with three years post-M.S.W. clinical experience. Advanced clinical field instruction.

SLWK 794. Concentration Field Instruction II. 3 Hours.
Continuous course; 21 hours per week. 3 credits. Prerequisite: SLWK 793. Second of a two-course sequence provides opportunities to master advanced social work application of theory 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 concentration curriculum. Completion of two-course sequence requires 630 structured field hours. Practicum supervisor has LCSW credentials or clinical course of study M.S.W. with three years post-M.S.W. clinical experience. Advanced clinical field instruction.

SLWK 795. Concentration Block Field Instruction. 6 Hours.
Semester fieldwork; five days a week for one semester. 6 credits. Prerequisite: SLWK 705. Advanced clinical block field instruction (option for part-time students). Provides opportunities to master advanced 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 concentration curriculum. Completion of course requires 600 structured field hours. Practicum supervisor has LCSW credentials or clinical course of study M.S.W. with three years post-M.S.W. clinical experience.

SLWK 796. Concentration Field Instruction DE I. 2 Hours.
Semester course; 15 hours per week. 2 credits. Prerequisites: M.S.W. concentration standing; enrollment in the distance education program. Pre- or corequisites: SLWK 703, 704-705, 706-707, 710 and electives; or SLWK 710 , 711, 712-713, 714 -715 and electives; or foundation curriculum; or permission of the instructor and M.S.W. program director. Course provides opportunities to master advanced social work application of theory knowledge, values and skills through practice under the direction of an agency-based field instructor and monitored by a faculty field liaison. Emphasizes integration of content from all areas of the concentration curriculum. Completion of course requires 210 structured field hours. Practicum supervisor has LCSW credentials or clinical course of study M.S.W. with three years post-M.S.W. clinical experience. Advanced clinical field instruction.

SLWK 797. Concentration Field Instruction DE II. 2 Hours.
Semester course; 15 hours per week. 2 credits. Prerequisites: M.S.W. concentration standing; enrollment in the distance education program; SLWK 796. Pre- or corequisites: SLWK 703, 704-705, 706-707, 710 and electives; or SLWK 710 , 711, 712-713, 714 -715 and electives; or foundation curriculum; or permission of the instructor and M.S.W. program director. Course provides opportunities to master advanced social work application of theory knowledge, values and skills through practice under the direction of an agency-based field instructor and monitored by a faculty field liaison. Emphasizes integration of content from all areas of the concentration curriculum. Completion of course requires 210 structured field hours. Practicum supervisor has LCSW credentials or clinical course of study M.S.W. with three years post-M.S.W. clinical experience. Advanced clinical field instruction.

SLWK 798. Concentration Field Instruction DE III. 2 Hours.
Semester course; 15 hours per week. 2 credits. Prerequisites: M.S.W. concentration standing; enrollment in the distance education program; SLWK 796, SLWK 797. Pre- or corequisites: SLWK 703, 704-705, 706-707, 710 and electives; or SLWK 710 , 711, 712-713, 714 -715 and electives; or foundation curriculum; or permission of the instructor and M.S.W. program director. Course provides opportunities to master advanced social work application of theory knowledge, values and skills through practice under the direction of an agency-based field instructor and monitored by a faculty field liaison. Emphasizes integration of content from all areas of the concentration curriculum. Completion of course requires 210 structured field hours. Practicum supervisor has LCSW credentials or clinical course of study M.S.W. with three years post-M.S.W. clinical experience. Advanced clinical field instruction.

SOCIAL WORK - DOCTORATE (SWKD)

SWKD 701. Quantitative Research Methods and Analysis I. 4 Hours.
Semester course; 4 lecture hours. 4 credits. Prerequisites: master's-level course work in research methods and introduction to statistics; graduate standing in social work or permission of program director. First of a three-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 collection within the context of professional values, ethics and commitment to social justice.

SWKD 702. Quantitative Research Methods and Analysis II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: master's-level course work in research methods and introduction to statistics, graduate standing in social work or permission of program director; SWKD 701. Second of a three-semester course sequence focused on concentrated study of principles of quantitative, scientific method for knowledge building, and practice- and policy-related research. Special emphasis 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: admission to Ph.D. program 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 underlying meta-framework for modes of inquiry in science. Of particular focus will be the social sciences including social work. Using a paradigm perspective, the seminar will investigate the epistemological, ontological and methodological implications for knowledge building for social work.

SWKD 704. Multiparadigmatic Qualitative Methods and Analysis. 4 Hours.
Semester course; 4 lecture hours. 4 credits. Focuses on assisting participants to develop and refine their understanding of and skills in qualitative research from multiple paradigmatic perspectives. The course will investigate a variety of qualitative strategies that allow for examination, exploration and/or description of phenomena by theory building, theory testing or constructing meaning. Emphasis will be on a range of qualitative methods for collecting empirical material and methods for the analysis of those data, including decisions about the use of computer analysis.

SWKD 705. Multivariate Analysis in Social Work and Human Services Research. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: master's-level course work in research methods and introduction to statistics, graduate standing in social work or permission of program director, and SWKD 701 and 702. The third of a three-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 application and interpretation of multivariate statistical techniques within the context of applied social work research.

SWKD 708. Social Science Foundations for Social Work. 3 Hours.
Semester course; 3 lecture hours. 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 for social work practice. Emphasis will be given to developing the abilities of students to identify the essential elements of theory, determining the knowledge building purposes of theory and articulating the rationale for selection of theories as a basis and guide for scholarly inquiry. In addition, theories are officially evaluated for their implicit assumptions, values, empirical support and potential usefulness for students' own specialized area of study. Classic and contemporary theories covered will be drawn from the social 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: doctoral program admission or permission of instructor. Required seminar for social work doctoral students. Examination of social work, 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 from the perspective of social work 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A required seminar for second-year doctoral students that builds on behavioral science theory and research methods/data analysis courses. This course offers analytical and comparative perspectives on classic and contemporary theories and models of change that underlie real-world social work practice interventions, services, programs and policies across system sizes, and the research approaches and methods used to evaluate their implementation and impact. Students discover existing practice theories and models of change related to their own substantive interest in solving a pressing social problem or human challenge and propose a new theoretically and empirically grounded change strategy that contributes to the science of social work, including the advancement of social justice and/or an appreciation of diversity.

SWKD 722. Evaluation of Human Service Programs. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: Ph.D. program standing or permission of instructor. Application of social research methods to the planning and development of evaluation research in human service programs. Covers the planning and evaluation cycle, categories of evaluation (evaluability assessment, needs assessment, social indicators, asset mapping, process, performance, outcome and impact), roles of evaluators and stakeholders, development and use of program theory, and dissemination of evaluation results for policy and program improvement.

SWKD 724. Constructivist Inquiry. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: Ph.D. program standing or permission of program director. The purpose of this course is to: 1) contrast interpretive and functionalist (positivist) inquiry paradigms and note the conditions under which each is the paradigm of choice for research; 2) clarify the relationship between constructivist and qualitative methodologies; 3) acquaint the student with some of the more common constructivist methods and to offer opportunities in applying those methods; 4) prepare the student to act as a peer reviewer or auditor in a constructivist inquiry.

SWKD 726. Seminar on Social Work Education and Teaching. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment requires Ph.D. program standing or permission of program director. This doctoral seminar prepares students to become effective and ethical social work educators. The course focuses on teaching and learning approaches in higher education, assessment of educational outcomes, curriculum design and course development, roles and responsibilities of faculty members, and historical and contemporary trends in social work education.

SWKD 791. Topical Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated once 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. 1-3 Hours.
Semester course; 1, 2 or 3 credits. Prerequisite: permission of the program director. Independent reading and study in selected areas under the supervision of a member of the faculty. 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.

SWKD 797. Directed Research. 3 Hours.
Semester course; 3 credits. Prerequisite: completion of first-year Ph.D. courses in social work or permission of program director. The course provides doctoral students the opportunity to do hands-on research prior to the dissertation project that is relevant to their substantive area or individual learning needs. The topic and specific project will be initiated by the student and implemented in collaboration with a School of Social Work faculty member. A proposal for a directed research course must be submitted that specifies how the student will gain experience, knowledge and skills in one or more aspects of conducting a research project, including conceptualization of the question; development of a graphic or visual schema; measurement design and/or instrument development; qualitative, quantitative or mixed-methods research design and implementation; data collection or data management; data analysis; and dissemination of findings. Students may create their own project or dovetail with existing student or faculty projects.

SWKD 798. Intergrative Seminar. 1 Hour.
Semester course; 1 seminar hour. 1 credit. This seminar in the final semester of course work is a capstone course designed to highlight and extend the integration of learning, stress the "wholeness" of the doctoral experience and more intentionally embrace the program themes related to integration, critical thinking, and social justice and diversity. The course serves as organizing structure for understanding gaps in one's own knowledge base, practice peer mentoring and leadership in nurturing an intellectual community, and cooperatively plan final aspects of comprehensive exam study. It is seen as one vehicle for understanding the context of the student's line of inquiry and for deepening professional development, identity and career preparation as a social work scholar and leader. Graded as S/U/F.

SWKD 898. Dissertation Research. 1-16 Hours.
Semester course; 1-16 credits. Prerequisite: successful completion of comprehensive examinations or permission of program director. Students are required to complete 16 credit hours. May be taken for additional credits until dissertation is formally accepted.

SOCIOLOGY (SOCY)

SOCY 101. Introduction to Sociology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introduction to the study of human society. The basic concepts of society and culture and their relationships to each other are studied and then used to analyze the major social institutions.

SOCY 104. Sociology of Racism. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The course will explore the direct and indirect ways in which racial attitudes are acquired, their effect on individuals and society, and the institutional and ideological manifestations of racism as a "faith system," as exploitation and as a form of human conflict. The central focus of interest will be on black-white relationships. Crosslisted as: AFAM 104.

SOCY 202. Foundations of Theory. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 101. An introduction to classical theoretical traditions that have guided sociological work. Classical theorists whose writings have shaped the discipline will be studied, including Karl Marx, Max Weber, Emile Durkheim, Georg Simmel, W.E.B. Du Bois and Charlotte Perkins Gilman. This course also traces the historical development of the discipline of sociology during the 19th and early 20th centuries.

SOCY 206. African American Family Relationships. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Focuses on the African-American family from the 1940s to the present. Examines the values and the interpersonal/role relationships that are involved in forming and maintaining African-American families in the contemporary United States. Topics include dating and sexual relationships, marital relationships, parent-child relationships and relationships with members of the extended family. Crosslisted as: AFAM 206/GSWS 206.

SOCY 302. Contemporary Social Problems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 101. The examination from a sociological perspective of contemporary social problems such as population growth, crime, racism, family problems, substance abuse and aging in terms of their impact on American social institutions and values.

SOCY 303. Sociology of Deviance. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 101. An analysis of the relationship between social structure, social control and patterns of social deviance; a survey and critique of present social theories in light of empirical research and application of the theories to selected problem areas.

SOCY 304. Sociology of Families. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 101 or ANTH 103/INTL 103. The family in its social and cultural context. Analysis of child rearing, marriage, kinship, family crises and family change in various societies around the world. Crosslisted as: ANTH 304/GSWS 304.

SOCY 305. African American Family in Social Context. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 101. A socio-historical examination of the development of the family system of Americans from Africa. Focuses on large-scale (macro level) processes such as changes in the major mode of economic production and in political systems and the corresponding changes in black family structure and functioning. Presents the theoretical material on African-American families and social change that prepares students for further study of the family as a social institution and for the study of family policy. This course is designed to meet the needs of upper-division social science majors. Crosslisted as: AFAM 305/GSWS 305.

SOCY 307. Sociology of Food. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 101. Examines the role food plays in shaping cultures, societies and social inequalities by examining the modern food system, social inequalities surrounding food access and alternatives to the current system.

SOCY 310. Social Movements and Social Conflict. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 101. Theory and practice of social movements, community organizing and other forms of collective behavior.

SOCY 315. Sociology of Education. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 101. Analysis of education as a social institution in the societal context. Cross-cultural comparative perspectives on education.

SOCY 320. Research Methods in the Social Sciences. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Current methods of research in the social sciences. Includes a brief introduction to the use of SPSS for storage, retrieval and exploration of social science data. Crosslisted as: POLI 320.

SOCY 321. Sociology of Economic Inequalities. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 101. Analysis of social mobility, class, status and power.

SOCY 322. Sociology of Race and Ethnicity. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 101. A study of the various racial, religious and ethnic minority groups. Issues of power, pluralism and assimilation are addressed as well as the relationship between subcultures and the dominant culture.

SOCY 325. Analysis of Sociological Data. 2 Hours.
Semester course; 1 lecture and 2 laboratory hours. 2 credits. Prerequisites: POLI/SOCY 320 and STAT 210. Statistical techniques used in the analysis of data from sample surveys and censuses, including tabular, graphical and inferential procedures. SPSS software will be used in the laboratory.

SOCY 327. Urban Sociology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 101. Origin, character and significance of urban communities. Ecological and social factors are analyzed as well as changes in urban social organization and their consequences.

SOCY 330. Global Societies: Trends and Issues. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: INTL/POLI 105 or POLI 201 or SOCY 101. An analysis of factors that are promoting the globalization of social, economic and political relations, and an inquiry into implications of these developments for individuals, localities, nations and the world community. The course will highlight the impact of culture and ethnicity, historical and emerging patterns of international business activity and their societal significance, divergent strategies for economic and social development in the world's regions, and the effects of population growth and environmental problems on public life within and among nations. Crosslisted as: INTL 330.

SOCY 331. Juvenile Delinquency. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 101. Analysis of the biological, cultural, psychological and social factors involved in juvenile delinquency and their relation to current techniques of treatment, prevention and control.

SOCY 333. Gender in Society. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 101 or permission of instructor. Explores different theoretical approaches to gender and its intersections with other sources of inequality, including sexuality, race, class and age. Possible topics include masculinities, gender and the body, and how gender operates in various institutional settings, such as the economy and the family. Crosslisted as: GSWS 333.

SOCY 334. Sociology of Women. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 101 or consent of instructor. This course will examine the position and status of women across societies and the social forces that maintain existing patterns and arrangements. The integration of family and work in women's lives will be emphasized. Crosslisted as: GSWS 334.

SOCY 336. Violence Against Women. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 101 or GSWS 201. An examination of violence against women from a global and local perspective with a primary focus on violence perpetrated against women in the U.S. Requires a minimum of 20 hours of community service. Crosslisted as: GSWS 336.

SOCY 340. Self and Society. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 101. Focused discussion of the regularities in human behavior that arise due to man's participation in social groups. Emphasis will be placed on such topics as communications, attitudes, language, interpersonal perception, personal identities and social interaction.

SOCY 341. Group Dynamics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PSYC 101. Social and psychological principles and research related to the individual in groups. Specific topics include motivation for individuals forming and joining groups, performance and productivity of group members, group leadership and majority and minority influence. The group will be examined in relation to the larger society and as a subculture in itself. Crosslisted as: PSYC 341.

SOCY 360. Sociology of Religion. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 101. A systematic review and assessment of major sociological theories of and empirical research on religious behavior and groups. Topics include the structure of religious organizations; social correlates and functions of religion; denominationalism; religion and social class, social change and population. Crosslisted as: RELS 360.

SOCY 370. Media and Society. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 101, MASC 101 or POLI 103. A survey of the organization and social impact of the major types of mass media. Potential topics include the media as socializing agents; the effect of media messages on cultural patterns and social values; the impact of technology on social behavior; the role of "audiences" in interpreting media content; political and economic influences on the media industry; and the media as an instrument of social change. The structure and functions of the media in different societies will be compared.

SOCY 391. Topics in Sociology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 101. Maximum 6 credits per semester; maximum total of 18 credits in all departmental topics courses that may be applied to the major. Check with department for specific prerequisites. A discussion of specialized areas of sociological interest. See the Schedule of Classes for specific topics to be offered each semester.

SOCY 401. African-Americans and the U.S. Health Care System. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: AFAM 103, AFAM/SOCY/WMNS/GSWS 305 or permission of the instructor. Explores issues surrounding the disparity in health status and health outcomes between African-Americans and other groups in the United States. Students are required to participate in an experiential exercise designed to enhance learning. Crosslisted as: AFAM 401.

SOCY 402. Contemporary Theory. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 202 with a minimum grade of C; pre- or corequisite: SOCY 320. Restricted to sociology majors. A study of the works of the major sociological theorists of the 20th century.

SOCY 403. Criminology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 202 or permission of instructor. Analysis of the nature, extent and distribution of crime, emphasizing theories of and research on causation, prediction and prevention.

SOCY 406. Sociology Senior Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: 21 credit hours in sociology. Course must be taken in the student's last 30 hours at VCU. Senior capstone class; provides students the opportunity to synthesize, integrate and apply their sociological knowledge and skills.

SOCY 410. Aging and the Life Course. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 202 or permission of instructor. An introduction to the study of aging and the life course. Focus will be on research specific to older adulthood in order to foster an understanding of aging and old age as a characteristic of both individuals and societies. Requires a minimum of 20 hours of community service if taken as a service-learning course.

SOCY 421. Advanced Research Methods. 1-6 Hours.
Semester course; variable hours. Variable credit. May be repeated for a total of 6 credits. Prerequisites: POLI 320/SOCY 320 and SOCY 325. A laboratory course providing training in the application of social research methods under laboratory and field situations to problems of mutual interest to community policy makers and professionals in the disciplines of sociology, social psychology and anthropology. This course is designed to enhance the skills of students in applied social research. With direct supervision by the instructor, individuals or small groups of students will address themselves to the tasks of defining, designing and executing research projects.

SOCY 426. Population Dynamics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 202 or permission of instructor. The study of trends in fertility, mortality, population growth, distribution, migration and composition. The mutual influences of these factors and social organization.

SOCY 430. Politics, Power and Ideology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 202 or permission of instructor. Sociological analysis of political organization and behavior. Such subjects as distribution and uses of power, creation and management of group conflict, development and diffusion of political ideologies, and problems of bureaucracy and mass society will be considered.

SOCY 434. Sociology of Sport. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 101. Sport will be viewed as a major social institution within many societies. The class will study the relationship between sport and society both in terms of sport reflecting the ideology and culture of society as well as sport as an active agent of change in society. Race, gender and social class will be examined within the context of sport.

SOCY 436. Sociology of Work and Labor Markets. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 202 or permission of instructor. The study of industrial plants and business organizations as social systems.

SOCY 440. Advanced Social Psychology. 3 Hours.
Semester course; 3 credits. Prerequisites: SOCY 202 and SOCY 340 or permission of instructor. The study of how human groups create the environment that, in turn, influences their individual behavior. The symbolic interactionist perspective will be thoroughly explored for its contribution to the study of persons, objects and meaning.

SOCY 445. Medical Sociology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 202. A survey of the social, economic, cultural and social psychological factors in health and illness; the sociology of health and medical care organizations and settings; the sociology of health occupations; and the techniques of research in medical sociology.

SOCY 446. Sociology of Mental Disorder. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 101. A survey of selected social, economic, cultural and social psychological factors in mental health and illness. Such problems as defining mental illness; social factors in the distribution, diagnosis, etiology and treatment of mental disorders; mental illness as a social role; and research methods used in the sociology of mental illness will be considered.

SOCY 476. Economic Sociology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SOCY 202. An examination of labor force participation in terms of the individual worker's experience, the work setting, the nature of occupations and labor force composition.

SOCY 492. Independent Study. 1-6 Hours.
Semester course; variable hours. Variable credit. Maximum of 6 credits per semester; maximum total of 12 credits for all independent study courses. Open generally only to students of junior or senior standing who have acquired at least 12 credits in the departmental discipline. Determination of the amount of credit and permission of the instructor and department chair must be received prior to registration of the course. Cannot be used in place of existing courses.

SOCY 493. Field Research Internship. 3 Hours.
Semester course; 3 credits. May be repeated for a maximum of 6 credits. Prerequisites: applications must be approved by a faculty adviser and the internship coordinator. For sociology majors of junior or senior standing. Students are placed in organizations that offer supervised work or research experience appropriate to their interests. Each student must work 150 clock hours in the organization and write a sociological analysis of experiences using appropriate fieldwork methodological techniques.

SOCY 498. Honors Research Course. 3 Hours.
Semester course; 3 credits. Prerequisites: student must be in the honors program of the department and have achieved senior status. This course will entail the planning and execution of a major research project demonstrating a thorough understanding and use of research techniques in sociological/anthropological analysis, knowledge of relevant literature, sophisticated writing and research ability under the direction of a faculty mentor.

SOCY 500. Advanced Principles of Sociology. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The foundations of 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. 3 Hours.
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. Introduction to Social Statistics. 3 Hours.
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 or Computer Science. Crosslisted as: STAT 508.

SOCY 510. Domestic and Sexual Violence in Social Context. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Students will learn about the experiences of and responses to sexual and domestic violence in specific social contexts, with a focus on less visible contexts and underserved populations. Examines violence within various family structures and intimate relationships including racial/ethnic minority and immigrant groups and gay/lesbian/bisexual/transgender relationships, in various community settings including college campuses and the military, and among people with disabilities. Guest lectures provided by community experts in these areas.

SOCY 515. Globalization and Transformation: Concepts and Realities. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines how globalization significantly affects cultural processes at both local and national levels. Transformations of cultural understandings and practices under such circumstances will be explored. Virtual course components will bring causes, processes and consequences of the transformations of Western, Eastern and developing countries into focus. Crosslisted as: INTL 500.

SOCY 524. Aging and the Minority Community. 3 Hours.
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 593. Internship in Sexual and Domestic Violence Practice and Research. 3 Hours.
Semester course; 12 hours per week. 3 credits. Provides students practical experiences working in settings that address sexual and domestic violence. Students will focus on various areas including but not limited to service provision, intervention, research and program evaluation. Students will work closely with organizations/agency staff and follow their instructions.

SOCY 601. Sociological Research Methods. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Review of sociological research methodologies, including research design, ethical issues, measurement, data collection techniques, sampling and the basic logic of qualitative and quantitative analysis.. The focus is on developing the student's abilities to critically evaluate uses of methodologies in the research literature and justify methodological choices.

SOCY 602. Applications of Sociological Research Methods. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: SOCY/STAT 508 or equivalent and SOCY 601. Emphasis on applying methods for developing and executing a sociological research project, including the problem statement, theoretical framework, literature review, research design, ethics, sampling, data collection procedures, data analysis and presentation of results.

SOCY 603. Seminar in Population Studies. 3 Hours.
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. 3 Hours.
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. Survey Research Methods. 3 Hours.
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. Crosslisted as: PADM 605.

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

SOCY 608. Statistics for Social Research. 3 Hours.
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. Crosslisted as: STAT 608.

SOCY 609. Seminar in the Family. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The nature and functions of deviance. Theories and problems of social control.

SOCY 613. Social Stratification. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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. Seminar in Criminology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examination and analysis of social, psychological, and economic theories and correlates of criminal behavior. Typologies of offenders. Crosslisted as: CRJS 620.

SOCY 622. Theory Construction. 3 Hours.
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 624. Community and Community Services for the Elderly. 3 Hours.
3 credits. A conceptual/theoretical overview of community focusing on the ecological, psychological and social dimensions of community and on communities of the aged. Crosslisted as: GRTY 624.

SOCY 625. Urban Sociology. 3 Hours.
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. 3 Hours.
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 631. Battered Women in the Criminal Justice System. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides students with an understanding of (1) the major developments and trends in the law related to battered women in the criminal justice system; (2) the role of the various players in the criminal justice system; (3) how child abuse and sexual abuse are treated in the criminal justice system; and (4) battered women who kill and the defense of battered woman syndrome. Introduces the stages of the criminal justice system as it relates to battered women and their children.

SOCY 632. Intimate Partner and Sexual Violence: Medical Practice and Policy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides an overview of the sociological perspective on intimate partner and sexual violence as it relates to women's health. Also covers practical responses to violence such as screening, assessment, treatment and referral behaviors of medical providers, as well as policy in the health care setting.

SOCY 633. Application of the Policy Process to Issues of Violence. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Offers an interdisciplinary approach to understanding different models of decision-making and the policy process found at all levels of American government. The focus is on the public sector with application to private and nonprofit settings. A six-stage model of policy initiation, selection, implementation, evaluation and termination is presented and explored through the use of case studies and examples of policy initiatives related to domestic violence, sexual assault and youth violence. Prepares students to recognize and understand the key stages of and influences on the policy process and apply them in their current and future work settings.

SOCY 634. Social Contexts of Childhood and Violence. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Course will increase awareness and knowledge of children and adolescents as victims of violence, "absorbers" of violence and perpetrators of violence, as well as the victim-perpetrator dichotomy. Course is informed by an interdisciplinary framework to include neuroscience, trauma-informed practice, socioecological model, child development and resiliency. Topics include children and adolescents' experience with domestic violence, sexual violence, physical abuse, neglect, human trafficking, teen-dating violence, violence against LGBTQ youth, school violence, neighborhood/community violence and violence in the media. This highly interactive course will also consider innovative intervention and prevention strategies and discuss relevant policy issues.

SOCY 635. Theorizing Gender Violence. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Teaches students to think sociologically and structurally about gender and violence. Familiarizes students with sociological and feminist scholarship and explanatory theories related to preventing and responding to gender violence. Students will learn about the experiences of and responses to sexual and domestic violence in specific social contexts, with a focus on less visible and underserved populations. Guest lectures provided by community experts in these areas. Also examines social policy and research implications of various approaches.

SOCY 640. Seminar in Political Sociology. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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 652. Environmental Sociology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Exploration of the social and political dimensions of human-environment relationships through the lens of environmental sociology and human geography. The course focuses on large-scale, planetary transformations often referred to as climate change, a diverse range of effects that are becoming increasingly salient parts of our everyday lives.

SOCY 654. Political Economy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A rigorous introduction to historical and theoretical modes of inquiry that are foundational to a wide range of critical sociology. An exploration of the major sociological paradigms for analyzing relations among state, economy and society. Topical focus will vary each term, but will include a critical evaluation of liberal political economy, an investigation of 20th century capitalism and the rise of neoliberalism, and the intersections of race, gender and class in the modern world-system.

SOCY 656. Social Network Analysis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: graduate standing or permission of instructor. Provides a solid introduction to the theoretical foundations, basic measures and common applications of Social Network Analysis. Begins with overview of what it means to practice SNA and discusses the implications and use of SNA as social science methodology. Using online discussions and standard SNA methodological tools, students will engage in peer discussions and complete a series of practica designed to introduce the SNA methodology. Course will also take a broad look at how SNA has been used in understanding social mobility, interpersonal violence and terrorism/gangs. By course end, students will have an understanding of the theories and basic measures and methods of SNA.

SOCY 660. Seminar in the Sociology of Gender. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An analysis of the social construction of gender, the social forces that create and maintain gender hierarchy, and how the gender hierarchy intersects with other systems of inequality such as race, class and sexuality.

SOCY 673. Public Sociology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides students an opportunity to reflect on public sociology and develop skills in disseminating their sociological insights to a broader public. Some of the major questions addressed include: What is public sociology? What/who is the sociological audience? What is the relationship between academia and public intellectual life? How does the internet influence the availability of publics? How does style of writing determine our relationship to different publics?.

SOCY 690. Practicum in the Teaching of College Sociology. 1 Hour.
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 691. Special Topics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Seminars on current specialized areas of sociological and anthropological interest.

SOCY 692. Independent Study. 1-6 Hours.
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. Internship. 1-6 Hours.
Semester course; variable hours (50 contact hours per credit). 1-6 credits. May be repeated for a maximum of 6 credits. Permission of the internship coordinator and graduate director required for enrollment. A graduate-level internship that allows students to explore professional opportunities as related to the discipline of sociology. Students will be required to write a professional paper applying sociological concepts and methodologies to their experiences in the setting, as appropriate.

SOCY 694. Practicum in Sociology. 1-6 Hours.
Semester course; variable hours. 1-6 credits. May be repeated for a maximum of 6 credits. Provides opportunities for training experiences in sociological applications under faculty supervision leading to progressively greater degrees of skill development. Specific experiences offered vary from semester to semester.

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

SPANISH (SPAN)

SPAN 101. Elementary Spanish. 4 Hours.
Continuous courses; 5 lecture/recitation hours. 4-4 credits. Prerequisite: completion of SPAN 101 to enroll in SPAN 102. Elementary grammar, reading and oral drills.

SPAN 102. Elementary Spanish. 4 Hours.
Continuous courses; 5 lecture/recitation hours. 4-4 credits. Prerequisite: completion of SPAN 101 to enroll in SPAN 102. Elementary grammar, reading and oral drills.

SPAN 201. Intermediate Spanish. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SPAN 102. Continuation of the essentials of grammar, with emphasis on achieving proficiency in aural comprehension, speaking, reading and writing skills.

SPAN 202. Intermediate Spanish Readings. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SPAN 201. Designed to increase the student's proficiency through the study of selected cultural and literary texts.

SPAN 205. Intermediate Spanish Conversation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SPAN 201. Designed to increase the student's proficiency in the spoken language through audio-oral exercises, dialogues and free conversation.

SPAN 300. Advanced Grammar and Writing. 3 Hours.
Semester courses; 3 lecture hours. 3, 3 credits. Prerequisite: SPAN 202 or 205. Prerequisite for SPAN 301: SPAN 300. A systematic review of Spanish grammar with emphasis on the elements of style and vocabulary building, translation and composition.

SPAN 301. Advanced Grammar and Writing. 3 Hours.
Semester courses; 3 lecture hours. 3, 3 credits. Prerequisite: SPAN 202 or 205. Prerequisite for SPAN 301: SPAN 300. A systematic review of Spanish grammar with emphasis on the elements of style and vocabulary building, translation and composition.

SPAN 305. Spanish Conversation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SPAN 202, SPAN 205 or SPAN 300. Conducted in Spanish. Practice in the spoken language with emphasis on discussions relating to topics of current interest.

SPAN 307. Spanish Conversation and Film. 3 Hours.
Semester courses; 3 lecture hours. 3, 3 credits. Prerequisite: SPAN 202, SPAN 205 or SPAN 300. Designed to develop the student's conversational skills, oral comprehension ability and knowledge of contemporary culture through discussion of selected Spanish and Latin American films. Emphasis is also placed on vocabulary development and writing practice.

SPAN 311. Spanish Through the Media. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SPAN 202, SPAN 205 or SPAN 300. Further development of listening, reading, writing, speaking and cultural skills through a focus on mass media in Latin America and Spain. Spanish language and current events will be taught through direct contact with newspapers, journals, television and radio programming, and online media. Students will view programs outside of class, participate actively in class discussions, create presentations and conduct research.

SPAN 320. Civilization of Spain I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: SPAN 300; SPAN 305 or 307 or 311; corequisite: SPAN 301. Conducted in Spanish. A treatment of salient manifestations of Spanish culture and civilization from its origins to the present.

SPAN 321. Latin American Civilization I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: SPAN 300; SPAN 305 or 307 or 311; corequisite: SPAN 301. Conducted in Spanish. A treatment of salient manifestations of Latin American culture and civilization from pre-Columbian times to the present.

SPAN 322. Hispanic Immigrants in the U.S.. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: SPAN 300; SPAN 305 or 307 or 311; corequisite: SPAN 301. Conducted in Spanish. Analysis, research and discussion of the life and history of Hispanics in the U.S. Topics such as identity, assimilation, immigration laws, education, jobs, housing, health, religion and politics will be covered. Students will apply their course learning through 15 hours of community service for Hispanics.

SPAN 330. Survey of Spanish Literature. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SPAN 300; SPAN 305 or 307 or 311; corequisite: SPAN 301. Conducted in Spanish. A survey of Spanish literature up to the present.

SPAN 331. Survey of Latin American Literature. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SPAN 300; SPAN 305 or 307 or 311; corequisite: SPAN 301. Conducted in Spanish. An introduction to major authors and trends up to the present. Crosslisted as: INTL 331.

SPAN 332. Latino Writers in the U.S.. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: SPAN 300; SPAN 305 or 307 or 311; corequisite: SPAN 301. Conducted in Spanish. Explores Latino cultural identity and the Latino contribution to U.S. cultural life through a variety of works in the different literary genres produced by Latino writers, both immigrants and those raised in the U.S.

SPAN 402. Language Issues in the Spanish-speaking World. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Course can be repeated with different topics up to a total of 6 credits. Prerequisites: SPAN 301; SPAN 305 or 307 or 311; SPAN 320 or 321 or 330 or 331. Conducted in Spanish. Through a variety of topics this course explores the links between language and human behavior as exemplified by language phenomena in the Spanish-speaking world. Topics will be drawn mainly from sociolinguistics, language and culture, and education and applied linguistics. See the Schedule of Classes for the specific topic to be offered each semester. Crosslisted as: LING 402.

SPAN 403. History of the Spanish Language. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Course can be repeated with different topics up to a total of 6 credits. Prerequisites: SPAN 301; SPAN 305 or 307 or 311; SPAN 320 or 321 or 330 or 331. Conducted in Spanish. A study of the evolution of Spanish from Latin through the Middle Ages to the Modern era. Historical phonology, etymology, morphology, orthography, semantics and syntax of standard Castilian. See the Schedule of Classes for the specific topic to be offered each semester.

SPAN 414. Commercial Spanish. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Course can be repeated with different topics up to a total of 6 credits. Prerequisites: SPAN 301; SPAN 305 or 307 or 311; SPAN 320 or 321 or 330 or 331. Conducted in Spanish. This course will develop the student's ability to use the Spanish language as a means of oral and written communication in the business world. See the Schedule of Classes for the specific topic to be offered each semester.

SPAN 420. Civilization of Spain II. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Course can be repeated with different topics up to a total of 6 credits. Prerequisites: completion of 9 credits of Spanish at the 300 level including SPAN 300 or 301. This course explores the cultural diversity and differences of Spain. Topics focus on a particular interdisciplinary theme, such as the formation of cities, ethnicity and on a particular area of Spain. See the Schedule of Classes for the specific topic to be offered each semester.

SPAN 421. Civilization of Latin America II. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Course can be repeated with different topics up to a total of 6 credits. Prerequisites: completion of 9 credits of Spanish at the 300 level including SPAN 300 or 301. This course explores the cultural diversity of Latin America and the social and political forces behind cultural change. Topics will focus on a specific interdisciplinary theme, such as urban life, the politics of identity and on a specific area of Latin America. See the Schedule of Classes for the specific topic to be offered each semester. Crosslisted as: INTL 421.

SPAN 422. Spanish and Latin American Cinema. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Course can be repeated with different themes, up to a total of 6 credits. Prerequisites: completion of 9 credits of Spanish at the 300 level including SPAN 300 or 301. Conducted in Spanish. Spanish and/or Latin American cinema from the 1940s to the present, including the works of important directors, such as Bunuel, Saura, Almodovar, Emilio Fernandez, Glauber Rocha, Solanas or Gutierrez-Alea. The formal and aesthetic issues of cinematic texts and the historical, cultural and social contexts of their production. See the Schedule of Classes for the specific theme to be offered each semester.

SPAN 430. Literary Genres. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Course can be repeated with different topics up to a total of 6 credits. Prerequisites: completion of 9 credits of Spanish at the 300 level including SPAN 300 or 301. Conducted in Spanish. An in-depth look at the development and expression of varieties of literature in Spanish. See the Schedule of Classes for the specific topic to be offered each semester.

SPAN 431. Literary Periods. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Course can be repeated with different topics up to a total of 6 credits. Prerequisites: completion of 9 credits of Spanish at the 300 level including SPAN 300 or 301. Conducted in Spanish. An in-depth synchronic look at movements and their context in literature in Spanish. See the Schedule of Classes for the specific topic to be offered each semester.

SPAN 432. Hispanic Culture Through Literature. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: SPAN 301; SPAN 320, SPAN 321 or SPAN 322; and SPAN 330, SPAN 331 or SPAN 332. Conducted in Spanish. An in-depth analysis of Hispanic texts dealing with cultural topics such as love relationships, death, family, religion, politics, gender and ethnicity, as well as their relationships to cultural values, behaviors, ideologies, beliefs and the histories of Spain and Spanish America.

SPAN 433. Don Quixote. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: SPAN 301, and SPAN 320 or SPAN 330. Conducted in Spanish. An in-depth analysis of Miguel de Cervantes's masterpiece. Focuses on questions of the literary, linguistic and cultural complexity of "Don Quixote." Examines the work in the social and historical context of Early Modern Spain.

SPAN 485. Spanish Study Abroad. 1-12 Hours.
Semester course; variable hours. Variable credit. Prerequisites: SPAN 301 and SPAN 321; SPAN 330 or 331 or 332. This course offers all students the opportunity to improve their oral and written proficiency in Spanish, to enhance their awareness of cultural diversity and to become independent learners of Spanish language and the cultures of its speakers.

SPAN 491. Topics in Spanish. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May be repeated with different topics for a maximum of 9 credits. Prerequisites: SPAN 301; SPAN 305 or 307 or 311; SPAN 320 or 321 or 330 or 331. An in-depth study of selected topics in Spanish. See the Schedule of Classes for specific topics to be offered each semester.

SPAN 492. Independent Study. 1-3 Hours.
Semester course; variable hours. Variable credit. Maximum of 3 credits per semester; maximum total of 6 credits for all independent study courses in Spanish. Prerequisites: SPAN 301; SPAN 305 or 307 or 311; SPAN 320 or 321 or 330 or 331. A course designed to give students an opportunity to become involved in independent study in a literary or linguistic area or subject in which they have an interest.

SPAN 533. Spanish for the Professions. 1-4 Hours.
Semester course; 1-4 lecture hours. 1-4 credits. May be repeated for a maximum of 8 credits. Prerequisites: SPAN 301; SPAN 305 or 307 or 311; SPAN 320 or 321; SPAN 330 or 331; SPAN 404. An intensive study of specialized communication in Spanish. The content of this course will emphasize the knowledge and language skills for particular professions, which may include business, education, health sciences and translation. See the Schedule of Classes for specific topic offered each semester.

SPAN 543. Texts and Contexts in Spain and Latin America. 1-4 Hours.
Semester course; 1-4 lecture hours. 1-4 credits. May be repeated for a maximum of 8 credits. Prerequisites: SPAN 301; SPAN 305 or 307 or 311; SPAN 320 or 321; SPAN 330 or 331. Restricted to seniors in Spanish concentration with at least 85 credit hours taken toward the degree. An exploration of themes concerning Spain, Latin America and/or Latinos in the U.S. as reflected in a variety of textual genres, including film.

SPANISH/ENGLISH TRANSLATION AND INTERPRETATION (SETI)

SETI 400. Spanish-English Comparative Grammar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: SPAN 301; SPAN 320, 321 or 322; and SPAN 330, 331 or 332; or a combined scaled AVANT Stamp Assessment Test score of 1300 and permission of instructor. Conducted in Spanish and English. Advanced comparison of English and Spanish grammar with emphasis on the more complex forms of both languages.

SETI 410. Introduction to Spanish-English Translation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Pre- or corequisite: SETI 400. Course conducted in Spanish and English. Integrates the basic theory and practical aspects of translation, focused from a perspective of applied linguistics. Practice given in both written and oral translation of diverse texts.

SETI 411. Intermediate Translation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SETI 410. Course conducted in Spanish and English. Exposes students to more advanced translation skills, introducing a more focused vocabulary for the legal, medical, business and educational fields that regularly use translation. Introduces students to professional associations and journals of the industry, including those dedicated to literary translation. Analyzes pros and cons of computer-assisted translations.

SETI 420. Introduction to Spanish-English Interpretation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Pre- or corequisite: SETI 400. Course conducted in Spanish and English. Covers theory and practical aspects of interpretation, including the three modes of interpretation: simultaneous, consecutive and sight translation.

SETI 421. Intermediate Interpretation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SETI 420. Conducted in Spanish and English. Exposes students to more advanced interpreting skills in all three modes of interpretation -- simultaneous, consecutive and sight translation -- introducing a more focused vocabulary for the legal, medical, business and educational fields that regularly use interpreters.

SETI 422. Legal Interpretation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SETI 420. Conducted in Spanish and English. Exposes students to the ethics, regulations and advanced vocabulary used in legal interpreting, with a focus on the state examination for certification in the court system.

SETI 423. Medical Interpretation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SETI 420. Conducted in Spanish and English. Exposes students to the ethics, regulations and advanced vocabulary used in medical interpreting. Explores the range of accreditation bodies and history of national and international certification in the medical interpreter profession, with the goal of grooming students for careers in this field.

SETI 493. SETI Internship. 3 Hours.
Semester course; 120 clock hours in local, national or international internship placement where Spanish-English language interpretation or translation is required. 3 credits. Prerequisites: SETI 410 and SETI 420. Under the supervision of both a faculty member and a field supervisor, students will apply their translation and/or interpretation skills in an approved work situation. Each internship will be specifically designed in accordance with the student's linguistic level and the placement site requirements.

SPECIAL EDUCATION AND DISABILITY POLICY (SEDP)

SEDP 330. Survey of Special Education. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Presents an overview of the historical basis and regulatory requirements related to special education, including the individual education program as a legal document and the rights and responsibilities of parents, teachers and schools. The characteristics of learners with disabilities and their educational and medical implications are also examined, as well as the cultural, familial and ethical issues involved.

SEDP 492. Independent Study. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Opportunities are provided for supervised independent study in selected areas. All work offered on an individual basis with the approval of instructor and department chair.

SEDP 501. Characteristics of Students with High Incidence Disabilities. 3 Hours.
Semester course, delivered online, face-to-face or hybrid; 3 lecture hours. 3 credits. Focuses on characteristics and identification of individuals with learning disabilities, emotional disturbance, intellectual disabilities, developmental delay, the less severe autism spectrum disorders, traumatic brain injury and other health impairments throughout the lifespan, as well as providing information on effective educational, psychosocial and behavioral interventions that serve as adaptations to the general curriculum. The possibilities of co-morbid or multiple conditions, coupled with cross-categorical instructional settings warrant a class that examines all eligibility categories of students served under the special education, general curriculum.

SEDP 502. Supervision Seminar I. 1 Hour.
Semester course; 1 lecture hour. 1 credit. This course emphasizes effective techniques to use when working with special education and general education teachers, instructional assistants, parent and students with disabilities. Participants will examine the different roles of the special educator. Class members are encouraged to introduce topics for discussion based on their teaching experiences. Problem-solving strategies will be developed to address the issues raised during class. The course will provide the special educator with an understanding of the Individualized Education Program process from fostering consensus to developing the IEP. Emphasis will be placed on understanding the impact of the student's disability in accessing the general curriculum. Developing a data-driven IEP based on standards will also be emphasized.

SEDP 503. Supervision Seminar II. 1 Hour.
Semester course; 1 lecture hour. 1 credit. This course emphasizes effective techniques to use when working with special education and general education teachers, instructional assistants, parent and students with disabilities. Participants will examine the different roles of the special educator. Class members are encouraged to introduce topics for discussion based on their teaching experiences. Problem-solving strategies will be developed to address the issues raised during class. The course will provide the special educator with an understanding of how to implement mandates in the classroom as related to the state assessment program. Participants will learn why there is an emphasis on the development of standards-based IEPs and how they are integrated in daily classroom instruction. Participants will also learn about the different SOL participation options and how to use criteria to determine the appropriate option.

SEDP 505. Theory and Practice of Educating Individuals with Special Needs. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Not for certification or endorsement in special education. In-depth study of 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 collaboration and inclusion.

SEDP 531. Educational Foundations for Collaboration and Universally Designed Learning. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Delivered as online, face-to-face or hybrid course. Focuses on providing candidates with the knowledge of the foundation for educating students with disabilities, as well as the principles and processes for collaboration and consultation with educational colleagues, community professionals and families. Covers the historical, philosophical and sociological foundations underlying the role, development and organization of public education in the U.S. Discussions and readings will focus on creating and maintaining inclusive schools, effective communication strategies for building successful collaborative teams and universally designed instructional strategies to use in co-taught classrooms.

SEDP 532. Understanding Autism Spectrum Disorder. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course presents an introduction to autism spectrum disorder. The course will include a discussion of the core behavioral and secondary characteristics and how they impact the individual across the lifespan, from infancy through adulthood. Family concerns and considerations will be discussed in the context of age, development and need for support. The course will also describe the qualities of intervention strategies and will outline ways to evaluate practices and make sound intervention decisions.

SEDP 533. Educational Assessment of Individuals with Diverse Learning Needs. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Delivered as online, face-to-face or hybrid course. Focuses on current assessment theory, procedures and instruments used to evaluate students with high incidence disabilities in grades K through 12. The examination of both formal and informal assessment and their application in an educational setting and the designing of IEPs will be emphasized. Course will include the historical, philosophical and sociological foundations of the instructional design based on assessment data (relationships among assessment, instruction and monitoring student progress to include student performance measures in grading practices, the ability to construct and interpret valid assessments using a variety of formats in order to measure student attainment of essential skills in a standards-based environment, and the ability to analyze assessment data to make decisions about how to improve instruction and student performance).

SEDP 600. Language/Communication Intervention for Young Children and Individuals with Severe Disabilities. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: permission of instructor. An intensive study of the developmental sequence of language/communication acquisition and intervention strategies for individuals with severe language delays or deficits, severe intellectual disabilities and/or other severe multiple disabilities.

SEDP 601. Methods I: Teaching Students in Special Education - General Education. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Delivered as online, face-to-face or hybrid course. Provides an introduction to instructional strategies and organization of activities, including curriculum, media, materials and physical environment for children in grades K-12 with high incidence disabilities. Candidates will develop skills to plan and deliver instruction in a variety of educational settings such as inclusive classrooms, resource rooms, self-contained classes and residential programs.

SEDP 602. Methods II: Teaching Students in Special Education - General Education. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Delivered as online, face-to-face or hybrid course. Prerequisites: SEDP 601 and acceptance for teacher preparation if in the M.Ed. program. Provides a study of instructional strategies and organization of activities with focus on elementary and secondary students with high incidence disabilities (in grades K-12) including curriculum, media, materials and physical environment. Candidates will use the foundation from Methods I as a context for developing skills necessary to provide the most effective classroom instruction for secondary students. A continued focus will be on assessing and monitoring student performance, adapting instructional interventions based upon students' response to intervention, and selecting evidence-based practices that have the greatest likelihood of success.

SEDP 603. Theories, Assessment and Practices in Reading for Students With High Incidence Disabilities. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Delivered as online, face-to-face or hybrid course. Prerequisite: TEDU 561. Designed to prepare special education teachers to instruct students with high incidence disabilities who exhibit reading deficits. Strategies, techniques and methods will be analyzed for their appropriate use with different types of reading/language problems. The course includes assessment practices and use of instruments that form the basis for instructional planning.

SEDP 604. Characteristics of Students With Severe Disabilities. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to students who have been admitted to the Virginia Consortium for Teacher Preparation in Special Education Adapted Curriculum. Examines nature and causes of disabling or special health conditions. Covers screening and evaluation techniques, characteristics and educational implications.

SEDP 610. Teaching Strategies for Students with Severe Disabilities. 3 Hours.
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.

SEDP 611. Secondary Education and Transition Planning. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Delivered as online, face-to-face or hybrid course. Explores the literature, research, issues and trends that are relevant to high school-aged students with high incidence disabilities as they prepare for their transition to life after high school. Focus is on providing candidates with the ability to prepare their students and work with their families to promote successful student transitions throughout the educational experience including postsecondary training, employment and independent living that addresses an understanding of long-term planning, career development, life skills, community experiences and resources, self-advocacy and self-determination, guardianship, and legal considerations. The full range of functioning is addressed in the areas of education, employment, social/emotional functioning, personal and daily living issues.

SEDP 612. Assessment and Curriculum for Students with Severe Disabilities. 3 Hours.
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 team approach.

SEDP 616. Introduction to Disability Studies, Community Services and Business Networks. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines disability history, theory and current thinking in the field of disability studies. Changes in philosophy, legislation and policy over the past four decades will be examined to trace the paradigm shift that led to our current conceptualization of disability. Students will investigate the community services and resources available to support adults with disabilities, as well as new trends in business partnerships and employment service models that promote the economic self-sufficiency of adults with disabilities.

SEDP 619. Multicultural Perspectives in Education. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Designed to enhance cultural competence in diverse classrooms and schools. Major considerations include race, ethnicity, linguistic, gender, abilities and sexual orientation differences. Key concepts include structural, curricular and instructional facets of working successfully in diverse educational settings. Personal and theoretical constructs of race, ethnicity, culture, disability and other related concepts are explored. This course is delivered online. Crosslisted as: TEDU 619.

SEDP 621. Applied Behavior Analysis: Principals, Procedures and Philosophy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Designed to provide an overview of the basic principles and procedures of applied behavior analysis. Factors and principles that contribute to improved performance as well as development of interfering behaviors are identified. Further procedures that can be used to minimize interfering behavior, improve performance, teach new behaviors and increase the probability of behaviors occurring under appropriate circumstances are described.

SEDP 622. Ethics and Professional Conduct for Behavior Analysts. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Pre- or corequisite: SEDP 621. Provides an overview of the professional conduct standards consistent with the practices of applied behavior analysis and outlines how to provide ethical and responsible behavioral programming. The Virginia Behavior Analyst Licensure law, the Behavior Analyst Certification Board's Guidelines for Responsible Conduct and Disciplinary Standards, as well as the Association for Positive Behavior Supports Standards of Practice are reviewed and used to guide course content. A focus is placed on developing and implementing ethical behavioral programming that promotes the improvement as well as the dignity of the person receiving intervention. Ethical conduct as it relates to colleagues, the field of ABA and society also is discussed.

SEDP 623. Applied Behavior Analysis: Empirical Bases. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Pre- or corequisite: SEDP 621. Provides information on the basic content of applied behavior analysis and how to implement the core principles in real-life situations. Participants will be instructed on how to implement behavioral procedures and develop behavioral programs for individuals who may need to increase positive skills or reduce interfering behavior. Participants also will be instructed on single-subject design, the research methodology used in the field of ABA and its applications in real-life situations.

SEDP 624. Applied Behavior Analysis: Applications. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Pre- or corequisite: SEDP 621. Discusses the various applications of the field of applied behavior analysis and expands the capability to deal with more complex behavioral situations, enabling the ability to relate to more sophisticated professional issues and environments. Specifically, the course demonstrates how ABA is applied in real-world situations to make socially significant changes by minimizing interfering behavior, improving performance, teaching new behaviors and increasing the probability of behaviors occurring under appropriate circumstances. This course also provides a foundation for giving appropriate support to those implementing the behavior plan.

SEDP 625. Applied Behavior Analysis: Assessments and Interventions. 3 Hours.
Semester course. 3 lecture hours. 3 credits. Pre- or corequisite: SEDP 621. Expands on basic content of applied behavior analysis and teaches how to implement behavioral procedures and develop behavioral programs for individuals with fundamental socially relevant behavioral needs. In this course, participants will learn how to implement behavioral assessments, select and develop intervention procedures, and compose instructions for implementation.

SEDP 626. Applied Behavior Analysis: Verbal Behavior. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Pre- or corequisite: SEDP 621. Further expands the participant's capability to use applied behavior analysis in complex behavioral situations and enables students to apply principles to sophisticated issues through analysis of language development. The course will provide information on verbal behavior and basic verbal operants and how to develop intervention procedures to teach diverse learners.

SEDP 630. Trends in Special Education. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Includes an overview of legislation and case law pertaining to special education, characteristics of individuals with and without exceptionalities including growth and development from birth though adolescence, mainstreaming, integration/inclusion, transition, and classroom adaptations for educating students with disabilities in least restrictive environments. Candidates will become familiar with the general characteristics of children with and without exceptionalities relative to age, varying levels of severity and developmental differences manifested in cognitive, linguistic, physical, psychomotor, social or emotional functioning.

SEDP 631. Classroom Management and Behavior Support for Students with Disabilities. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Delivered as online, face-to-face or hybrid course. Provides an in-depth analysis of theoretical models, research and strategies for supporting positive behavior of students with various disabilities. Emphasis is on developing, implementing and evaluating behavior management programs in special education programs including functional assessment of behavior. This course will help develop a candidate's ideas about examining the behaviors of students with special needs in school settings, including an understanding and application of classroom and behavior management techniques and individual interventions. Techniques and approaches taught will promote skills that are consistent with norms, standards and rules of the educational environment and will be diverse based upon behavioral cognitive, affective, social and ecological theory and practice. As part of the course requirements, candidates complete approved modules in child abuse and neglect recognition and intervention.

SEDP 632. Transition Strategies for Students with Disabilities. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Designed to provide knowledge of the special educator's role in preparing 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.

SEDP 634. Assessment, Curriculum and Teaching Methods for Autism Spectrum Disorder. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SEDP 532. Students will review assessment techniques and curriculum design, as well as the major methodologies to teach individuals with autism spectrum disorder from early intervention through transition to adult services in inclusive and specialized educational settings. This course will focus on scientifically based interventions that address the communication development and academic needs of the individual with autism spectrum disorder. Participants will be required to demonstrate knowledge of course goals by integrating content with students with autism spectrum disorder.

SEDP 635. Supporting Behavior and Social Skills for Autism Spectrum Disorder. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SEDP 532. Students will review major methodologies needed to create a positive social and emotional learning environment for individuals with autism spectrum disorder from early intervention through transition to adult services in inclusive and specialized educational settings. This course will address the individual's social, behavioral and sensory needs by focusing on the emerging best-practice interventions needed to teach social understanding and shape appropriate social behavior, build play and leisure skills, teach anger and stress management, procure sensory motor modulation, conduct functional behavior assessments, and provide positive behavior support. Participants will be required to demonstrate knowledge of course goals through integration with students with autism spectrum disorder.

SEDP 638. Instructional Design and Field Experience for Autism Spectrum Disorder. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: SEDP 532, 634 and 635. Students will focus on the integration of theoretical and practical concepts related to supporting individuals with autism spectrum disorder from early intervention through transition to adult services in educational settings. It provides the opportunity to apply knowledge of assessment, curriculum design, teaching methodologies and environmental and technological supports while working collaboratively with caregivers and educational teams to develop individualized programming. This course has a 20-hour field-based experience that is to take place in an educational setting. The field-based experience will be coordinated with the course instructor.

SEDP 641. Independent Study. 1-3 Hours.
Semester course; variable hours. 1-3 credits. Prerequisite: permission of instructor. An individual study of a specialized issue or problem in education.

SEDP 651. Topics in Education. 1-3 Hours.
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.

SEDP 658. Educating Students with Physical and Sensory Disabilities. 3 Hours.
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.

SEDP 700. Externship. 1-6 Hours.
Semester course; 1-6 lecture hours. 1-6 credits. The externship experience for M.Ed. candidates requires the study and integration of theory with practice in a clinical setting supervised by an approved professional and university faculty member. This externship includes planned site visits by the university faculty member (at least four of the visits will be observations of the student in a teaching situation). During the semester-long externship, students are in classrooms with a set amount of hours spent supervised by a fully licensed, experienced teacher in direct teaching activities. Any other externship configuration can only be done with the permission of the severe disabilities program coordinator. The supervision provided emphasizes effective techniques to use when working with special education and general education teachers, instructional assistants, parents and students with disabilities.

SEDP 705. Seminar on Disability Policy. 3 Hours.
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.

SEDP 706. Personnel Development in Special Education. 3 Hours.
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.

SEDP 707. Critical Issues in Special Education. 3 Hours.
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, referral and assessment methods and instructional models.

SEDP 708. Grant Writing in Special Education and Other Social Sciences. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines conceptual, empirical and practical issues in the preparation of grant proposals and in the conduct of interdisciplinary research in the social sciences that focuses on education and related issues in youth development, with a specific emphasis on youth with disabilities. Students will develop practical skills in establishing interdisciplinary research teams; interdisciplinary research design and grant proposal development; matching research questions to funding agencies and their priorities; working with community agencies and relevant stakeholders to secure their involvement in the research process; writing research or training grant proposals.

SEDP 709. Literature Reviews in Special Education and Other Social Sciences. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides in-depth, advanced instruction in the conducting of systematic literature reviews; instruction in how to create and refine a research question; instruction in defining and refining search terms; instruction in critically analyzing identified literature; and instruction in the writing and structure of a literature review.

SEDP 711. Doctoral Seminar in Single Subject Design. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course is intended to provide an overview of strategies for designing and conducting single subject studies that are relevant to education, special education, psychology and other related fields of inquiry. Its purpose is to provide doctoral students or advanced graduate students who are interested in applied research designs with an opportunity to acquire competencies related to planning, implementing and analyzing such research. The content of the course will focus on applications and interpretations of single-case research designs and the analysis of human behavior in educational and community settings. This course is designed as an initial course in single research design.

SEDP 771. Research Internship. 1-3 Hours.
Semester course; 1-3 research hours. 1-3 credits. May be repeated for a total of 3 credits. Enrollment requires prior approval of adviser. The research internship is designed to provide doctoral students with an opportunity to demonstrate competence at designing and conducting a pilot research study and disseminating research findings. Graded as S/U/F.

SEDP 772. Teaching Internship. 1-3 Hours.
Semester course; 1-3 internship hours. 1-3 credits. Enrollment requires prior approval of adviser. The teaching internship is designed to provide doctoral students with an opportunity to demonstrate competence in the activities related to the preparation of teachers of students with disabilities at the university level. Graded as S/U/F.

SEDP 773. Service/Policy Internship. 1-2 Hours.
Semester course; 1-2 hours of internship. 1-2 credits. Enrollment requires prior approval of adviser. The service competency is met through an internship that is designed to give doctoral candidates an intensive experience in which they can become actively involved in professional service to the field of special education and, in particular, in the development and implementation of local, state or national policy. Graded as S/U/F.

SEDP 890. Dissertation Prospectus Preparation. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: SEDP 709 Students will receive guidance in the preparation of their dissertation prospectus, describing their plan for conducting an original research study as the final requirement for their Ph.D. in Special Education and Disability Policy. Graded S/U/F.

SEDP 899. Dissertation. 1-9 Hours.
Semester course; variable hours. Variable credit. May be repeated. A minimum of 9 semester hours required. Prerequisite: Successful completion of comprehensive examinations and approval of student's doctoral prospectus. Dissertation work under direction of dissertation committee. Graded as S/U/F.

SPEECH (SPCH)

SPCH 121. Effective Speech. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Structured speaking and critical listening experiences within the basic forms of speech communication: interpersonal, small group and public.

SPCH 321. Speech for Business and the Professions. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Theory and practice in the oral communication process. Organization and presentation of informative and persuasive subject matter in professional contexts related to the student's major area of interest.

SPORT LEADERSHIP (SPTL)

SPTL 591. Topical Seminar. 1-3 Hours.
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 health, physical education, exercise science, recreation and sport. Crosslisted as: HEMS 591.

SPTL 603. Research Methods in Sport. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Designed to help graduate students acquire the fundamental skills of evaluating peer-reviewed research, while also facilitating the development of student research projects. Course offers an introduction to market research, an important aspect in today's sport environment and industry, and will help students determine and defend problems in sport from a statistical perspective, bringing more credibility to their stance.

SPTL 604. Research Practicum. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SPTL 603. Focuses on conceptualizing 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 leadership chosen by the student in consultation with the instructor and adviser. Emphasizes problem identification, literature review and research design.

SPTL 607. Field Instruction. 3 Hours.
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 or 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.

SPTL 608. Sport and Entertainment Event Development. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The first semester of a two-course sequence designed to allow graduate students to acquire the fundamental skills needed to plan events in all areas of the sport and entertainment industry, including planning and event design, understanding financial contracts, facility and security risk management, marketing and promotions, and implementation and control methods. By the completion of the sequence (SPTL 608/SPTL 610), students will have designed, planned and implemented an actual event that will take place at the end of the spring semester.

SPTL 610. Sport and Entertainment Event Development. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SPTL 608. Designed to allow graduate students to acquire the fundamental skills needed to plan events in all areas of the sport and entertainment industry, including planning and event design, understanding financial contracts, facility and security risk management, marketing and promotions, and implementation and control methods. By the completion of the two-course sequence (SPTL 608/SPTL 610), students will have designed, planned and implemented an actual event that will take place at the end of the spring semester.

SPTL 622. Sport Consumer Behavior. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course focuses on the importance of understanding consumer behavior within contemporary sport. Students will gain an appreciation for how understanding and influencing sport consumer behavior is a fundamental marketing/management strategy, and how an understanding of consumers (fans) enables sport marketers and managers to more effectively meet the needs of buyers in the market. The course explores psychological, social, situational and marketing factors that influence the selection and usage of sport products and services.

SPTL 623. Sport and the Environment. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course is designed to explore the relationship between sport and the environment. Specifically, the course will investigate (a) the ways in which sport (participant and spectator) effect the natural environment, (b) the ways the natural environment effect sport and (c) the stewardship role sport can play with respect to environmental issues.

SPTL 630. Sociology of Sport. 3 Hours.
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.

SPTL 631. Contemporary Issues in Sport. 3 Hours.
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 sport, athlete's rights 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 the NCAA.

SPTL 632. Sport Business. 3 Hours.
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 and law necessary for successful entry into sports related careers.

SPTL 633. Marketing of Sport. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Will familiarize the student with practical aspects of sports marketing including the dynamic nature of sport marketing and the importance of branding. Through lecture and case-study analysis, the course will provide students with the understanding of the importance of marketing theory and fundamentals specific to the marketing of sport. Designed to introduce students to marketing within the sport industry, including understanding the unique aspects of sport as product, the sport consumer market and the sport product market.

SPTL 634. Foundations of Coaching. 3 Hours.
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 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.

SPTL 635. Leadership Models in Sport. 3 Hours.
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.

SPTL 640. Sport Media and Communications. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An examination of the converging worlds of journalism, public relations, marketing and advertising as expressed in the new commercial reality of sport. Students will be provided with a history of sports media and the changes the media has undergone in recent years. Students will learn the many reasons media relations are important as well as methods to make sure those relations are strong with sport entities. Students will also have the opportunity to be placed in the media chair and produce written material as a reporter covering a team or an athletic program.

SPTL 641. Sports Psychology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An overview of the discipline of sports psychology designed to facilitate an understanding and application of mental skills as well as to provide an understanding of other applied domains, such as life skills within sport psychology. Goal setting, relaxation, imagery, burnout and communication are some of the key issues examined.

SPTL 642. Sport Ethics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Offers an application of the tools of moral reasoning and ethics to the management of sports and recreation programs. This class places students in ethical decision-making situations within the sport industry and provides the tools necessary to effectively navigate these circumstances.

SPTL 643. Sport Law. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An application of basic principles of law to the management of sports, events, teams, organizations, educational institutions and facilities. This course will involve the study of the application of various legal doctrines to a broad range of sports-related activities. Particular areas of the law that will be discussed include contracts, labor law, antitrust, taxation, torts, remedies, arbitration and constitutional law.

SPTL 644. NCAA Collegiate Coaching. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Designed to prepare students for the daily responsibilities of assistant and head NCAA coaches by gaining knowledge and confidence through working with camps, managing a budget and developing an understanding of the NCAA rules and regulations. At the conclusion of the course, students will understand the many principles needed to be a successful coach at the collegiate level.

SPTL 645. Sales and Development. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Designed to provide students with an in-depth analysis of sales and fundraising management, emphasizing strategies and techniques, sales presentations, professional image, product/service knowledge, customer relations, sales ethics, and return-on-investment. Additional topics will explore various aspects of development including annual fund management, corporate and foundation relations, prospect research, special events, major gifts, capital campaigns and gift planning.

SPTL 646. Facilities and Event Development. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Designed to help graduate students acquire the fundamental skills needed to plan different types of events, from facility design to determining the nuts and bolts of event design and implementation.

SPTL 647. Global Sports Issues. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Designed to provide a systematic study of human behavior as it occurs in and is influenced by social groups, institutions, organizations and societies pertaining to sports beyond the United States. Through this course students will gain a better understanding of sport as a social phenomenon (economically, politically, religiously, educationally, etc.) throughout the world.

SPTL 648. Issues in College Athletics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course seeks to identify contemporary issues and challenges in intercollegiate athletics. A primary objective is that students be cognizant of issues and concerns in sport, which may have a direct bearing in their future involvement in sport at the collegiate level. In addition, students will be encouraged to think critically about the current state of intercollegiate athletics and provide practical solutions for the sustainable growth and prosperity of athletic departments, student-athletes and institutions of higher education.

SPTL 650. European Model of Sport. 3 Hours.
Semester course. 3 lecture hours. 3 credits. An opportunity for students to get a first-hand examination of how sports principles and techniques are carried out overseas. Students will learn the global business of sport through class sessions, tours and events with top sport professionals in Europe. This class provides an excellent chance to gain access to a distant market and build contacts and networks, while growing culturally in the understanding of sport on a global scale.

SPTL 651. Advanced Coaching Techniques. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to students in the coaching track. Designed to provide students who have career aspirations of coaching an in-depth analysis of the profession and its challenges. Students will examine topics including coaching philosophies, networking, recruiting, marketing, fundraising, crisis management and other pertinent topics.

SPTL 691. Topics in Sport Leadership. 1-3 Hours.
Semester course; 1-3 lecture hours. 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 sport leadership.

SPTL 692. Independent Study. 1-3 Hours.
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.

SPTL 695. Externship. 1-6 Hours.
Semester course; 1-6 credits. May be repeated for a total of 6 credits. Prerequisites: permission of the fieldwork supervisor or executive director, and completion of 24 graduate credits. Restricted to sport leadership majors. Plan of work designed by the extern with prior approval of the offering program. Off-campus planned experiences for advanced graduate students designed to extend professional competencies in recreation, parks and sport leadership. Directed by university faculty in cooperation with placement site directors.

SPTL 701. Seminar in Sport Research. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Must be taken for a total of 3 credits. Restricted to students in the sport leadership track of the Ph.D. in Education program. Provides students with a broad, comprehensive understanding of academic research as it relates to the sport industry. This course is designed to fully engage students in the research process, including exploration of journals in the area of sport management and leadership, developing a literature review, overview of the manuscript review process and collaboration with faculty within the university and across the country. Students will also learn to prepare for academic research presentations at regional and national conferences and submit first-author manuscripts for scholarly journals.

SPTL 702. Seminar in Sport Leadership and the Profession. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to students in the sport leadership track of the Ph.D. in Education program. The course is designed to provide students with a broad, yet comprehensive preparation for a career in academe and offer a general sense of university structure and of the breadth of opportunities in higher education. Students will also explore their vision of "being a professor" and discuss timely and pressing topics in the field of sport leadership and academia, as well as receive assistance in the job-search process.

STATISTICAL SCIENCES (STAT)

STAT 206. Data Analysis and Statistics for Elementary Education. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: Passing score on the PRAXIS I exam. Restricted to students majoring in liberal studies for early and elementary education. Understanding probability, describing data both graphically and numerically, regression/correlation, common distributions and interpretation, item analysis for tests, interpreting test scores and educational studies, experimental design and limitations, comparing results using t-tests. This course relies heavily on using a graphing calculator as a data-analysis tool. Students may receive credit toward graduation for only one of STAT 206, STAT 208, STAT 210, STAT 212 or SCMA 301.

STAT 208. Statistical Thinking. 3 Hours.
Semester course; 2 lecture and 1.5 laboratory hours. 3 credits. Prerequisite: satisfactory score on the VCU Mathematics Placement Test within the one-year period immediately preceding the beginning of the course, or a minimum grade of C in MATH 131, MATH 141, MATH 151, MATH 200 or MATH 201. An exploration of the use of statistics in the world around us through in-depth case studies. Emphasis is on understanding statistical studies, charts, tables and graphs frequently seen in various media sources. Laboratories involve learning activities centered on case studies. Students may receive credit toward graduation for only one of STAT 206, STAT 208, STAT 210, STAT 212, STAT 312 or SCMA 301.

STAT 210. Basic Practice of Statistics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: satisfactory score on the VCU Mathematics Placement Test within the one-year period immediately preceding the beginning of the course, or a minimum grade of C in MATH 131, MATH 141, MATH 151, MATH 200 or MATH 201. An exception to this policy is made in the case where the stated alternative prerequisite course has been completed at VCU. Designed for students who will likely take another quantitative reasoning course for which statistics may be a prerequisite. Not open to mathematical sciences or computer science majors. Topics include examining distributions, examining relationships, producing data, sampling distributions and probability, introduction to inference. Students may receive credit toward graduation for only one of STAT 206, STAT 208, STAT 210, STAT 212, STAT 312 or SCMA 301.

STAT 212. Concepts of Statistics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: satisfactory score on the VCU Mathematics Placement Test within the one-year period immediately preceding the beginning of the course, or MATH 151, MATH 200 or MATH 201. Introductory statistics course with an emphasis on descriptive statistics, correlation and regression, probability, normal distributions, t distributions, and statistical inference. Graphing calculators will be used extensively. A core course for mathematical sciences. Students may receive credit toward graduation for only one of STAT 206, STAT 208, STAT 210, STAT 212, STAT 312 or SCMA 301.

STAT 291. Topics in Statistics. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. A study of selected topics in statistics. Specific topics may fulfill general education requirements. See the Schedule of Classes for specific topics and prerequisites.

STAT 305. Intermediate Statistics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 200 and STAT 212, or their equivalents. A study of intermediate-level statistical inference procedures, including categorical data analysis, analysis of variance, multiple regression and nonparametric procedures. Students may receive credit toward graduation for only one of STAT 305 or STAT 314.

STAT 309. Introduction to Probability Theory. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 307 and either MATH 211 or MATH 300. A study of the mathematical theory of probability, including finite and infinite sample spaces, random variables, discrete and continuous distributions, mathematical expectation, functions of random variables and sampling distributions.

STAT 310. Introduction to Statistical Inference. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: STAT 212 and STAT 309, or permission of instructor. Framework for statistical inference. Point and interval estimation of population parameters. Hypothesis testing concepts, power functions, Neyman-Pearson lemma and likelihood ratio tests. Elementary decision theory concepts.

STAT 314. Applications of Statistics. 4 Hours.
Semester course; 4 lecture hours. 4 credits. Prerequisite: STAT 210 or 212. A study of the concepts and application of statistical methods including: estimation and hypothesis testing for two sample problems; one factor analysis of variance and multiple comparisons; randomized block designs and analysis; inferences on categorical data, including chi-square test for independence for contingency tables; simple linear regression and correlation; multiple linear regression. Special topics include distribution-free (nonparametric) methods in various statistical problems, two factor analysis of variance and the use of a statistical software package for data analysis. Students may receive credit toward graduation for only one of STAT 305 or STAT 314.

STAT 321. Introduction to Statistical Computing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: STAT 212 and MATH 200 or their equivalents. The application of computers and computing software to statistical concepts using R, SAS and other quantitative software. Topics include data storage and retrieval, data modification and file handling, standard statistical analyses, graphical representations, practical presentation of results.

STAT 391. Topics in Statistics. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Prerequisite: because of the changing subject matter to be treated in this course, permission of the instructor is required. A study of selected topics in statistics. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

STAT 403. Introduction to Stochastic Processes. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 307 and STAT 309. Introduction to the theory of stochastic processes and their applications. In-depth studies of random variables, conditional probability and conditional expectation. Topics include Markov chains, random walks, Poisson processes, birth and death processes and applications to classical problems (e.g., gambler's ruin, physics, etc.).

STAT 415. Statistical Consulting. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: STAT 305 and STAT 321, or their equivalents. An introduction to the techniques of statistical consulting. Topics include applying statistical concepts to real-world scenarios, dealing with messy data and communicating results.

STAT 421. Applied Statistical Computing Using R. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 310 and either STAT 305 or STAT 314, or their equivalents. Completion of STAT 321 is strongly recommended. Introduction to object-oriented programming in the R environment for use with statistical analyses. Topics include basic algorithms in R and applications involving random number generation, parametric and non-parametric data analysis and inference, linear models, simulation, and advanced data manipulation.

STAT 422. Structured Problem Solving Using Statistics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: STAT 314, PSYC 214 or SCMA 302, or permission of instructor. Focuses on using analytic frameworks and applying statistics to solve problems in a real-world environment. Topics include discussion of analytical frameworks, problem restatement, divergent/convergent thinking, causal flow diagramming, the matrix method, decision tree analysis, review of sampling, confidence intervals, regression, ANOVA, chi squared tests, as well as applications of these concepts to solve case studies.

STAT 423. Nonparametric Statistics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: STAT 305 and STAT 321. Introduction to statistical estimation and inference methods that require relatively mild assumptions about the underlying population distribution. Topics include classical nonparametric hypothesis testing methods, permutation tests, bootstrap methods and density estimation.

STAT 425. Multivariate Statistics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 307, MATH 310, STAT 309, and either STAT 305 or STAT 314. Completion of STAT 421 is strongly recommended. Introduction to multivariate statistical analysis methods. Topics include multivariate probability distributions and their properties, conditional and marginal distributions, multivariate normal distribution, Hotelling's T2 distribution, multivariate analysis of variance, repeated measures, multivariate regression, principle component analysis, exploratory factor analysis, linear discriminant analysis, cluster analysis, and regression trees. Students will use modern statistical software to perform these analyses.

STAT 435. Industrial Statistics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: STAT 309; and STAT 305 or STAT 314. Introduction to statistical methods for quality control and process improvement. Topics include special versus common causes of variation, statistical thinking in industrial settings, Shewhart control charts, capability analysis, components of variation, design of experiments and response surface methods. Incorporates use of statistical software.

STAT 441. Applied Statistics for Engineers and Scientists. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: MATH 201 or equivalent, and a working knowledge of computers. An introduction to applied statistics intended primarily for students in engineering. The fundamental ideas about 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 black designs, fixed and random effects and multiple comparisons; correlation and linear regression analysis; control charts; contingency tables and goodness-of-fit. Students may receive degree credit for only one of STAT 441, STAT 543 or STAT 641.

STAT 443. Regression. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: STAT 305 and STAT 321, or permission of instructor. Completion of MATH 310 is strongly recommended. Introduction to the concepts and methods of linear regression, logistic regression, and other nonlinear regression models. Topics include model development and assumptions, estimation of model parameters, statistical inferences about the regression model, selection of an appropriate model, and diagnostics regarding multicollinearity and influence points. Applications involve the use of a statistical software package.

STAT 475. Time Series. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: STAT 321 and either STAT 305 or STAT 314. Completion of STAT 421 is strongly recommended. Introduction to the modeling of univariate time series data. Topics include simple and exponential moving averages, Brown's double exponential smoothing, Holt-Winters model, autocorrelation, partial autocorrelation, autoregressive integrated moving average models, seasonal autoregressive moving average models, harmonic analysis and time series regression. Students will use modern statistical software to perform these analyses.

STAT 508. Introduction to Social Statistics. 3 Hours.
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 or Computer Science. Crosslisted as: SOCY 508.

STAT 513. Mathematical Statistics I. 3 Hours.
Continuous course; 3 lecture 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. Crosslisted as: BIOS 513.

STAT 514. Mathematical Statistics II. 3 Hours.
Continuous course; 3 lecture hours. 3 credits. Prerequisite: STAT 513/ BIOS 513. 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. Crosslisted as: BIOS 514.

STAT 543. Statistical Methods I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to students with graduate standing, or those with 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 receive degree credit for only one of STAT 541, STAT 543 or BIOS 543, or STAT 641. Neither STAT 543 nor BIOS 543 is applicable toward the M.S. degree in mathematical sciences or the M.S. degree in computer science.

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

STAT 546. Linear Models. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: STAT 513 and one applied course in statistics, or permission of instructor. A study of the theory underlying the general linear model and general linear hypothesis. Topics include the general linear model for quantitative responses (including multiple regression, analysis of variance and analysis of covariance), binomial regression models for binary data (including logistic regression and probit models) and Poisson regression models for count data (including log-linear models for contingency tables and hazard models for survival data).

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

STAT 608. Statistics for Social Research. 3 Hours.
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. Crosslisted as: SOCY 608.

STAT 613. Stochastic Processes. 3 Hours.
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisite: graduate status in mathematical sciences or systems modeling and analysis, or permission of instructor. 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 614. Stochastic Processes. 3 Hours.
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisite: graduate status in mathematical sciences or systems modeling and analysis, or permission of instructor. 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 621. Nonparametric Statistical Methods. 3 Hours.
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-, two- and k-sample problems. Tests of randomness, Kolmogorov-Smirnov tests, analysis of contingency tables and coefficients of association. Crosslisted as: BIOS 621.

STAT 623. Discrete Multivariate Analysis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: graduate status in mathematical sciences or systems modeling and analysis, or permission of the instructor. Methods for the analysis of categorical data, including logistic regression and the general log-linear model. Emphasis on social and biomedical applications of these techniques using SPSS and SAS software.

STAT 625. Applied Multivariate Analysis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: graduate status in mathematical sciences or systems modeling and analysis, or permission of instructor. Multivariate statistics is a study of dependent random variables. This course covers methods for analyzing continuous multivariate data, such as numerical and graphical summary of multivariate observations, principal component analysis, factor analysis, classification and discrimination, canonical correlation analysis, and cluster analysis. Students will learn the motivation behind these methods, how to implement them in statistical software packages and how to interpret the results.

STAT 626. Complex Sampling Designs and Variance Estimation. 3 Hours.
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 636. Machine Learning Algorithms. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to students with graduate status in mathematical sciences, systems modeling and analysis, decision sciences and business analytics, or computer science, or by permission of the instructor. Includes an in-depth analysis of machine learning algorithms for data mining, equipping students with skills necessary for the design of new algorithms. Analyses will include framing algorithms as optimization problems and a probabilistic analysis of algorithms. Students will be exposed to current areas of research in the construction of data mining algorithms. Crosslisted as: OPER 636.

STAT 641. Applied Data Analysis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: completion of a multivariate calculus course. Experience with mathematics or statistics software is strongly recommended. Introduction to applied data analysis intended primarily for graduate students in mathematical sciences and engineering. Topics include the fundamental ideas of descriptive statistics, elementary probability theory, statistical inference including tests of hypotheses and confidence intervals, ANOVA, principles of experimental design, correlation and linear regression analysis, categorical data analysis, and quality control. Focus is on the practical side of implementing these techniques using statistical software packages. Students may receive degree credit for only one of STAT 441, STAT 543/BIOS 543 or STAT 641.

STAT 642. Design and Analysis of Experiments I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: graduate status in mathematical sciences or systems modeling and analysis, or permission of instructor. An introduction to the design and analysis of experiments. Topics include the design and analysis of completely randomized designs, one variable block designs, the family of Latin square designs and split-plot designs. Introductions are also given to multiple comparison procedures and contrasts, analysis of covariance and factorial experiments. Applications involve the use of a statistical software package.

STAT 643. Applied Linear Regression. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 200-201, STAT 212 and MATH 310 or equivalents. An introduction to the concepts and methods 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 645. Bayesian Decision Theory. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: STAT 514 or equivalent. Presents statistical decision theory and Bayesian analysis, with discussions of loss functions, risk, utility, prior information; conjugate families; posterior distributions, estimation, hypothesis testing; empirical and hierarchical Bayes analysis; and robustness.

STAT 648. Systems Reliability Analysis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: graduate status in mathematical sciences or systems modeling and analysis, or permission of the 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 also will be discussed. Crosslisted as: OPER 648.

STAT 649. Statistical Quality Control. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: graduate status in mathematical sciences or systems modeling and analysis, or permission of the 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. Crosslisted as: OPER 649.

STAT 650. Design and Analysis of Response Surface Experiments. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to students with graduate status in mathematical sciences or systems modeling and analysis, or permission of the instructor. Philosophy, terminology and nomenclature for response surface methodology, analysis in the vicinity of the stationary point, canonical analysis, description of the response surface, rotatability, uniform information designs, central composite designs and design optimality. Crosslisted as: BIOS 650.

STAT 675. Time Series Analysis I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: graduate status in mathematical sciences or systems modeling and analysis, or permission of instructor. Analysis of data when observations are not mutually independent, stationary and nonstationary time series, ARIMA modeling, trend elimination, seasonal models, intervention analysis, transfer function analysis, prediction and applications in economics and engineering.

STAT 691. Special Topics in Statistics. 1-3 Hours.
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 696. Applied Project. 1-3 Hours.
Semester course; 1-3 lecture hours (to be arranged). 1-3 credits. Up to three credits will be applied to the M.S. in Mathematical Sciences (operations research or statistics concentration) per section. Can be repeated for credit. Prerequisite: SSOR 690 or permission of the faculty adviser. Designed to allow students to apply concepts and theories learned in other courses to a practical situation. Includes the selection, written description, completion and written report of the project and a presentation of the findings. Students may not receive credit for both OPER/STAT 696 and OPER/STAT 698. Graded as Satisfactory/Unsatisfactory. Crosslisted as: OPER 696.

STAT 697. Directed Research. 1-3 Hours.
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. 1-3 Hours.
Hours to be arranged. 1-3 credits. A total of 3 or 6 credits may be applied to the M.S. in Mathematical Sciences/Statistics. (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.

STAT 725. Advanced Multivariate Statistical Methods. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: STAT 625 and STAT 643. This course emphasizes statistical analysis, methodology and theory in modern statistical learning. A variety of multivariate statistical methods, algorithms and software tools will be introduced, with emphasis on conceptual, theoretical and computational aspects. Topics include regularized regression (linear/nonlinear), classification, clustering, sufficient dimension reduction and high dimensional data analysis. Applications involve the use of a statistical software package.

STAT 736. Mathematics of Knowledge and Search Engines. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: STAT 541 or equivalent. Investigates the mathematics, methods and algorithms for searching for and extracting structures of interest (knowledge) from large and possibly high-dimensional datasets. The motivation is the rapid and phenomenal growth of the search engine (as demonstrated by Google) as a major tool for search on the Internet, which has impacted commerce, education and the study of social, financial and scientific datasets. The development of the mathematical and statistical learning algorithms behind these search engines has led to advances in how large, high-dimensional datasets can be effectively analyzed for the extraction of knowledge. Crosslisted as: OPER 736.

STAT 742. Design and Analysis of Experiments II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: STAT 642. Advanced study of the design and analysis of experiments. Topics include the design and analysis of incomplete block designs, factorial designs, fractional factorial designs, asymmetric factorial designs, blocking in fractional factorial designs, nested designs and response surface designs. Applications involve the use of a statistical software package.

STAT 744. Regression II. 3 Hours.
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, advanced model selection criteria, influence diagnostics including multiple observation diagnostics and singular value decomposition, nonlinear regression, Poisson regression, logistic regression, generalized linear models and the exponential family, variance modeling and nonparametric regression. Applications involve the use of a statistical software package.

STAT 745. Advanced Bayesian Statistics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: STAT 546 and STAT 645 or permission of instructor. Introduces modern aspects of Bayesian methodology. Numerical and sampling techniques such as the Gibbs sampler, importance sampling resampling, Monte Carlo integration, Metropolis-Hastings sampling and adaptive sampling methods. Inferential methods including model selection, highest probability models, Bayesian model averaging, Markov chain Monte Carlo model composition. A large portion of the course will survey the current literature in the areas listed above as well as applications of the methods.

STAT 746. Spatial Data Analysis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: STAT 513 and STAT 643 or permission of instructor. The course will introduce graphical and quantitative analysis for spatial data. Topics include data on fixed-grids, point-referenced data, lattice data, point-pattern data and experimental design for spatial data collection. Students will be expected learn how to program in appropriate software packages.

STAT 775. Time Series Analysis II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: STAT 513 and STAT 675, or permission of instructor. Advanced study of time series analysis. Topics include multivariate time series, state-space models and GARCH models. Applications involve the use of a statistical software package.

STAT 791. Special Topics in Statistics. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. May be repeated for credit. Prerequisitie: permission of instructor. A detailed study of selected advanced topics in statistics.

STATISTICAL SCIENCES AND OPERATIONS RESEARCH (SSOR)

SSOR 490. Developing Professional Skills in Operations Research and Statistics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: UNIV 200 or HONR 200; either OPER 427 and OPER 428, or STAT 321 and either STAT 305 or STAT 314. Capstone course designed to help students apply analysis techniques and attain proficiency in professional and academic communication in the context of statistics and operations research. Focuses on the discipline-specific skills necessary to excel in careers or graduate studies in these disciplines.

SSOR 492. Independent Study. 2-4 Hours.
Semester course; variable hours. 2-4 credits. Maximum 4 credits per semester; maximum total of 6 credits. Generally open only to students of junior or senior standing who have acquired at least 12 credits in the departmental discipline. Determination of the amount of credit and permission of instructor and department chair must be procured prior to registration in the course. The student must submit a proposal for investigating some area or problem not contained in the regular curriculum. The results of the student's study will be presented in a report.

SSOR 493. Internship. 3 Hours.
Semester course; the equivalent of at least 15 work hours per week for a 15-week semester. 3 credits. Enrollment restricted to mathematical sciences/statistics and mathematical sciences/operations research majors only with junior or senior standing. Admission by permission from the department chair. Through placement in a position in business, industry, government or the university, the student will serve as an intern in order to obtain a broader knowledge of statistics or operations research techniques and their applications.

SSOR 495. Expositions in Statistical Sciences and Operations Research. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: SSOR 490. Capstone course designed to help students obtain proficiency in professional writing and presentation skills. The students will present, both orally and in writing, the findings from their capstone projects.

SSOR 690. Research and Communications Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment restricted to students with nine graduate credits in OPER and/or STAT courses and with permission of the instructor. Designed to help students attain proficiency in professional and academic communication and research in the context of statistics and operations research. The course focuses on the discipline-specific communication and research skills necessary to excel in careers or graduate studies in these disciplines.

SUPPLY CHAIN MANAGEMENT AND ANALYTICS (SCMA)

SCMA 171. Mathematical Applications for Business. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 141 or satisfactory score on the VCU Mathematics Placement Test within the one-year period immediately preceding the beginning of the course. Pre- or corequisite: INFO 162. Mathematics equivalency may be validated by a satisfactory score on the VCU Mathematics Placement Test within the one-year period immediately preceding the beginning of the course. Formulation and solution of problems using a spreadsheet and algebra, mathematics of finance, matrices and introductory linear programming. Instruction will include spreadsheet use as a calculation and graphing tool.

SCMA 212. Differential Calculus and Optimization for Business. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SCMA 171 or MATH 151 or satisfactory score on the VCU Mathematics Placement Test within the one-year period immediately preceding the beginning of the course. Univariate and bivariate differential calculus and optimization of algebraic functions that model business phenomena. Students should take SCMA 212 immediately after completing SCMA 171. Students may not receive degree credit for both SCMA 212 and MATH 200.

SCMA 301. Business Statistics I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SCMA 212 or MATH 200. Statistical methods for collection, visualization and analysis of business and economic data from populations and processes. Statistical thinking, concepts of variability, sampling, descriptive measures, contingency tables, probability and introduction to regression, correlation, confidence intervals and hypothesis testing. Students may receive credit toward graduation for only one of STAT 206, STAT 208, STAT 210, STAT 212, STAT 312 or SCMA 301.

SCMA 302. Business Statistics II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SCMA 212 or MATH 200 and SCMA 301, STAT 210 or STAT 212. Statistical methods employed in the collection and analysis of business and economic data. Continuation of statistical inference for means and variable relationships using t-tests, analysis of variance, contingency tables, regression and correlation analysis with emphasis on problem formulation and interpretation of computational results.

SCMA 303. Business Analytics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: INFO 162; SCMA 212 or MATH 200; and SCMA 301, STAT 212 or STAT 210. Descriptive analysis (Excel models and pivot tables, summary statistics, data visualization and regression analysis), predictive analysis (time series and forecasting) and prescriptive analysis (optimization models, decision trees and sensitivity analysis).

SCMA 320. Production/Operations Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SCMA 301, STAT 210 or STAT 212. This course is restricted to students who have completed at least 54 credit hours (junior standing). Discipline of management and the management process within the operations of an organization. Planning and controlling of operations through decision analysis, forecasting, aggregate planning, inventory management and quality management.

SCMA 339. Quantitative Solutions for Supply Chain Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SCMA 301, STAT 210 or STAT 212. Enrollment is restricted to students who have completed at least 54 credit hours (junior standing). Modeling business-related problems using quantitative techniques. Focus is on applications to problems in the service and manufacturing sectors. Typical problem situations involve management of inventory, scheduling of people and processes and allocation of scarce resources.

SCMA 350. Introduction to Project Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: junior standing. Introductory exposure to and practice with the concepts of project management, the activities and skills of project managers, the prevalence of projects in organizations, and the value of project management skills for all managers. Students will employ project management terminology, participate in project work and engage in the appropriate technical and interpersonal processes for managing successful projects.

SCMA 386. Global Supply Chain Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Enrollment is restricted to students who have completed at least 54 credit hours (junior standing). Introduction to supply chains with emphasis on management, e-commerce and globalization. Topics covered include achievement of strategic fit among members of the chain; managing information system requirements; managing economies of scale, role of cycle inventory, impact of aggregation on risk and inventory; determining the optimal level of product availability, coordination and performance measurement.

SCMA 410. Logistics and Distribution Strategy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SCMA 320. This course provides an introduction to the principal analytical tools and methods used in supply chain management, including experience in solving relevant supply chain and logistics problems. The course content includes a heavy emphasis on the use of Microsoft Excel functions to develop modeling skills, including decision analysis, linear programming, heuristics and simulation for supply chain decision-making. Context areas for problem solving include supply chain network design, inventory management, transportation management, purchasing and demand management.

SCMA 420. Strategic Sourcing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SCMA 320. Procurement and strategic sourcing address the processes that facilitate the structure, creation and management of value-added transactions and relationships between supplier and customer organizations in a channel, supply chain and integrated value system context.

SCMA 427. Employment Law. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: BUSN 323 or MGMT 331. Enrollment is restricted to students who have completed at least 54 credit hours (junior standing). A survey of legislation and court and administrative-body decisions affecting the employer/employee relationship.

SCMA 430. Data Management and Visualization. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SCMA 303. This course is designed with the goal of equipping students with competencies in data management and visualization, with the intended product being an individual capable of developing analytically rigorous decision support tools, catered to specific managerial environments, which can be easily handed off for robust application by a range of intended users in those environments.

SCMA 439. Process Management and Quality Control. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SCMA 320. Enrollment is restricted to students who have completed at least 54 credit hours (junior standing). Critical concepts of process management from quality management and Six Sigma; service quality; systems thinking; process improvement strategy and methods; fact-based decision-making; collection and use of data in improvement projects; introduction to data analysis tools and techniques; statistical process control.

SCMA 440. Data Mining and Forecasting. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SCMA 302 or STAT 314. Enrollment is restricted to students who have completed at least 54 credit hours (junior standing). This course introduces nonmathematical managers to the major quantitative models designed for sound demand, competitive and system forecasting in today's complex and increasingly uncertain business environment. The course is useful for multiple business disciplines, including general management, marketing and finance. Topics include game theory, Markov processes, statistical quality control, exponential smoothing and seasonally adjusted trend analysis. Emphasis is placed on a general understanding of theory, mechanics, application potential, available software packages and templates.

SCMA 491. Topics in Supply Chain Management and Analytics. 1-3 Hours.
Semester course; variable hours. 1-3 credits. Students are restricted to a maximum total of 6 credits for all topics courses. Prerequisite: junior standing. An in-depth study of a selected business topic related to the disciplines in supply chain management and analytics, to be announced in advance.

SCMA 492. Independent Study in Supply Chain Management and Analytics. 1-3 Hours.
Semester course; 1-3 credits. Maximum total of 3 credits. Prerequisites: junior or senior standing as a major in a business curriculum and approval of adviser and department chair prior to course registration. Intensive study under supervision of a faculty member in an area not covered in depth or contained in the regular curriculum.

SCMA 493. Internship in Supply Chain Management and Analytics. 3 Hours.
Semester course; 3 credits. Prerequisites: senior standing in the major offering the internship and permission of the department chair. Intention to enroll must be indicated to the instructor prior to or during advance registration for semester of credit. Involves students in a meaningful experience in a setting appropriate to the major.

SCMA 500. Quantitative Foundation for Decision-making. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: MATH 141, MATH 151 or SCMA 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 credits of advanced work required for any of the master's degrees offered by the School of Business.

SCMA 524. Statistical Fundamentals for Business Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SCMA 171, SCMA 212, SCMA 500 or MATH 200. Develops an ability to interpret and analyze business data in a managerial decision-making context. Applications are stressed in the coverage of descriptive statistics, contingency tables, probability, sampling, correlation, confidence interval estimation, hypothesis testing and regression analysis. Business-oriented computational software will be used for data visualization and analysis. This is a foundation course.

SCMA 530. Fundamentals of the Legal Environment of Business. 3 Hours.
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.

SCMA 602. Global Supply Chain Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course explores supply, operations and logistics processes and how these processes are integrated with other functions within the firm and across organizations. The objective of this course is to provide students with knowledge of the fundamentals of supply chain management and how those concepts apply to business practice in a global setting.

SCMA 603. SAP ERP and Supply Chain Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course focuses on the concept of enterprise information systems as the application of information technology to support the integration of organizational processes. SAP ERP software applications will focus on the design, plan and control of supply chain management processes. Students will have extensive hands-on activities, assignments and cases using a live SAP ERP system.

SCMA 606. Supply Chain Innovation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Students are introduced to cross-disciplinary principles pertaining to creativity, design, invention and innovation. The focus is learning and applying problem-solving methodologies to address complex, open-ended supply chain problems. Innovation from individual and team perspectives is addressed to hone more comprehensively students' problem-identification, information-gathering, conceptualization, evaluation and selection skills.

SCMA 632. Statistical Analysis and Modeling. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOS 543, SCMA 302, SCMA 524, STAT 541 or STAT 543. Statistical analysis and modeling with an applied focus on regression modeling, analysis of variance and data collection planning. Use of business-oriented computational software will be integral to statistical analysis of data.

SCMA 643. Applied Multivariate Methods. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SCMA 524, STAT/BIOS 543 or ECON 501. Study of multivariate statistical methods frequently used in business and analytics problems including principal components, factor analysis, discriminant analysis, MANOVA, logistic regression and cluster analysis. The focus is on applying these techniques through the use of a computer package.

SCMA 645. Management Science. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOS 543, SCMA 301, SCMA 524, STAT 541 or STAT 543. Examines the formulation, analysis and solution of quantitative models for business problems. Problems addressed include the allocation of resources, making decisions and dealing with uncertainty. Applications relevant in diverse business disciplines will be investigated, and the models may include linear programming, simulation and other management science tools. Current computer solution methods will be utilized.

SCMA 646. Legal Foundations of Employment. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: SCMA 530 or MGMT 637. 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.

SCMA 648. Analytics for Organizational Decision-making. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOS 543, SCMA 302, SCMA 524, STAT 541 or STAT 543. Analytical procedures and techniques used by organizations in reaching decisions based on data and application area knowledge. The emphasis is on the application of data-driven decision approaches to solving problems in contemporary organizations using business-oriented computational software.

SCMA 669. Developing and Implementing Forecasting Methods for Business. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOS 543, ECON 501, SCMA 302, SCMA 524, STAT 541 or STAT 543. Forecasting methods and applications appropriate for managerial decision-making. Methods covered include moving average and exponential smoothing, seasonal adjustments, time series, forecast averaging, new-product forecasting, and combining managerial judgment and analytical forecasts. Particular emphasis is placed on developing and implementing forecasting techniques and other analytical tools in an interactive organization and appreciation of issues and caveats associated with each technique. Course includes data acquisition and teamwork along with effective consulting, communication and presentation skills.

SCMA 675. Operations Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite:BIOS 543, SCMA 301, SCMA 524, STAT 541 or STAT 543. A systematic investigation of the concepts and issues in designing, operating and controlling productive systems in both manufacturing and services.

SCMA 677. Quality Management and Six Sigma. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOS 543, SCMA 302, SCMA 524, STAT 541 or STAT 543. Concepts of quality management and Six Sigma: quality strategies, organizational quality assessment, Six Sigma process management tools and techniques, process control and improvement tools, the voice of the customer and the voice of the employee.

SCMA 690. Research Seminar in Supply Chain Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Approval of proposed work is required by graduate studies office in the School of Business. This course is designed to provide research experience for candidates pursuing a non-thesis option.

SCMA 691. Topics in Supply Chain Management and Analytics. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Study of current topics. Topics may vary from semester to semester.

SCMA 693. Field Project in Supply Chain Management and Analytics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: Approval of proposed work is required by graduate studies office in the School of Business. Students will work under the supervision of a faculty adviser in planning and carrying out a community-engaged research project. A written report of the investigations is required.

SCMA 697. Guided Study in Supply Chain Management. 1-3 Hours.
Semester course; variable hours. 1-3 credits. Prerequisite: Approval of proposed work is required by graduate studies office in the School of Business. Graduate students will submit a detailed outline of their research problem. They will be assigned reading and will prepare a written report on the problem. To be taken at the end of the program.

SYSTEMS MODELING AND ANALYSIS (SYSM)

SYSM 681. Systems Seminar I. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: graduate standing in mathematical sciences or systems modeling and analysis. Designed to help students attain proficiency in academic communication and research in the context of mathematics, operations research and statistics. Focuses on the discipline-specific communication and research skills necessary to excel in graduate studies in these disciplines.

SYSM 682. Systems Seminar II. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: graduate standing in mathematical sciences or systems modeling and analysis. Designed to help students attain proficiency in professional communication and research in the context of mathematics, operations research and statistics. Focuses on the discipline-specific communication and research skills necessary to excel in professional careers in these disciplines.

SYSM 683. Systems Seminar III. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: graduate standing in mathematical sciences or systems modeling and analysis. Designed to help students attain proficiency in literature review and research in the context of mathematics, operations research and statistics. Focuses on the discipline-specific literature review and research skills necessary to write an applied project, thesis or dissertation.

SYSM 697. Systems Research. 3 Hours.
Semester course; 3 credits. May be repeated for credit. Prerequisite: graduate standing in systems modeling and analysis. Supervised individual research and study. Research culminates with an oral presentation and submission of a written report to the supervising faculty member.

SYSM 780. Stochastic Methods in Mathematical Biology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: STAT 513 or 613, MATH 532. Covers commonly used stochastic methods in mathematical biology, including cellular physiology and related areas. Topics covered include stochastic differential equation models, applications of first passage time (escape time) and applications of density or master equations, diffusion in cells, stochastic ion channel dynamics, and cellular communication. Students will be expected to learn how to program in appropriate software packages.

SYSM 798. Dissertation Research. 1-12 Hours.
Semester course; variable hours. 1-12 credits. May be repeated for credit. Research and work leading to the completion of the Ph.D. dissertation in systems modeling and analysis. Graded S/U/F.

TEACHER EDUCATION (TEDU)

TEDU 101. Introduction to Teaching. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides undergraduate students with an introduction to teaching and learning in elementary settings. Students will explore current educational reforms and their influences on elementary schools and students. Service-learning activities will enable students to gain firsthand experiences in urban elementary classrooms.

TEDU 203. Focus on Choice. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May be repeated for a maximum of 3 credits. A career planning experience for adults focusing on discontinuity in life patterns and a review of current educational and occupational opportunities. Consideration of the world of work, fields of education and volunteer service, and the development of one's own potential will be featured.

TEDU 310. Elementary School Practicum A. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Corequisites: TEDU 410, TEDU 414 and TEDU 426. Restricted to students admitted to the Extended Teacher Preparation Program. A field placement that precedes student teaching/internship. Includes planned observations, tutorials and small-group involvement. Graded pass/fail.

TEDU 311. Middle School Practicum. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Corequisite: TEDU 537. Restricted to students admitted to the Extended Teacher Preparation Program. A field placement that precedes student teaching/internship. Includes planned observations, tutorials and small-group involvement. Graded pass/fail.

TEDU 312. High School Practicum. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Pre- or corequisite: TEDU 311; corequisite: TEDU 540, 545, 547 or 548. Restricted to students admitted to the M.T. program with concentrations in secondary education. A field placement that precedes student teaching/internship. Includes planned observations, tutorials and small-group involvement. Course graded as pass/fail.

TEDU 313. Elementary School Practicum B. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Prerequisite: TEDU 310; corequisites: TEDU 517, TEDU 522 and TEDU 591. Restricted to students admitted to the M.T. program with a concentration in early and elementary education. A field placement that precedes student teaching/internship. Includes planned observations, tutorials and small-group and whole class involvement.

TEDU 386. Children's Literature I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. Designed to give students an appreciation of children's literature; includes biography, fable, myth, traditional and modern fanciful tales and poetry, as well as a survey of the history of children's literature. Crosslisted as: ENGL 386.

TEDU 387. Literature for Adolescents. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291, or 295. Designed to acquaint the prospective middle and secondary school English teacher with the nature, scope and uses of adolescent literature. The student is acquainted with reading materials for meeting the varied needs and interests of adolescents. Crosslisted as: ENGL 387.

TEDU 389. The Teaching of Writing Skills. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Studies the theory and methods for teaching writing to students in middle and secondary schools. Teaches strategies for prewriting, composing, peer revision, evaluation and topic construction. Includes extensive journal and essay writing. Crosslisted as: ENGL 389.

TEDU 390. Physical Education for the Elementary Teacher. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Methods and curriculum planning in physical education for the elementary school teacher and physical education specialist. Emphasis is placed on using activities and games to foster the growth and development of the child with a focus on the psychomotor and affective domains.

TEDU 400. Independent Study. 1-6 Hours.
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 410. Classroom Management in Elementary Schools. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Designed to help students develop their understanding of effective classroom management techniques. Students will examine management models and research and evaluate antecedent factors of a management scheme such as their philosophy of education, management style, learning styles and school and classroom climate.

TEDU 411. Integrating the Arts in Curriculum for Young Children. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides pre-service teachers with an understanding of how experiences in visual art, music, drama and movement can be used to support the growth and development of children ages 3 to 8. Students will learn of the importance of all of the arts for children's cognitive, socio-emotional and psychomotor development. Emphasis will be given to integrating developmentally appropriate experiences in the arts into early childhood curriculum.

TEDU 414. Curriculum and Methods for Early/Elementary Children. 4 Hours.
Semester course; 4 lecture hours. 4 credits. Prerequisite: admission to teacher preparation program. Corequisites: TEDU 310 (Practicum A) and 426. A study of developmentally appropriate curriculum and methods for early/elementary children, including diversity, assessment, behavior guidance and management, planning instruction and creating positive learning environments. Includes an overview of the history of early/elementary education and issues currently facing the profession.

TEDU 426. Teaching Reading and Other Language Arts. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Presents teaching strategies and materials in reading and the other language arts based on current theory and research. Emphasizes the interrelatedness of listening, speaking, reading and writing and the importance of naturalistic language experiences.

TEDU 485. Directed Student Teaching I. 6 Hours.
6 credits. Prerequisites: admission to TEDU 310 or equivalent with a minimum grade of C, recommendation of practicum supervisor and passing score on the VCLA test. A classroom teaching experience in a public school or other approved setting, which includes opportunities for increasing involvement with children. Culminates in full responsibility for planning, implementing and evaluating classroom activities.

TEDU 486. Directed Student Teaching II. 6 Hours.
6 credits. Prerequisites: admission to TEDU 310 or equivalent with a grade of C or better and recommendation of practicum supervisor. A classroom teaching experience in a public school or other approved setting, which includes opportunities for increasing involvement with children. Culminates in full responsibility for planning, implementing and evaluating classroom activities.

TEDU 494. Topical Seminar in Education. 1-3 Hours.
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. 1-3 Hours.
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. Supervising Student Teachers. 1-3 Hours.
3 credits. Prerequisite: permission of instructor. Focuses on the role of clinical faculty as site-based supervisors of student teachers. Provides knowledge, skills and training necessary to supervise and evaluate student teachers.

TEDU 503. Guidance for Exceptional Children. 3 Hours.
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 512. Teaching Elementary Health and Physical Education. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Restricted to students in general health and physical education who have been admitted to teacher preparation program. Designed to enhance knowledge and advanced pedagogical skills in teaching elementary health and physical education. Through an analysis of the NASPE and AHEE standards, state SOL, goals, objectives and programs, students construct year-round curricula and daily lesson plans for use in public school settings. Emphasis also placed upon classroom management skills and administrative and organizational strategies dealing with facilities, equipment, teaching aids, measurement and safety.

TEDU 513. Teaching Health Education. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Restricted to students in general health and physical education who have been admitted to teacher preparation program. Prepares students to become independent problem-solvers and decision-makers by applying previously acquired knowledge to advanced instructional techniques in the public school health classroom. Students acquire advanced pedagogical skills and gain insight into the development of health education programs for middle and secondary schools. Course includes the development of curricula, unit plans and lesson plans.

TEDU 514. Teaching Physical Education. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Restricted to students in general health and physical education who have been admitted to teacher preparation program. Designed to enhance knowledge and advanced pedagogical skills in teaching secondary physical education. Through an analysis of the national standards, state SOL, goals, objectives and programs, students construct year-round curricula, units and daily lesson plans to be used in public schools. Emphasis also placed upon the acquisition of administrative and organizational knowledge dealing with facilities, equipment, teaching aids, measurement and safety.

TEDU 517. Science Education in the Elementary School. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: TEDU 414 and admission to teacher preparation program. Corequisites: TEDU 310 (Practicum B), 522 and 591. A course designed to renew and/or expand teachers' knowledge and skills in the teaching of science in the classroom and the community. New materials and methodologies will be examined in the light of current trends, research findings and professional recommendations.

TEDU 521. Teaching Mathematics for Middle Education. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: TEDU 414 and admission to teacher preparation program or permission of instructor. Corequisites: TEDU 310 (Practicum B), 517 and 591. 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides the student with fundamental 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. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Teaching techniques and materials for the developmental teaching 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 526. Word Study. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Integrates the linguistic, historical, theoretical and research bases of developmental spelling and word knowledge (phonics, phonemic awareness and vocabulary). A primary focus is on the stages of spelling development, including assessment and instruction of orthographic knowledge at each stage.

TEDU 528. Children's Literature II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of classic and current children's books from a variety of literary genres. 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 351/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. Crosslisted as: ENGL 528.

TEDU 531. Media Literacy in the K-12 Classroom. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Offered in online and traditional formats. Explores the role of media in society and methods for incorporating media literacy instruction in the K-12 school classroom. Participants will study the foundations of media literacy, critical thinking and the ways media shapes our views of culture, society and education. Through hands-on activities and projects, participants will become familiar with a variety of media tools and instructional methods for utilizing media to support student learning. Participants will research methods for assessing student learning when using paper-based and digital media.

TEDU 535. Problems of Social Studies Instruction. 3-6 Hours.
Semester course; 3-6 credits. Prerequisite: Permission of instructor and appropriate teaching experience. 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. 3 Hours.
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 540. Teaching Middle and High School Sciences. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EDUS 301 and admission to teacher preparation or permission of instructor. 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 544. Introduction to the Middle School. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: upper-division mathematical sciences major or EDUS 301 and admission to teacher preparation or permission of instructor. Examines materials, resources, innovations, procedures, methods, equipment and learning principles appropriate for decision-making related to the teaching of secondary mathematics.

TEDU 547. Teaching Secondary School Social Studies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines demands involved in secondary social studies instruction; preparatory approaches to using academic and professional insights in confronting the demands; formulating and implementing appropriate methodological approaches.

TEDU 548. Teaching Secondary School English. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: EDUS 301 and admission to teacher preparation or permission of instructor. 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. 3 Hours.
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 procedures. Course techniques are practiced with students in grades 6 through 12.

TEDU 550. Teaching Interdisciplinary Language Arts and Social Studies in the Middle School. 3 Hours.
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 approaches to 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. Teaching English as a Second Language. 3 Hours.
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. Crosslisted as: ENGL 552/LING 552.

TEDU 554. Applications of Computers in the Teaching of Mathematics. 3 Hours.
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. 3 Hours.
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. Advanced Computer Applications in Education. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequsites: TEDU 507or its equivalent, a portfolio demonstrating content and skills covered in TEDU 507, or permission of instructor. Develops the technology instructional framework, including teaching strategies, models of instruction and best practices in technology integration; creation of instructional lessons integrating technology by using typical office suite production tools; and connecting theory to practice. Will satisfy most of the ISTE and state technology standards.

TEDU 560. Instructional Strategies Using the Internet. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Emphasizes understanding of informational technology instructional strategies; theoretical underpinnings of constructivism; preparation and assessment of instructional models that include project-based learning, inquiry-based learning, problem-based learning and collaborative learning using resources on the Internet.

TEDU 561. Reading Foundations: Sociological/Psychological Perspectives. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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. 4 Hours.
Semester course; 3 lecture hours and 1 practicum hour. 4 credits. Prerequisite: TEDU 426 or 561. 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 course component.

TEDU 569. Diagnosis and Remediation in Mathematics. 3 Hours.
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 575. Intercultural Communication. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An experientially oriented seminar for persons preparing for or in careers necessitating intercultural communication among persons of differing cultural and/or national backgrounds. Special attention is given to teachers and other professionals who work with a clientele from Latin America, the Middle East, Asia, Africa and Eastern Europe. American cultural patterns broaden understanding of specific groups and engagement in intercultural communication. Crosslisted as: FRLG 575.

TEDU 588. Classroom Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Designed to assist teachers in becoming effective classroom managers. Emphasis on application of classroom management, motivational and instructional theories. Models of classroom management explored; personal management plans developed.

TEDU 591. Social Studies Education in the Elementary School. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: TEDU 414 and admission to teacher preparation. Corequisites: TEDU 310, 517 and 522. 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, current trends and research findings.

TEDU 594. Topical Seminar. 1-3 Hours.
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 602. National Board Certification I and Externship Proposal Development. 3 Hours.
Semester course; 3 credits. Prerequisites: participation in a two-day pre-candidacy workshop and approval of department. Analyze and reflect on teaching practices, study national teaching standards, and develop initial portfolio entries. Development of externship proposal.

TEDU 610. Developing and Critiquing Visual Literacy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Develop skills and evaluate the effectiveness and appropriateness of the use of media. Understand imagery, develop visual communication skills to appropriately represent data, video or text by applying design principles in creating print, as well as non-print, as an instructional resource.

TEDU 611. Critical Investigations in Mathematics Education. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: TEDU 521, 522 or 545, or permission of instructor. A critical investigation of current and appropriate learning theories, instructional activities, programs and manipulative materials applicable to mathematics education in the elementary school. This course assumes an overall knowledge 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. 3 Hours.
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 and the Curriculum. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course presents a layered, contextualized approach to curriculum and instruction. Students will consider broad families of instructional models. These models will then be reconsidered in light of current cognitive/psychological theories of learning and broader sociopolitical rationales that situate instruction. Throughout this three-tiered journey, students critically appraise and reappraise their initial understandings of instructional models and create a model of their own.

TEDU 618. Curriculum Construction. 3 Hours.
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 619. Multicultural Perspectives in Education. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Designed to enhance cultural competence in diverse classrooms and schools. Major considerations include race, ethnicity, linguistic, gender, abilities and sexual orientation differences. Key concepts include structural, curricular and instructional facets of working successfully in diverse educational settings. Personal and theoretical constructs of race, ethnicity, culture, disability and other related concepts are explored. This course is delivered online. Crosslisted as: SEDP 619.

TEDU 620. Video Applications in Instruction. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: TEDU 556 and 610 or permission of instructor. Emphasizes the design and instructional strategies used with the production of video resources. Differentiates analog and digital video, importing images, video and sound, editing, previewing, transitions, filters, motion settings, superimposing, titles, special effect options, and exporting video. Students will produce and edit a personalized instructional module using digital video hardware and editing software. Crosslisted as: MASC 681.

TEDU 621. Curriculum Seminar. 3 Hours.
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 course work and professional experiences in curriculum.

TEDU 622. Creative and Cognitive Development. 3 Hours.
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. 3 Hours.
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 baseline for prescribing/providing appropriate activities.

TEDU 624. Early Childhood Education Programs and Policies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of Early 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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Translation of curriculum development principles into appropriate curricular programs for young children. Impact of recent research on these curricula. Consideration of child development as related to planned activities and expected outcomes.

TEDU 626. Home-School Communication and Collaboration. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: TEDU 414 or permission of instructor. Studies the rationale, methods, programs and current research of home-school partnerships, preschool through secondary education.

TEDU 627. Exploring Historical Consciousness. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course is designed to introduce students interested in the fields of public history and history teaching to the contemporary scholarship on how people become conscious of history in schools and in the culture at large. Two inquiry questions will guide our work: What does it mean to be conscious of history? and How do people learn to understand history?.

TEDU 640. Designing and Managing eLearning. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: TEDU 556 or 560, or permission of instructor. Emphasizes identification of appropriate methods of instructional delivery to meet online learner needs, develop online modules and lessons for different virtual learning environments, including team and collaborative projects, and best practices associated with the development of online instruction.

TEDU 641. Independent Study. 1-6 Hours.
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 642. Instructional Mentoring and Coaching. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Designed to develop skills in mentoring, coaching and observing teachers to improve instruction. Students learn how to build an effective mentoring relationship, select appropriate coaching strategies, collect and analyze data during instruction; provide strategic feedback to teachers using supportive language and behavior; assist teachers in analyzing K-12 student work; employ differentiated instruction; and help teachers set professional goals. Emphasis on developing the knowledge, skills and dispositions necessary to respond to teachers' individual and contextual needs through ongoing examination of classroom practice for the purpose of promoting high achievement for all students.

TEDU 643. Teacher as Change Agent. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Designed to help teachers become more effective leaders by assessing and developing their leadership skills, deepening knowledge about policy, sharpening skills at influencing change and developing action plans and issue portfolios to address educational issues.

TEDU 644. Leadership Theory and Practice. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Designed for teacher leadership as opposed to administrative leadership. Explores practical and theoretical models of leadership across several fields, with an emphasis on teacher leadership. Research examined on meaningful collegiality, the art and science of teaching, and the principles of leadership.

TEDU 647. Educational Technology for School Leaders. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides an overview of the impact of technology -- particularly Web-based technologies -- on K-12 instruction, from pedagogical considerations and associated tool choices to more pragmatic leadership issues of planning, funding and faculty development. This course is designed for administrators, teacher leaders and other interested professionals who are or intend to be leaders in technology. Crosslisted as: ADMS 647.

TEDU 648. Preparation of Instructional Materials. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: TEDU 507 or permission of instructor. Development of materials for the classroom with an emphasis on 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. 3 Hours.
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 650. Second Language Acquisition. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course is designed for those who plan to work with English language learners in diverse instructional settings. A major focus of this course is analyzing second language acquisition theories and how they apply in classroom settings. In-depth analysis of readings will enhance the students' understanding of second language acquisition and the research related to this field. Students will observe classroom teaching, analyzing the application of SLA theories utilized in the instructional setting. Crosslisted as: LING 650.

TEDU 651. Special Topics in Education. 1-3 Hours.
Semester course; variable hours. 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 657. Mathematics Education Leadership I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Analyze and reflect on mathematics instruction in the grades K- 8 classroom with respect to design, teaching and evaluation of mathematical tasks, inquiry based instruction and discourse. Appropriate learning theories, instructional programs and technology are investigated. This course is an introduction to the role of the mathematics specialist and is a core course for preparation as a K-8 mathematics specialist.

TEDU 658. Mathematics Education Leadership II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: TEDU 657 or permission of instructor. Designed for teachers to build skills, understandings and dispositions necessary for mathematics education leadership roles. Emphasis is on developing and refining coaching and professional development skills, becoming familiar with a body of research within mathematics education, and building one's ability to work within and to lead a school-level mathematics learning community. This is a core course for preparation as a K-8 mathematics specialist.

TEDU 659. Mathematics Education Leadership III. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: TEDU 658 or permission of instructor. Designed to acquaint prospective mathematics specialists with those skills, understandings and dispositions needed to facilitate the lesson study process, create and use formative and summative assessments for diagnosing student mathematical understandings and misunderstandings, and increase communication and formal professional presentation skills to work within and lead a district-level mathematics learning community. This is a core course for preparation as a K-8 mathematics specialist.

TEDU 661. Current Topics in Virtual Teaching. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Students will investigate and critically consider emerging technological tools and their impact on various forms of virtual teaching and learning. Affordances and constraints of emerging technologies will be identified and participants will consider the implications of these technologies on various content areas and pedagogical strategies.

TEDU 662. Foundations of Online Teaching. 3 Hours.
Semester course; 3 lecture hours; 3 credits. This introductory course in online teaching provides participants the opportunity to explore current research in online teaching, standards for course design and facilitation, methods and models, and the latest tools available. Participants will explore multiple learning management systems, as well as discover how to work outside of these systems to design effective learning environments. This course will benefit teachers working in solely online environments as well as those who wish to use elements of online teaching in their face-to-face and hybrid courses.

TEDU 663. Facilitating Digital Communication. 3 Hours.
Semester course; 3 lecture hours; 3 credits. The heart of online courses exists in communication: between instructors and students and among the students themselves. This communication requires strong writing and facilitation skills. This course will provide an overview of research related to online course communication as well as practical application for facilitating communications in online courses. Participants in the course will learn how to develop online discussions, employ a variety of techniques to encourage discussions, utilize a variety of tools to support discussion and moderate online conflict to create a healthy online learning environment. Activities will include analysis of online discussions to identify various discussion techniques, work in small groups to guide discussions and learning, respond to scenarios related to solving online conflict and experiment with Web-based discussion tools.

TEDU 664. Instructional Design of Online Environments. 2 Hours.
Semester course; 2 lecture hours; 2 credits. This course emphasizes a systematic instructional planning for online teaching and was created based on the idea of the technological pedagogical content knowledge model. Students will learn how effectively they can prepare their online teaching through a systematic instructional planning process and the use of effective technology integration for pedagogy around their specific subject matter. Students will explore both basic concepts and applied examples in accordance with each step of the online instructional planning processes.

TEDU 665. Assessment and Evaluation in Online Environments. 1 Hour.
Semester course; 1 lecture hour; 1 credit. Providing in-depth assessment and evaluation in online courses can be one of the most challenging parts of teaching and learning online. How does the instructor provide creative and useful assignments that incorporate Web-based tools and require students to demonstrate their learning in authentic ways? This course will provide an overview of formative and summative assessment techniques as they relate to online teaching and learning and provide participants with opportunities to practice those skills.

TEDU 666. Content Focus Workshop. 1 Hour.
Semester course; 1 workshop hour; 1 credit. Effective technology integration requires an understanding of all aspects of teaching including content, pedagogy and technology. Participants in this course will be introduced to the TPACK model that focuses on the knowledge needed to make effective choices for the use of technology to support content-based instruction. In addition, they will learn about activity types as tools for planning pedagogically sound instruction. Students will practice using the model and the activity types to develop technology enhanced curriculum using the framework.

TEDU 667. Course Development Practicum. 3 Hours.
Semester course; 3 practicum hours; 3 credits. This course provides participants with collaborative support and guidance to effectively utilize the knowledge and skills gained from prerequisite courses in foundations of online teaching, facilitating digital communications, instructional design, and assessment and evaluation. Practicum participants will work with a group of peers and the course instructor to finalize the development of their online course.

TEDU 668. Time and Course Management for Online Learning. 1 Hour.
Semester course; 1 lecture hour; 1 credit. Teaching and learning online makes different demands on both instructors and participants than the traditional face-to-face experience. In particular, working asynchronously means that instructors and participants must learn new ways of communicating -- with both the instructor and other students. One important role of the instructor is to help participants navigate this online learning environment, including developing appropriate time-management skills for discussion participation and assignment completion and managing student expectations related to instructor support and feedback. Participants in this course will develop policies and procedures to use as part of their online courses.

TEDU 669. Online Course Facilitation Practicum. 3 Hours.
Semester course; 3 practicum hours; 3 credits. In this practicum experience, participants will facilitate an online learning course with the guidance of an experienced mentor. The exact details of the experience will be dependent on each participant's situation. Participants will collaboratively work together to reflect on various aspects of the experience to identify best practices, hurdles and other aspects of the experience.

TEDU 672. Internship. 4 Hours.
Semester course; 4 hours. 4 credits. May be repeated for a maximum of 12 credits. Prerequisites: passing scores on Praxis II examination and Virginia Communication and Literacy Assessment and 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 673. Technology Leadership and Staff Development. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: Admission to IT certificate or master's in curriculum and instruction program, or permission of instructor. Emphasis on professional preparation in educational technology leadership; studies of and experiences with leadership, staff development, and supervisory concepts and skills as they relate to the use of technology in K-12 education. Participation in field experience to observe the use of technology to support instruction required.

TEDU 674. Internship II. 1-6 Hours.
Semester course; full time, eight weeks. 1-6 credits. Prerequisites: passing scores on Praxis II examination and Virginia Communication and Literacy Assessment and permission of adviser. Study and integration of theory with practice in clinical or off-campus settings supervised by an approved professional and university faculty member. May include seminars, selected readings, projects and other activities designed and evaluated by supervising faculty.

TEDU 675. Internship in ESL. 3 Hours.
Semester course; 150 contact hours. 3 credits. Enrollment requires permission of instructor. The ESL internship serves as an integrative application experience. Candidates are expected to implement a planned internship project with English language learners, apply knowledge in their area of focus within the field of ESL/TESOL education and demonstrate their ability to be a critically reflective practitioner. Graded as pass/fail.

TEDU 680. Externship Proposal Seminar. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: enrolled in M.I.S. degree, mathematics specialist track; 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. 1-3 Hours.
Semester course; variable hours. 1 or 3 credits. Early and elementary education students register for 1 credit; secondary education students register for 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. 3 Hours.
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 683. ESL Assessment and Trends. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides future ESOL teachers with the ESL trends and assessment practices in K-12 settings including specific skills regarding instruction, evaluation, assessment and test construction for English learners. Examines policies that influence assessment and the role of standards in assessment.

TEDU 700. Externship. 1-6 Hours.
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. Graded P/F.

TEDU 702. National Board Certification II and Externship. 3 Hours.
Semester course; 3 credits. Prerequisite: TEDU 602 with a minimum grade of B. Apply advanced analysis and reflection on teaching practice, culminating in the completion of a portfolio that provides evidence of meeting national teaching standards. Conduct externship.

TEDU 730. Professional Development for Changing Schools. 3 Hours.
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 professional development programs that focus on instructional improvement within the context of changing schools. Includes the application of various staff development models that are designed to meet the needs of educators at different stages of their careers.

TEDU 731. Instructional Theories and Strategies. 3 Hours.
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 732. Advanced Seminar in Curriculum Studies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Completion of TEDU 617 is recommended prior to enrollment. Designed to engage doctoral students in a range of readings, writings, discussions and other experiences that address the questions: What should be taught in schools? and Why? The course builds on earlier course work that examines curricular movements and frameworks, and considers contemporary approaches to curriculum study and the implications and effects of their epistemic and philosophical stances -- regarding the nature of knowledge, learners, schools and society -- on instruction.

TEDU 798. Thesis. 1-6 Hours.
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.

THEATRE (THEA)

THEA 100. Technical Production for Performers. 1 Hour.
Semester course; 1 lecture hour. 1 credit. A crew assignment for a Mainstage production fulfilling all required work and hours of production calls. Course restricted to theatre majors.

THEA 103. Stagecraft. 3 Hours.
Semester course; 9 studio hours. 3 credits. Restricted to theatre majors. The fundamental methods, materials and techniques of set construction for the stage. Participation in departmental productions.

THEA 104. Costume Construction. 3 Hours.
Semester course; 9 studio hours. 3 credits. Restricted to theatre majors. The fundamental methods, materials and techniques of costume construction for the stage. Participation in departmental productions.

THEA 105. Advanced Costume Construction. 3 Hours.
Semester course; 1 lecture and 3 studio hours. 3 credits. Prerequisite: THEA 104. Focuses on the development of skills needed to function as a stitcher in a theatrical costume shop through practical application of techniques and processes.

THEA 107. Introduction to Stage Performance. 3 Hours.
Semester courses; 3 lecture hours. 3, 3 credits. For non-theatre majors. A survey and application of the basic elements in stage performing; acting, scene study, voice and movement.

THEA 108. Introduction to Stage Performance. 3 Hours.
Semester courses; 3 lecture hours. 3, 3 credits. For non-theatre majors. A survey and application of the basic elements in stage performing; acting, scene study, voice and movement.

THEA 113. Introduction to Acting I. 3 Hours.
Semester course; 1 lecture and 2 studio hours. 3 credits. Open only to theatre majors upon satisfactory audition. An introduction to and exploration of performance skills through theatre games, role-playing, improvisation and work on basic script units.

THEA 114. Introduction to Acting II. 3 Hours.
Semester course: 1 lecture and 2 studio hours. 3 credits. Open only to theatre majors upon satisfactory audition. Study of the basic Stanislavski System and practicing toward competency of applying this system to monologue and scene study.

THEA 121. Introduction to Drawing. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Open only to theatre majors. An introduction to drawing skills. Topics include line quality and contour, volume, value with shading and crosshatching, texture, space and composition, perspective, gesture, and figure drawing.

THEA 122. Color Theory. 2 Hours.
Semester course; 2 lecture hours. 2 credits. Open only to theatre majors. An introduction to color theory. Topics covered include how to create different values, hues and intensities, and how to mix color to best express a specific artistic intent.

THEA 161. Figure Drawing: Superficial Anatomy. 2 Hours.
Semester course; 1 lecture and 4 studio hours. 2 credits. Introductory course focused on developing drawings from direct observations of the figure. The specific problem will be the study of superficial anatomy as related to costume design. Various drawing and painting media will be explored.

THEA 162. Figure Drawing: Draping the Human Form. 2 Hours.
Semester course; 1 lecture and 4 studio hours. 2 credits. Focus on developing drawings from direct observations of the figure and folds, students will show the surface influence of superficial anatomy on the draped figure. Various drawing and painting media will be explored.

THEA 201. Voice and Speech for the Actor I. 3 Hours.
Semester course; 1 lecture and 2 studio hours. 3 credits. Open only to theatre majors upon satisfactory audition. A study of the basic elements of voice and speech for actors.

THEA 202. Voice and Speech for the Actor II. 3 Hours.
Semester course; 1 lecture and 2 studio hours. 3 credits. Continuing study elements of voice and speech and practicing toward competency of applying these skills to text.

THEA 203. Movement for the Actor I. 3 Hours.
Semester course; 1 lecture and 2 studio hours. 3 credits. Open only to theatre majors upon satisfactory audition. Practice and study of stage movement for the purpose of creating truthful physical behavior in the theatre.

THEA 204. Movement for the Actor II. 3 Hours.
Semester course; 1 lecture and 2 studio hours. 3 credits. Continuing study of creating truthful physical behavior in the theatre, leading toward competency of applying same to characters and text.

THEA 211. Introduction to Drama. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Analysis and critical examination of plays for methods of interpretation and production qualities.

THEA 212. Introduction to Drama II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Analysis and critical examination of plays for methods of interpretation and production qualities.

THEA 213. Acting I. 3 Hours.
Semester course; 1 lecture and 2 studio hours. 3 credits. Open only to theatre majors upon satisfactory audition. Exploration of the Stanislavski System with particular emphasis on emotional availability, point of view and personalization techniques.

THEA 214. Acting II. 3 Hours.
Semester course; 1 lecture and 2 studio hours. 3 credits. Prerequisite: THEA 213. Open only to theatre majors upon satisfactory audition. Study of point of view with personalization and emotional availability and practicing toward competency of applying these techniques to monologue and scene study culminating in the sophomore assessment audition.

THEA 217. Theatrical Drafting. 2 Hours.
Semester course; 1 lecture and 4 studio hours. 2 credits. An introduction to the practices and procedures used in communicating technical and design information among a range of theatre practitioners. Focus on traditional hand-drafting techniques.

THEA 218. Introduction to Scene Painting. 3 Hours.
Semester course; 1 lecture and 4 studio hours. 3 credits. An introduction to fundamental scene painting technique. Students will have the opportunity to study the materials and techniques of scene painting as well as the practices and expectations of a career in scenic artistry.

THEA 219. Fundamentals of Entertainment Technology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Introduction to the physical science underlying various disciplines of technical theatre.

THEA 221. Introduction to Scene Design. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to theatre majors. An introduction to the theories, practices and procedures of designing for the stage.

THEA 223. Practicum in Theatre Technology. 3 Hours.
Semester courses; 9 studio hours. 3, 3 credits. Prerequisites: THEA 103 and THEA 104. Restricted to theatre majors. Advanced study in theatre technologies and the materials and methodologies of stage construction.

THEA 224. Practicum in Theatre Technology. 3 Hours.
Semester courses; 9 studio hours. 3, 3 credits. Prerequisites: THEA 103 and THEA 104. Restricted to theatre majors. Advanced study in theatre technologies and the materials and methodologies of stage construction.

THEA 225. Electricity for the Stage. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to theatre majors. A study of the properties and basic principles of electricity as they relate to the utilization of light on the stage. Participation in departmental productions.

THEA 227. Introduction to Theatrical Makeup. 3 Hours.
Semester course; 2 lecture and 2 studio hours. 3 credits. Prerequisite: THEA 104 or permission of instructor. Teaches basic makeup practices for theatrical work. Students will gain an introductory knowledge of the physiological structure of the human face and how to alter appearance of an actor through the use of stage-makeup and basic prosthetic appliances. These skills will be evaluated through practical applications and studio work.

THEA 228. Introduction to Costume Design. 3 Hours.
Semester course; 2 lecture and 2 studio hours. 3 credits. Prerequisite: THEA 227 or permission of instructor. Introduces students to the costume design process including: the techniques of drawing to aid in facilitating costume design, paperwork required of the costume designer, and costume sketching and painting techniques. Students will employ critical thinking in their evaluation of the costume design process and concurrently be introduced to the skills required in the design process through practical design projects.

THEA 229. Introduction to Lighting Design. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Restricted to theatre majors. A study of issues concerning the properties of light and electricity as they relate to theatre including design, composition and color.

THEA 237. Advanced Lighting I. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: THEA 229. An in-depth exploration into development and execution of a lighting design and the lighting potentials of a wide variety of facilities, production styles and lighting equipment. Includes work on development of communication skills with directors via value sketches and lighting plots. Work will include studies and design research, concepts, collaboration, professional procedures and systems, paperwork, and organization. Varies scales of theoretical and practical projects in the light lab.

THEA 251. Rehearsal and Performance I. 1-3 Hours.
Semester course; 2, 4 or 6 studio hours. 1, 2 or 3 credits. May be repeated for a maximum total of 6 credits. Restricted to theatre majors. Work in acting, management, design or technical areas within a TheatreVCU production.

THEA 252. Rehearsal and Performance II. 1-3 Hours.
Semester course; 2, 4 or 6 studio hours. 1, 2 or 3 credits. May be repeated for a maximum total of 6 credits. Restricted to theatre majors. Work in acting, management, design or technical areas within a TheatreVCU production.

THEA 261. Figure Drawing: Media and Technique. 2 Hours.
Semester course; 1 lecture and 4 studio hours. 2 credits. This course will explore various traditional wet and dry media techniques in depicting representational costume design. Assignments will incorporate applicable references to art history.

THEA 262. Figure Drawing: Advanced Media and Technique. 2 Hours.
Semester course; 1 lecture and 4 studio hours. 2 credits. Prerequisite: THEA 261. An advanced course investigating various traditional wet and dry media techniques depicting the human form and costuming. Assignments will incorporate applicable references to the history of art and contemporary developments.

THEA 292. Independent Study in Theatre. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May be repeated for a maximum total of six credits. Prerequisites: sophomore standing as a major in theatre and approval of department chair and instructor. Individual instruction and supervision of a special project. Learning experiences should be designed with the supervising faculty member in the form of a contract between student and instructor. This course is limited to those students who have demonstrated an exceptional level of ability and intense commitment to their discipline.

THEA 301. Advanced Voice and Speech for the Actor I. 3 Hours.
Semester course; 1 lecture and 2 studio hours. 3 credits. Prerequisite: THEA 202. Open only to theatre majors upon satisfactory audition. Building upon lessons and skills practiced in the prerequisite course, an introduction to advanced elements of voice and speech and practicing toward competency of applying these skills to text.

THEA 302. Advanced Voice and Speech for the Actor II. 3 Hours.
Semester course; 3 studio hours. 3 credits. Prerequisite: THEA 301 with a minimum grade of B. Building upon lessons and skills practiced in the prerequisite, continuing study in advanced elements of voice and speech and practicing toward competency of applying these skills to text.

THEA 303. Black Theatre. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the major developments in the evolution of black theatre through readings and studio performances in black-related and black theatre dramaturgy. Crosslisted as: AFAM 303.

THEA 305. Advanced Scenic Design I. 3 Hours.
Semester course; 1 lecture and 3 studio hours. 3 credits. Prerequisite: THEA 221. Open only to theatre majors. A study of the techniques and methods of scene design.

THEA 306. Advanced Scenic Design II. 3 Hours.
Semester course; 1 lecture and 3 studio hours. 3 credits. Prerequisite: THEA 221. Open only to theatre majors. Advanced study of the techniques and methods of scene design.

THEA 307. History of the Theatre. 3 Hours.
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisites: UNIV 200 or HONR 200; completion of THEA 307 to enroll in THEA 308. Restricted to theatre majors. A study and analysis of theatre history: the architecture, the performer and performances, the stage, the production methods and the audience.

THEA 308. History of the Theatre. 3 Hours.
Continuous courses; 3 lecture hours. 3-3 credits. Prerequisites: UNIV 200 or HONR 200; completion of THEA 307 to enroll in THEA 308. Restricted to theatre majors. A study and analysis of theatre history: the architecture, the performer and performances, the stage, the production methods and the audience.

THEA 309. History of Costumes. 3 Hours.
Semester courses; 3 lecture hours. 3, 3 credits. Illustrated lectures on the history of clothing from primitive times to the present.

THEA 310. History of Costumes. 3 Hours.
Semester courses; 3 lecture hours. 3, 3 credits. Illustrated lectures on the history of clothing from primitive times to the present.

THEA 311. Advanced Movement for the Actor I. 3 Hours.
Semester course; 1 lecture and 2 studio hours. 3 credits. Open only to theatre majors upon completion of satisfactory audition. Advanced study of movement for the actor emphasizing physical control, flexibility and various physical performance techniques.

THEA 312. Advanced Movement for the Actor II. 3 Hours.
Semester course; 1 lecture and 2 studio hours. 3 credits. Prerequisite: THEA 311 with a minimum grade of B. Building on the lessons of the prerequisite, continuing practice of movement skills toward proficiency in creating truthful physical behavior in the theatre.

THEA 313. Actor's Studio I. 3 Hours.
Semester course; 1 lecture and 2 studio hours. 3 credits. Open only to theatre majors upon completion of satisfactory audition. Scene study and exploration of personalized character work as it applies to modern acting.

THEA 314. Actor's Studio II. 3 Hours.
Semester course; 1 lecture and 2 studio hours. 3 credits. Prerequisite: THEA 313 with a minimum grade of B. Building on the lessons of the prerequisite, continuing exploration of personalized character work as it applies to modern acting.

THEA 315. Audition Technique. 3 Hours.
Semester course; 1 lecture and 4 studio hours. 3 credits. Prerequisites: minimum grade of B in THEA 313. Open only to theatre majors upon completion of a satisfactory audition or with permission of instructor. Concentrated work using various techniques and methods of auditioning for the stage, television and film.

THEA 317. Musical Theatre Performance I. 3 Hours.
Semester course; 1 lecture and 2 studio hours. 3 credits. Open only to theatre majors upon completion of a satisfactory audition. Development of skills necessary to prepare songs and roles in musical theatre productions.

THEA 318. Musical Theatre Performance II. 3 Hours.
Semester course; 1 lecture and 2 studio hours. 3 credits. Prerequisite: THEA 317. Open only to theatre majors upon completion of a satisfactory audition. Continuation of the development of skills necessary to prepare songs and roles in musical productions while also developing skills in audition technique and the building of a personal repertoire.

THEA 320. Structural Design for the Stage. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Introduction to basic structural analysis as applies to theatrical scenic construction and rigging.

THEA 321. Costume Design Studio I. 3 Hours.
Semester course; 2 lecture and 2 studio hours. 3 credits. Prerequisite: permission of instructor. A studio course exploring the practice of the creative techniques, skill-building tools and business processes used according to the practical standards of the industry developed by professional union costume designers.

THEA 322. Costume Design Studio II. 3 Hours.
Semester course; 2 lecture and 2 studio hours. 3 credits. Prerequisite: permission of instructor. Continuing studio course exploring the practice of the creative techniques, skill-building tools and business processes used according to the practical standards of the industry developed by professional union costume designers.

THEA 323. Practicum in Advanced Theatre Technology. 3 Hours.
Semester course; 9 studio hours. 3 credits. May be repeated for a maximum of 9 credits. Restricted to theatre majors. Advanced study in theatre technologies and technical management.

THEA 324. Practicum in Stage Lighting. 3 Hours.
Semester course; 9 studio hours. 3 credits. May be repeated for a maximum of 12 credits. Restricted to theatre majors. Practical application in the methodologies of stage lighting.

THEA 325. Stage Management Practicum. 3 Hours.
Semester course; 2 lecture and 2 studio hours. 3 credits. May be repeated for a maximum of 18 credits. Prerequisite: permission of instructor. The fundamental responsibilities and techniques of professional stage management at the assistant stage management level. Graded as pass/fail.

THEA 326. Audio Mixing for Theatre. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. May be repeated for a maximum total of 9 credits. A study of audio mixing and the practical application of these practices for live theatrical productions.

THEA 327. Computer-assisted Design and Drafting for the Theatre. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of 6 credits. Instruction and practice in the use of computer assisted design and drafting for the theatre such as preparation and presentation, perspective, rotation, development and graphic solutions pertaining to theatrical construction problems.

THEA 329. Patternmaking for the Theatre. 3 Hours.
Semester course; 1 lecture and 6 studio hours. 3 credits. Prerequisite: THEA 105. This course introduces basic patternmaking skills including: sloper development, pattern manipulations employing flat patterning techniques, drafting, scaling and copying of historic garments. This course introduces critical-thinking skills as related to the form, fit and composition of clothing as it relates to the body. Students will apply these skills to practical projects that can relate to a variety of historical period costumes.

THEA 330. Production. 3,6 Hours.
Semester courses; 1 or 2 lecture and 4 or 8 laboratory hours. 3 or 6 credits per semester. Open only to theatre majors. The design, rehearsal and performance of dramatic works.

THEA 331. Production. 3,6 Hours.
Semester courses; 1 or 2 lecture and 4 or 8 laboratory hours. 3 or 6 credits per semester. Open only to theatre majors. The design, rehearsal and performance of dramatic works.

THEA 332. Draping for the Theatre. 3 Hours.
Semester course; 1 lecture and 6 studio hours. 3 credits. Prerequisite: THEA 329. This course introduces basic draping skills including: sloper development, princess-line and bias garments, and clothing draped over extensive understructures. This course practices critical-thinking skills as related to the form, fit and composition of clothing as it relates to the body. Students will apply these skills to demonstrate specific historical period costumes.

THEA 333. Sound Design Technology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Introduction to basic concepts, equipment and software needed to create and reinforce sound imagery.

THEA 334. Sound Design I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Exploration in contemporary practices in sound design for the theatre.

THEA 336. Introduction to Costume Crafts. 3 Hours.
Semester course; 1 lecture and 6 studio hours. 3 credits. Prerequisite: THEA 227. The course will introduce the student to a variety of skills and application methods that are needed for the execution of costume designs in a theatrical production. An overview and basic understanding of these crafts will be explored and practiced during the semester.

THEA 337. Advanced Lighting Design II. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: THEA 237 with a minimum grade of C. Advanced study of lighting design, incorporating increasingly difficult texts, rep plots, facilities and production styles. Further exploration of the process of lighting design for theatre and other related events. Projects focus intensely on communication and the collaborative process.

THEA 340. Theatre Projects. 3,6 Hours.
Semester courses; 1 or 2 lecture and 4 or 8 laboratory hours. 3 or 6 credits per semester. Open only to theatre majors. Individual or group projects in acting, directing, costume design, stage design or dramaturgy.

THEA 341. Theatre Projects. 3,6 Hours.
Semester courses; 1 or 2 lecture and 4 or 8 laboratory hours. 3 or 6 credits per semester. Open only to theatre majors. Individual or group projects in acting, directing, costume design, stage design or dramaturgy.

THEA 351. Rehearsal and Performance. 1-3 Hours.
Semester courses; 2, 4 or 6 studio hours. 1, 2 or 3 credits. Restricted to theatre majors. Work in acting, management, design or technical areas within a TheatreVCU production.

THEA 352. Rehearsal and Performance. 1-3 Hours.
Semester courses; 2, 4 or 6 studio hours. 1, 2 or 3 credits. Restricted to theatre majors. Work in acting, management, design or technical areas within a TheatreVCU production.

THEA 361. Directing I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Open only to theatre majors. Introduction to and practice in the theories of stage direction.

THEA 362. Directing II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: THEA 361. Continuing practice in solving problems involved in the production of period plays and a study of modern theories.

THEA 371. Mechanical Design for the Stage. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Introduction to the process for, components of and applications for mechanical design for stage.

THEA 372. Control Systems for Entertainment. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Introduction to current and emerging control systems used in lighting, sound, stage machinery and show control.

THEA 373. Photo Manipulation for Theatre. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Introduction to the basic concepts and practices of creating computer-manipulated photo images and documents.

THEA 392. Independent Study in Theatre. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May be repeated for a maximum total of 6 credits. Prerequisites: junior standing as a major in theatre and approval of department chair and instructor. Individual instruction and supervision of a special project. Learning experiences should be designed with the supervising faculty member in the form of a contract between student and instructor. This course is limited to those students who have demonstrated an exceptional level of ability and intense commitment to their discipline.

THEA 403. History of Dramatic Literature. 3 Hours.
Semester courses; 3 lecture hours. 3, 3 credits. Restricted to theatre majors. Study and analysis of dramatic literature. First semester: Aeschylus through Shakespeare. Second semester: Corneille to Ibsen.

THEA 404. History of Dramatic Literature. 3 Hours.
Semester courses; 3 lecture hours. 3, 3 credits. Restricted to theatre majors. Study and analysis of dramatic literature. First semester: Aeschylus through Shakespeare. Second semester: Corneille to Ibsen.

THEA 407. Advanced Scenic Technique. 3 Hours.
Semester course; 1 lecture and 4 studio hours. 3 credits. Prerequisites: THEA 221 and permission of instructor. An intensive involvement in contemporary theory and practice of scenic techniques. Participation in departmental productions.

THEA 408. Advanced Scene Painting. 3 Hours.
Semester course; 1 lecture and 4 studio hours. 3 credits. Repeatable for a maximum of 12 credits. Practice of fundamental scene painting technique. Students will have the opportunity to study the materials and advanced techniques of scene painting, as well as the practices and expectations of a career in scenic artistry.

THEA 412. Acting for Camera. 3 Hours.
Semester course; 1 lecture and 4 studio hours. 3 credits. Prerequisite: THEA 314 with a minimum grade of B. Open only to theatre majors upon completion of a satisfactory audition or with permission of instructor. Students will learn techniques for approaching acting problems associated with performance in front of a camera.

THEA 413. Actor's Studio II. 3 Hours.
Semester course; 1 lecture and 4 studio hours. 3 credits. Prerequisites: minimum grade of B in THEA 314. Open only to theatre majors upon completion of satisfactory audition or with permission of instructor. Students will learn techniques for approaching specific acting problems associated with the performance of various classical acting styles.

THEA 415. The Business of Theatre. 4 Hours.
Semester course; 4 lecture hours. 4 credits. Open only to theatre majors upon completion of a satisfactory audition or with permission of instructor. An analysis and survey of beginning and maintaining a successful professional career in theatre, television and film, including information about contracts, unions, agents/managers, casting directors, taxes and other life strategies in order to develop a specific plan for the next steps after graduation.

THEA 416. Solo Performance. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: THEA 314 with a minimum grade of B. Open only to theatre majors upon completion of a satisfactory audition or with permission of instructor. An exploration of story and personal journey. Students will explore and interrogate a diverse range of solo-performance styles culminating in a solo performance of a "work-in-progress" of between 15 and 30 minutes presented to an audience.

THEA 421. Advanced Costume Design Studio I. 3 Hours.
Semester course; 2 lecture and 2 studio hours. 3 credits. Prerequisites: THEA 321 and 322. Advanced studio course exploring the practice of the creative techniques and the practical standards of the industry developed by professional union costume designers.

THEA 422. Advanced Costume Design Studio II. 3 Hours.
Semester course; 2 lecture and 2 studio hours. 3 credits. Prerequisites: THEA 321 and 322. Advanced studio course exploring the practice of the creative techniques and business processes used according to the practical standards of the industry developed by professional union costume designers. During the semester students will create a digital interview-quality portfolio.

THEA 423. Modern Drama. 3 Hours.
Semester courses; 3 lecture hours. 3, 3 credits. Restricted to theatre majors. Intensive study of major continental and American plays.

THEA 424. Modern Drama. 3 Hours.
Semester courses; 3 lecture hours. 3, 3 credits. Restricted to theatre majors. Intensive study of major continental and American plays.

THEA 426. Advanced Dramatic Writing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated once for credit. Prerequisite: ENGL 303. A practical approach to the creation of original scripts for theatre or film. Crosslisted as: ENGL 433.

THEA 430. Production. 3,6 Hours.
Semester courses; 1 or 2 lecture and 4 or 8 laboratory hours. 3 or 6 credits per semester. Open only to theatre majors. The design, rehearsal and performance of dramatic works.

THEA 431. Production. 3,6 Hours.
Semester courses; 1 or 2 lecture and 4 or 8 laboratory hours. 3 or 6 credits per semester. Open only to theatre majors. The design, rehearsal and performance of dramatic works.

THEA 432. Stage Management: Music Theory. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: THEA 325 with a minimum grade of B. Open only to theatre majors. An in-depth analysis of music theory as it pertains to the opera and musical theatre fields.

THEA 433. Stage Management: Musical Theatre and Opera. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: THEA 325 with a minimum grade of B. Open only to theatre majors. An in-depth analysis of the specific techniques required to successfully stage-manage musical theatre and opera.

THEA 434. Stage Management: Maintaining and Remounting Productions. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: THEA 325 with a minimum grade of B. Open only to theatre majors. An in-depth analysis of the advanced techniques in stage management required to successfully maintain a long-running show and remount a previously realized production.

THEA 435. The Business of Stage Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: THEA 325 with a minimum grade of B. Open only to theatre majors. An analysis of the techniques necessary for a successful career as a stage manager, studying resumes, interview skills, unions and other areas.

THEA 437. Advanced Lighting Design III. 3 Hours.
Semester course; 2 lecture and 3 studio hours. 3 credits. Prerequisite: THEA 337 with a minimum grade of C. Course incorporates increasingly difficult texts, facilities and production styles and alternative venue and production styles, such as landscape lighting and concert. Use of industry standard technology and 3-D rendering is a focus in the class.

THEA 439. Advanced Patterning Techniques I. 3 Hours.
Semester course; 1 lecture and 3 studio hours. 3 credits. Prerequisites: THEA 329 and 332. Garment patterning based on various historic periods. Projects emphasize creative solutions to patterning problems employing critical thinking. Skills learned in prerequisite courses will be practiced, developing competency as related to achieving fit, form and function of period garments within the limitations of a given design.

THEA 440. Theatre Projects. 3,6 Hours.
Semester courses; 1 or 2 lecture and 4 or 8 laboratory hours. 3 or 6 credits per semester. Open only to theatre majors. Individual or group projects in acting, directing, costume design, stage design or dramaturgy.

THEA 441. Theatre Projects. 3,6 Hours.
Semester courses; 1 or 2 lecture and 4 or 8 laboratory hours. 3 or 6 credits per semester. Open only to theatre majors. Individual or group projects in acting, directing, costume design, stage design or dramaturgy.

THEA 442. Advanced Patterning Techniques II. 3 Hours.
Semester course; 1 lecture and 3 studio hours. 3 credits. Prerequisite: THEA 439. Garment patterning based on various historic periods. Projects emphasize creative solutions to patterning problems employing critical thinking. Skills learned in prerequisite course will be practiced and built upon, developing complex understructures for period clothing while practicing competency in patterning and building the period garments, which complement the fit, form and function of these period garments.

THEA 451. Rehearsal and Performance. 1-3 Hours.
Semester courses; 2, 4 or 6 studio hours. 1, 2 or 3 credits. Restricted to theatre majors. Work in acting, management, design or technical areas within a TheatreVCU production.

THEA 452. Rehearsal and Performance. 1-3 Hours.
Semester courses; 2, 4 or 6 studio hours. 1, 2 or 3 credits. Restricted to theatre majors. Work in acting, management, design or technical areas within a TheatreVCU production.

THEA 469. Advanced Patterning Techniques III. 3 Hours.
Semester course; 1 lecture and 3 studio hours. 3 credits. Prerequisite: THEA 442. Advanced patterning techniques centered on tailoring for students who have completed flat patterning and draping classes. This class explores modern and historical methods of tailoring; lining and finishing are emphasized for stage and costume use. The course assesses the student's competency in skills taught in previous course work.

THEA 470. Advanced Patterning Techniques IV. 3 Hours.
Semester course; 1 lecture and 3 studio hours. 3 credits. Prerequisite: THEA 469. Exploration of costume patterning with an emphasis on period patterning in a production setting, assessing the basic and advanced knowledge of draping and flatpatterning. This course provides students with intense production projects on VCU Mainstage productions synthesizing all aspects of patterning.

THEA 491. Topics in Theatre. 1-3 Hours.
Semester course; variable hours. 1-3 credits per semester. May be repeated for a maximum of 9 credits. Restricted to theatre majors. Flexible semester course in selected aspects of performance, theory, literature or history. See the Schedule of Classes for specific topics to be offered each semester.

THEA 492. Independent Study in Theatre. 1-3 Hours.
Semester course; variable hours. 1-3 credits per semester. May be repeated for a maximum of 9 credits. Prerequisites: senior standing as a major in theatre and approval of department chair and instructor. Individual instruction and supervision of a special project. Learning experiences should be designed with the supervising faculty member in the form of a contract between student and instructor. This course is limited to those students who have demonstrated an exceptional level of ability and intense commitment to their discipline.

THEA 493. Professional Internship. 3-9 Hours.
Semester courses; 3-9 credits. Restricted to theatre majors. A practicum in theatre conducted in cooperation with selected professional or semi-professional theatre organizations.

THEA 494. Professional Internship. 3-9 Hours.
Semester courses; 3-9 credits. Restricted to theatre majors. A practicum in theatre conducted in cooperation with selected professional or semi-professional theatre organizations.

THEA 495. Senior Project: Portfolio Review. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisites: senior standing and a minimum of 18 credits in 300- or 400-level major courses. Restricted to theatre majors. A capstone experience integrating resume preparation and professional development within the field of theatre. Documentation of creative activities and achievements accumulated during theatre studies is compiled for a portfolio review.

THEA 501. Basic Voice and Speech Pedagogy. 3 Hours.
Semester course; 3 credits. Exploration of methodologies used in teaching basic principles of body alignment, breath support, resonance and dynamics of voice and speech. A review of IPA as it applies to American speech and dialect study.

THEA 502. Basic Voice and Speech Pedagogy With Application to Dialect Study. 3 Hours.
Semester course; 3 credits. Review of IPA. Study of six dialects while investigation a variety of teaching methodologies.

THEA 505. Advanced Scene Design III. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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 509. Theatre History. 3 Hours.
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 510. Theatre Historiography. 3 Hours.
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. Graduate Acting. 3 Hours.
Continuous courses; 6 studio hours. 3-3 credits. Graduate-level studio performance courses that utilize monologues and scenes as a venue to explore rotating topics in performance technique which may include Constantin Stanislavski, Michael Chekov, Uta Hagen, Sanford Meisner and Stella Adler.

THEA 514. Graduate Acting. 3 Hours.
Continuous courses; 6 studio hours. 3-3 credits. Graduate-level studio performance courses that utilize monologues and scenes as a venue to explore rotating topics in performance technique which may include Constantin Stanislavski, Michael Chekov, Uta Hagen, Sanford Meisner and Stella Adler.

THEA 517. Physical Acting. 3 Hours.
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 518. The Pedagogy of Movement. 3 Hours.
Semester course; 6 studio hours. 3 credits. Exploration of the principles of teaching movement and its practical application to the stage, with special emphasis on the links between physical theatre and the vocabulary of the Stanislavski system of acting.

THEA 593. Professional Internship. 3-9 Hours.
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 601. Advanced Voice and Speech Pedagogy: Shakespeare. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An exploration of a variety of methodologies used in teaching the speaking of Shakespeare's texts. Focus on scansion, rhetorical devices, full voicing and support of Shakespeare's language for the stage.

THEA 602. Advanced Topics in Voice and Speech Pedagogy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An exploration of a variety of specialty topics which may include but is not limited to vocal extremes, archetypes and the voice, voice in the out of doors.

THEA 603. Dramatic Literature and Theory. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Multicultural study of selected plays in the history of dramatic literature, criticism and theory.

THEA 604. Modern Theatre: Theory and Practice. 3 Hours.
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. Advanced Studies in Stage Design. 3 Hours.
Continuous courses; 1 lecture and 4 studio hours. 3-3 credits. Prerequisite: Permission of instructor. An advanced study in specific problems in stage design.

THEA 606. Advanced Studies in Stage Design. 3 Hours.
Continuous courses; 1 lecture and 4 studio hours. 3-3 credits. Prerequisite: Permission of instructor. An advanced study in specific problems in stage design.

THEA 607. Problems in Scenic Techniques. 3 Hours.
Continuous courses; 1 lecture and 4 studio hours. 3-3 credits. Prerequisite: Permission of instructor. An advanced, detailed study of selected problems in contemporary theory and practice of scenic techniques.

THEA 608. Problems in Scenic Techniques. 3 Hours.
Continuous courses; 1 lecture and 4 studio hours. 3-3 credits. Prerequisite: Permission of instructor. An advanced, detailed study of selected problems in contemporary theory and practice of scenic techniques.

THEA 609. Seminar in Production Process. 3 Hours.
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. 3 Hours.
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 614. Pedagogy of Acting. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course guides students through creating and implementing a curriculum appropriate for a beginning acting class. Discussions of acting theory and teaching practice are interspersed with teaching demonstrations complete with peer feedback and instructor critique.

THEA 617. Special Topics in Physical Acting. 3 Hours.
Semester course; 6 studio hours. 3 credits. Rotating topics in physical acting, which may include mask, mime, physical comedy, clowning and other approached to physical theatre.

THEA 618. Special Topics in Choreography and Directing. 3 Hours.
Semester course; 6 studio hours. 3 credits. Rotating topics in choreography and directing, which may include dance, stage combat, battle scenes, musicalized movement and other choreographic scenes.

THEA 619. Theatre Pedagogy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Theory and practice in the teaching of college-level theatre.

THEA 621. Problems in Costume Design. 3 Hours.
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 622. Problems in Costume Design. 3 Hours.
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. Advanced Studies in Modern Drama. 3 Hours.
Semester course; 3 lecture hours. 3, 3 credits. Intensive, detailed studies of selected subjects in major 19th- and 20th-century drama.

THEA 624. Advanced Studies in Modern Drama. 3 Hours.
Semester course; 3 lecture hours. 3, 3 credits. Intensive, detailed studies of selected subjects in major 19th- and 20th-century drama.

THEA 630. Production. 3 Hours.
Semester course; 6 laboratory hours. 3 credits. May be repeated. The design, rehearsal, and performance of dramatic works.

THEA 640. Advanced Theatre Projects. 3,6 Hours.
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 641. Advanced Theatre Projects. 3,6 Hours.
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. Individual Study in Graduate Design. 3 Hours.
Semester course; 1 lecture and 4 laboratory hours. 3 credits. Prerequisite: permission of instructor. May be repeated. Intensive individual training in design and presentation processes as they apply to contemporary professional production.

THEA 661. Graduate Direction. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Graduate-level studio course designed to introduce students to concepts involved in play direction, including play analysis, composition, blocking, style and form. Exercises and projects will reinforce elements discussed in class and include opportunities for stage work complete with peer feedback and instructor critique.

THEA 662. Graduate Direction. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Graduate-level studio course designed to introduce students to concepts involved in play direction, including play analysis, composition, blocking, style and form. Exercises and projects will reinforce elements discussed in class and include opportunities for stage work complete with peer feedback and instructor critique.

THEA 693. Colloquium and Practical Training. 3 Hours.
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. 1-6 Hours.
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 696. Dramaturgy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Study of the function of the dramaturge in the American theatre. Readings, research and practical exercises for production dramaturgy of classic and contemporary plays.

THEA 697. Research and Special Problems in Theatre. 1,3 Hour.
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. 3 Hours.
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. 3 Hours.
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. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May be repeated for a maximum of 12 credits. Additional credits may be taken with permission of the graduate directory. 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. 1-6 Hours.
Semester course; 1-6 credits. May be repeated. Prerequisite: Permission of the department graduate studies adviser and department chair. Preparation of a thesis based on independent research.

THEATRE LAB (THEZ)

THEZ 221. Introduction to Scene Design Laboratory. 1 Hour.
Semester course; 3 studio hours. 1 credit. Pre- or corequisite: THEA 221. Participation in departmental productions. Observation and participation in the practical application of scene design in performance.

THEZ 223. Practicum in Theatre Technology Laboratory. 1 Hour.
Semester courses; 3 studio hours. 1, 1 credit. Observation and participation in the practical application of theatre technology in performance.

THEZ 224. Practicum in Theatre Technology Laboratory. 1 Hour.
Semester courses; 3 studio hours. 1, 1 credit. Observation and participation in the practical application of theatre technology in performance.

THEZ 225. Basic Stage Electronics-Lighting Laboratory. 1 Hour.
Semester course; 2 studio hours. 1 credit. The practical application in production of the ideas, principles and theories discussed in design/technical courses.

THEZ 228. Basic Stage Costuming and Make-up Laboratory. 1 Hour.
Semester courses; 2 studio hours. 1, 1 credit. The practical application in production of the ideas, principles and theories discussed in design/technical courses.

THEZ 229. Introduction to Lighting Design Laboratory. 1 Hour.
Semester course; 2 studio hours. 1 credit. The practical application in production of the ideas, principles and theories discussed in design/technical courses.

THEZ 305. Scene Design Laboratory. 1 Hour.
Semester courses; 2 studio hours. 1, 1 credit. The practical application in production of the ideas, principles and theories discussed in design technical courses.

THEZ 306. Scene Design Laboratory. 1 Hour.
Semester courses; 2 studio hours. 1, 1 credit. The practical application in production of the ideas, principles and theories discussed in design technical courses.

THEZ 321. Research Techniques for Costume Design Laboratory. 1 Hour.
Semester courses; 2 studio hours. 1, 1 credit. The practical application in production of the ideas, principles and theories discussed in design/technical courses.

THEZ 322. Research Techniques for Costume Design Laboratory. 1 Hour.
Semester courses; 2 studio hours. 1, 1 credit. The practical application in production of the ideas, principles and theories discussed in design/technical courses.

THEZ 323. Practicum in Advanced Theatre Technology. 1 Hour.
Semester course; 3 studio hours. 1 credit. Pre- or corequisite: THEA 323. Observation and experience in a practical situation with an emphasis on leadership and crew management.

THEZ 324. Practicum in Stage Lighting. 1 Hour.
Semester course; 3 studio hours. 1 credit. Pre- or corequisite: THEA 324. Observation and experience in a practical situation with an emphasis on leadership and crew management.

THEZ 326. Theatrical Sound Design Laboratory. 1 Hour.
Semester course; 3 studio hours. 1 credit. Pre- or corequisite: THEA 326. Participation in departmental productions. Observation and participation in the practical application of sound design and execution in performance.

THEZ 407. Advanced Scenic Technique Laboratory. 1 Hour.
Semester course; 2 studio hours. 1 credit. The practical application in production of the ideas, principles and theories discussed in design/technical courses.

THEZ 421. Advanced Costume Design Laboratory. 1 Hour.
Semester courses; 2 studio hours. 1, 1 credit. The practical application in production of the ideas, principles and theories discussed in design/technical courses.

THEZ 422. Advanced Costume Design Laboratory. 1 Hour.
Semester courses; 2 studio hours. 1, 1 credit. The practical application in production of the ideas, principles and theories discussed in design/technical courses.

THEZ 429. Advanced Lighting Design Laboratory. 1 Hour.
Semester course; 2 studio hours. 1 credit. The practical application in production of the ideas, principles and theories discussed in design/technical courses.

UNIVERSITY COLLEGE (UNIV)

UNIV 101. Introduction to the University. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Designed to orient new students to the traditions, purposes and expectations of a university education. Students will assess their expectations and evaluate their academic strengths and goals. Through lectures, guest speakers and individual projects, students will learn of VCU resources designed to help them solve problems and to achieve a rewarding and successful academic program. This course is required for students admitted conditionally to VCU; it is recommended for all first-year students.

UNIV 102. Investigations in Learning. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Enrollment restricted to first-year students who want to improve college success skills. The student will create an individualized action plan to improve academic performance.

UNIV 103. Education and Career Planning. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. May be repeated for a total of 3 credits. An education- and career-planning course focusing on the process of researching and selecting a major. Through course work, research, guest speakers and informational interviewing, students will discover various educational and career options. Topics will include interest, abilities and work-values assessments, decision-making models and career development theories. One- and two-credit versions of the course are offered with correspondingly reduced meeting schedules.

UNIV 111. Focused Inquiry I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Utilizes contemporary themes to give students opportunities and practice in writing, critical thinking, oral presentation, collaborative learning, information retrieval and evaluation, and social and civic responsibilities. Incorporates common reading materials and course activities across all sections.

UNIV 112. Focused Inquiry II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 111 or equivalent. Builds on skills introduced in UNIV 111 by providing practice in expository essays, argument and contextual analysis. Focuses on practice in writing in a variety of genres, framing writing according to both purpose and audience and identifying academically valid sources. This course is writing intensive.

UNIV 151. Focused Learning Workshop in BIOL 151. 1-2 Hours.
Semester course; 3 workshop hours. 1-2 credits. Corequisite: BIOL 151. Designed to assist students in improving their understanding of complex biology material. Will supplement the BIOL 151 class lecture. Course assists students with integrating how-to-learn with what-to-learn for BIOL 151. Includes both discussion and study-skills strategies. Students required to complete homework assignments and to demonstrate mastery of specific study techniques. In addition to the semester-long 2-credit offering, a 1-credit course is opened to students after the first BIOL 151 exam.

UNIV 152. Focused Learning Workshop in BIOL 152. 1-2 Hours.
Semester course; 3 workshop hours. 1-2 credits. Corequisite: BIOL 152. Designed to assist students in improving their understanding of complex biology material. Will supplement the BIOL 152 class lecture. Course assists students with integrating how-to-learn with what-to-learn for BIOL 152. Includes both discussion and study-skills strategies. Students required to complete homework assignments and to demonstrate mastery of specific study techniques. In addition to the semester-long 2-credit offering, a 1-credit course is opened to students after the first BIOL 152 exam.

UNIV 200. Inquiry and the Craft of Argument. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 112 with a minimum grade of C. A research and writing process course that emphasizes critical analysis, elements of argument, inquiry-based research skills, writing conventions of academic argument and the presentation of argument and research into new mediums.

UNIV 211. Food for Thought. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An interdisciplinary exploration of food using analytical lenses from sociology, anthropology, philosophy, art, literature, history, political science, psychology, economics and religious studies.

UNIV 213. The Truth About Lying. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Students will engage in collaborative inquiry to critically consider their own beliefs, common notions of ethical behaviors and practical standards through exploring the nature and function of lying. Students will work together to build a foundation of knowledge on the subject of lying and investigate a broad range of disciplines through the lie to question, abandon and embrace value judgments imperative to their daily lives.

UNIV 217. Finding Your Voice in Contemporary Society. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: UNIV 111 and 112 or both ENGL 295 and HONR 200. Focuses on strategies for expression in contemporary society. This course examines the messages that are conveyed in our society and how people decode and understand those messages. Course will focus on popular culture themes and practical problem-solving.

UNIV 222. Pseudoscience. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Course critically evaluates controversial fringes of scientific inquiry, such as those related to paranormal investigations and quack medicine. By engaging with topics chosen from astronomy, anthropology, biology, mathematics, medicine, philosophy and psychology, students will apply critical thinking skills to a variety of strange and provocative ideas.

UNIV 250. Undergraduate Teaching Assistant Program. 1 Hour.
Semester course. 1credit. May be repeated for up to 2 credits. Prerequisites: successful completion of UNIV 111 and 112 with minimum grades of B. Utilizes classroom practice to further the core skills developed in UNIV 111 and 112 (writing, critical thinking, oral presentation, collaborative learning, information retrieval and evaluation, and social and civic responsibilities) as well as exposing students to the practice, possibilities, rewards and responsibilities of the act of teaching.

UNIV 251. Undergraduate Teaching Assistant Program. 1 Hour.
Semester course; 1 credit. May be repeated for up to 2 credits. Prerequisites: instructor permission; successful completion of UNIV 200 or HONR 200 with minimum grade of B. Utilizes classroom practice to further the core skills developed in UNIV 200 (including writing, critical thinking, collaborative learning, information retrieval and evaluation) as well as exposing students to the practice, possibilities, rewards and responsibilities of the act of teaching.

UNIV 270. Introduction to Leadership Studies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Open only to students participating in the Emerging Leaders Scholarship Program or enrolled in VCU LEAD. Introductory study of leadership theory, group dynamics and human relationships used in volunteer organizations and leisure delivery systems. Foundations of leadership/follower behavior, advanced facilitation techniques and techniques of decision-making, problem-solving, conflict management and program evaluation will be examined.

UNIV 291. University Special Topics. 1-4 Hours.
Semester course; variable hours. 1-4 credits. May be repeated with different content. Specialized topics in subject and competency areas related to the core curriculum program not provided by an existing course or program. May be multidisciplinary. Graded as pass/fail or normal letter grading at the option of the instructor.

UNIV 299. What's the Big Idea?. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Each section in this interdisciplinary course will focus on a particular "big question" that has intrigued thinkers throughout time and across cultures. As students move from personal to global — and from theoretical to practical — investigations of the question, they will come to understand inquiry as a complex cycle of questioning, gathering, examining, interpreting, comparing, analyzing and evaluating, with important application to decision-making and problem-solving in the "real world.

UNIV 350. Peer Leadership Program. 3 Hours.
Semester course; 3 credits. May be repeated for up to 6 credits. Prerequisite: 2 credits of UNIV 250 with a minimum grade of B. Building on skills introduced in UNIV 250, this course gives students hands-on experience in the practice of creating and maintaining student engagement.

UNIV 391. University Special Topics. 1-4 Hours.
Semester course; variable hours. 1-4 credits. May be repeated with different content. Specialized topics in subject and competency areas related to the core curriculum program not provided by an existing course or program. May be multidisciplinary. Graded as pass/fail or normal letter grading at the option of the instructor.

UNIV 499. BIS Senior Capstone. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: senior standing and 18 hours in focus area. Students will synthesize and evaluate the theoretical, methodological and substantive issues discovered during course work in the focus area.

UNIVERSITY STUDIES (UNVS)

UNVS 291. Interdisciplinary Topics. 1-4 Hours.
Semester course; variable hours. 1-4 credits per semester. Maximum total of 8 credits in all university studies courses. An interdisciplinary course designed to give the student an overview of a topic not associated with a particular discipline.

URBAN STUDIES (URSP)

URSP 102. Introduction to Human Geography. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introduction to human geography from a global perspective, emphasizing settlement patterns, human-environment interactions, cultural variations, political transitions and population change in the global economy.

URSP 108. Uncovering Richmond. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introduction to the dramatic changes Richmond has undergone in recent decades and how those changes mirror trends in cities across the country. The student will discover the role of politics, public safety, education and other important issues in the development of the city through course lectures, readings, discussion and presentations by guest speakers.

URSP 116. Introduction to the City. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Introduction to the various theories of urbanism and attempt to offer solutions to the problems of urban life in modern civilization. The course will survey the major works of those who have studied cities or offered solutions and alternatives to existing urban structures. The works of noted social reformers, political analysts, economists, and architects as well as urban planners will be examined through lectures, readings, films, slides, discussions and field trips (when feasible).

URSP 120. Urban Issues in Film. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Introduces students to a variety of themes in urban studies through the medium of film. Focusing on a selection of films and related readings, the course exposes students to critiques of the socioeconomic, historical, political and structural aspects of cities and regions.

URSP 203. Physical Geography: Weather, Climate and Biogeography. 3 Hours.
Semester courses; 3 lecture hours. 3 credits. Analysis of the interrelated systems of the earth. Content includes the earth in space, atmosphere, climate and vegetation.

URSP 204. Physical Geography: Geomorphology and Soils. 3 Hours.
Semester courses; 3 lecture hours. 3 credits. Analysis of the interrelated systems of the earth. Content includes earth materials, tectonics, weathering, erosion, landforms and soils.

URSP 245. Housing and Community Revitalization. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The purpose of this course is to examine housing issues as a major determinant of the make-up and the quality of community life in modern American society. Attention is given to the public and private forces that influence various components of the housing issue, such as: demand for housing; housing availability to various economic and social groups; housing design and quality (including new construction, rehabilitation, historic preservation, and adaptive re-use), housing finance and the relationship of housing to planning in metropolitan areas.

URSP 261. Design of the City. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Architecture, space and activities play a special role in the overall design of the city. These elements are analyzed to understand their interrelationships and importance to a city's visual character. Architectural styles, civic art, effects of space on the individual and methods for designing cities will be discussed. The class is for those who want to understand urban design elements and for those who will be involved in city design.

URSP 303. World Regions. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An examination of the various regions of the earth, including land forms, climate, resources, peoples, agriculture and urban conditions. Regions to be selected each semester from Anglo-America, Latin America, western Europe, Eastern Europe, the former USSR, Middle East and North Africa, Africa (south of the Sahara), Indian subcontinent, China, Japan, Southeast Asia, and Oceania. May be taken only once for credit. Crosslisted as: INTL 303.

URSP 304. Urban Social Systems. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the growth and development of neighborhoods, cities and metropolitan systems. Analyzes origins of community interests and factors that affect the ability of communities to further their interests. Particular attention is given to how patterns of service delivery and the placement of public facilities affect community interest and whether federal or municipal departments are able to set adequate community service standards.

URSP 306. Economic Geography. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Explores the workings of regional economies through analysis of industries and occupations. Studies the reasons for variation in regional economic characteristics and examines policies and strategies for enhancing regional economic conditions. Course relies heavily on the use of Microsoft Excel; proficiency with using this program is required.

URSP 310. Introduction to Urban and Regional Planning. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: URSP 116 or permission of instructor. Introduction to the theory and practice of governmental planning in the U.S. with emphasis on urban and regional planning. Surveys the history of planning, current planning practice and the ethical responsibilities of planners.

URSP 312. History of Human Settlement. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A cultural and historical geography of human migration and settlement over the earth. Topics may include agricultural and urban systems, exploration, colonization and imperialism, and changing relationships with the environment, during and since the Middle Ages. Crosslisted as: ANTH 312.

URSP 313. Research and Field Methods in Urban and Regional Studies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: STAT 210. Introduces students to a variety of field and research techniques used to gather and analyze information to study urban and regional issues. Key topics include designing a research project, developing and implementing surveys, conducting focus groups and observation, analyzing data statistically, interpreting and reporting results, and utilizing secondary information.

URSP 315. The Evolution of American Cities. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A general survey of how cities developed in the United States and the factors that contributed to the process of urbanization. Emphasis is placed on the public attitudes and values that have dominated particular periods of history and how these values affected the efforts to urbanize. The American city is examined as a vital force in the economic, social and political development of modern America, as the major location for conflict between people of all persuasions, and as the home of much of what is meant by American "civilization.

URSP 316. Urban Life in Modern America. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to nonmajors. Examines how a modern city functions, the public services rendered within the city and the impact of public policy on the city. The city is treated as a system consisting of economic, social and political activities that influence and are influenced by the physical/demographic environment. Each activity is studied separately with the cause-effect relationships among the activities highlighted by an analysis of public service delivery and, more generally, urban public policy.

URSP 321. Urban Economics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ECON 203 with a minimum grade of B or ECON 210. An introduction to urban economics, with an emphasis on the economics of agglomeration and the role of externalities in the urban economy. Economic analysis of the provision of urban public services and urban public financing, especially in politically fragmented areas. Crosslisted as: ECON 321.

URSP 322. Urban Finance. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: GEOG/URSP 306. Treats the local government from a practical management perspective as an organization in a political-economic environment. The nature of city expenditures and sources of revenues are explored. Budgeting and taxing decision-making processes are explored in depth. Economic impacts of these decisions on citizens are analyzed and implications for practice drawn.

URSP 331. Geography of Latin America and the Caribbean. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines the physical and human geography of Latin America and the Caribbean from an interdisciplinary perspective. A systems approach is used to concentrate on particular topics, themes and patterns that have broader relevance to the overall region or subregions (e.g. Central America, the Lesser Antilles, the Andes, Amazonia) rather than on the details of each country. However, in relation to some topics, case studies are used that may focus on a particular country.

URSP 332. Environmental Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: GEOG 204 or URSP 204. An interdisciplinary review of domestic and international environmental problems and their underlying causes, current management frameworks, alternative management approaches and strategies, and barriers to their implementation. Other topics include: environmental history and economics, population growth, natural resources use, biodiversity, pollution. Crosslisted as: ENVS 332.

URSP 333. Geography of Africa. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the land forms, climate, peoples, livelihoods, settlement patterns and cultural groupings of sub-Saharan Africa. Crosslisted as: AFAM 333/INTL 333.

URSP 334. Regional Geography of ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A study of the land forms, climate, resources, peoples, agricultural and urban conditions in a specific region such as North America, Europe, Latin America, the Middle East and India, the USSR and Eastern Europe. See the Schedule of Classes for specific region to be studied each semester. Crosslisted as: INTL 334.

URSP 340. World Cities Outside of North America. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An examination of urban habitats in a variety of geographical regions with emphasis on their differences and their common experiences. Crosslisted as: INTL 340.

URSP 350. Great Cities of the World. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated under different topics for a total of 6 credits. Enrollment restricted to students with sophomore standing or with permission of instructor. An interdisciplinary course with a focus on the origin, expansion and significance of one or more cities, the specifics of its/their culture and the role of language. Particular emphasis will be placed on relating the physical, social and economic aspects of the city's growth and development to the cultural expression of urbanism. Crosslisted as: FRLG 345/INTL 345.

URSP 360. Community and Regional Analysis and GIS. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Introduces students to the core functions and applications of geographic information systems. Trains students in the management, modeling, analysis and visualization of urban and regional georeferenced data. The GIS techniques covered include the classification and symbolization of geographic features, data querying, table and spatial joining, spatial selection, projections, creation and editing of spatial features, geocoding, spatial analysis, and mapping.

URSP 391. Special Topics in Urban Studies. 1-3 Hours.
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. See the Schedule of Classes for the specific topic to be offered each semester.

URSP 392. Independent Study. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Prerequisite: junior or senior standing is required. Under supervision of a faculty adviser, who must approve the student taking the course, a student studies a topic of interest.

URSP 397. Independent Study. 2,3 Hours.
Semester courses; 2 or 3 lecture hours. 2 or 3 credits. Prerequisite: junior or senior standing is required. Under supervision of a faculty adviser, whose consent is required to register, study a topic of concern to the student. Examines the role of cities in development of a variety of geographical regions outside of North America.

URSP 398. Independent Study. 2-3 Hours.
Semester courses; 2 or 3 lecture hours. 2 or 3 credits. Prerequisite: junior or senior standing is required. Under supervision of a faculty adviser, whose consent is required to register, study a topic of concern to the student. Examines the role of cities in development of a variety of geographical regions outside of North America.

URSP 413. Policy Implementation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An examination of the administrative setting of government and its policy impacts on public programs, policy design and redesign, and evaluation and monitoring.

URSP 425. Labor, Employment and Regional Development. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines the role of employment and the workforce in regional development from social, economic and geographic perspectives. Explores the factors impacting U.S. employment patterns, such as the green economy, immigration and technological change, and their implications for workers and regional economies. Also examines policy approaches to address labor and workforce issues with special consideration of disadvantaged groups and communities.

URSP 428. Land Use and Infrastructure Planning. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: URSP 310. Explores how the integration of land use, transportation and other infrastructures (e.g., water supply, waste water and storm water) in urban and regional planning can improve development patterns to ensure sustainability and livability. Examines specific professional planning techniques such as site plan review, subdivision permitting and capital improvements planning.

URSP 440. Senior Capstone Seminar in Urban and Regional Studies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: URSP 310 and URSP 313. Enrollment also restricted to students with senior standing. Requires students to synthesize knowledge gained in previous major courses and apply it through one or more field-based exercises. Also explores issues related to career planning.

URSP 461. Applied Planning Studio. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: all core courses in the urban and regional studies program. Applying the principles and theories of urban studies, students work as a group in the preparation of a plan to address a real community problem.

URSP 502. Global Economic Change and Geography. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines the global economy, its changing geographies and its impact on cities and regions. Considers the role of technological progress, industrial organization and international institutions in shaping the locations of production and services. Topics include global economic trends, evolution of the industrial core and periphery, globablization of production systems, global cities, rise of knowledge-based and creative industries and transnational economic integration.

URSP 517. Historic Preservation in Planning. 3 Hours.
Semester course; 3 lecture hours. 3 credits. The course surveys the process of historic preservation that includes 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 is considered.

URSP 520. Park Planning. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Explores the general approaches and strategies for planning recreation areas and facilities. Topics include specific principles of design relating to outdoor recreation facilities; standards relative to space requirements, locations and programs; and trends in site design and planning.

URSP 521. Introduction to Geographic Information Systems. 3 Hours.
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. Crosslisted as: GEOG 521/ENVS 521.

URSP 525. Site Planning and Graphics. 3 Hours.
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. 3 Hours.
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 567. The American Suburb. 3 Hours.
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 development, new urbanism and master planned communities. A working knowledge of the U.S. Census is needed for some assignments.

URSP 605. Urban Planning History. 3 Hours.
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. 3 Hours.
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. 3 Hours.
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 621. Introduction to Geographic Information Systems. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours 3 credits. Introduces the components, capabilities, and functionalities of Geographic Information Systems. In addition to the concepts upon which GIS is based, how it works and what it does, this course introduces cartographic techniques necessary to design and construct effective maps with an emphasis on thematic mapping. It also examines the processing, compilation and symbolization of spatial data and the application of related analytical techniques. Laboratory work emphasizes practical applications and uses of ArcGIS and the spatial analyst extension.

URSP 622. Community Socioeconomic Analysis Using GIS. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Introduces students to data sources and database management for community analysis using geographic information systems. Includes an overview of database structures, public domain software and data resources, descriptive statistical analysis, population projection, 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. Laboratory work emphasizes practical applications and uses of ArcGIS.

URSP 623. Research Methods for Government and Public Affairs. 3 Hours.
Semester course; 3 lecture hours. 3 credits. 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. Crosslisted as: GVPA 623/PADM 623/CRJS 623.

URSP 625. Spatial Database Management and GIS Modeling. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: URSP 621 or 622, or permission of the instructor. Introduces principles and applications of Geographic Information Science and GIS to transportation. Students discuss the fundamental scientific principles of capturing, representing, integrating, processing and analyzing digital geographic information about transportation infrastructure and systems. Concentrates on the applications of GIS-T software, tools and related technologies to transportation planning, intelligent transportation systems, environmental and hazards analysis and logistics.

URSP 626. Transportation Analytics and Modeling. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Introduces conventional travel demand forecasting techniques, i.e., the Urban Transportation Modeling System. UTMS typically consists of trip generation, trip distribution, mode choice and trip assignment. Land-use modeling and post-processing procedures will also be introduced. Additionally, other latest modeling developments, such as activity/tour-based modeling, 4D post-processing and land use/transportation integration models will also be explored. Case studies of the Virginia Transportation Modeling and its Cube Voyager applications are included.

URSP 627. GIS Applications in Urban Design. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: URSP 621 or 622, or permission of the instructor. Covers GIS tools and techniques in relation to 3D visualization, decision analysis, program evaluation and Internet-GIS. Emphasizes the integration of exploratory/predictive spatial analyses and 3D visualization into the decision-making process. GIS tools and techniques are used to automate decision analysis and facilitate future visioning in analyzing and visualizing decision actions. Laboratory work emphasizes practical applications and uses of ArcGIS, ArcIMS and the Scenario 360 software suite.

URSP 628. Land Use Planning. 3 Hours.
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. Strategic Planning and Management in the Public Sector. 3 Hours.
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. Crosslisted as: PADM 630.

URSP 632. Planning Theory and Processes. 3 Hours.
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. Crosslisted as: GVPA 632.

URSP 635. Legal and Legislative Foundations of Planning. 3 Hours.
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 637. Sustainable Community Development. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course includes both theoretical and practical aspects of sustainable development and its relationship to land-use planning. Through examination of the literature, class discussion, focused exercises and guest speakers, students will develop the skills needed to evaluate and propose activities to plan for sustainable development. The course begins with an overview of the origins and definitions of sustainability and developing operational principles of sustainable development. The three "Es" of sustainability (environment, equity and economics) are then explored and connected to the role of the planner in influencing the balance between these dimensions in practice. A variety of tools and initiatives for sustainable practices are introduced, followed by examination of standards for measuring progress toward sustainable goals. Finally, through the evaluation of case studies and construction of policy recommendations, students will propose guidance for adapting local government function and modifying regulations and policies for implementing and governing sustainable communities.

URSP 641. Citizen Participation and Negotiation. 3 Hours.
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. 3 Hours.
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 645. Sustainable Energy Planning and Policy. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Discusses current energy production and consumption trends and related economic, environmental and social issues. Reviews energy planning and policy approaches from the international to local levels. Analyzes and evaluates different types of energy systems and existing and proposed energy policies.

URSP 647. Adaptive Reuse of Buildings. 3 Hours.
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. Natural Resources and Environmental Planning. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Examines key problems and challenges linked to the use and abuse of natural resources, both nationally and globally, through urbanization, agriculture, coastal zone development, waste generation and other human activity. Students explore these problems in terms of the biophysical processes to which they relate, as well as their underlying political-economic and sociocultural causes. Also studied are policy and planning strategies aimed at more efficient and sustainable use of natural resources and the environment.

URSP 651. Transportation Policy and Planning. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Provides an introduction to the urban transportation system. Sets the scene by exploring core concepts, providing an overview of passenger and freight movements in the urban context, describing the history of transportation and urban form and assessing the likely impact of information technology on travel patterns and urban form. Introduces the urban transportation planning process and contemporary trends in this process, places the planning process within the political context and provides an overview of the use of GIS in transportation planning. Course will also address pressing policy issues such as public transportation, land use/transportation integration, clean vehicles, clean fuels, land use, energy, finance, equity and environmental impacts.

URSP 652. Environmental Analysis. 3 Hours.
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 653. Transportation Projects. 3 Hours.
3 credits. Directed-research course in which students will complete a professional transportation project for a local or state government agency or nonprofit organization. For example, students might evaluate the effectiveness of a new high occupancy vehicle/toll lane in northern Virginia; develop an emergency evacuation plan for a small or midsized city; help a local government evaluate the likely transportation impacts of a new shopping mall; assist a local bus system in the development of more cost-effective transit routes; or finish a traffic-modeling and GIS application project.

URSP 654. Environmental Remote Sensing. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: ENVS 602, or permission of the instructor. 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. Crosslisted as: ENVS 654/BIOL 654.

URSP 655. Environmental Policy and Planning. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Investigates the environmental protection role of urban and regional planning, including the ways in which local planning implements and enforces state- and federal-level environmental policies. Explores the role of planners in environmental assessment, i.e. evaluating the environmental impacts of public and private sector development.

URSP 658. Transportation Finance. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Introduces urban transportation financing principles, procedures and funding mechanisms. Explores existing governmental institutions, intergovernmental relations and laws/regulations pertaining to transportation financing. Also details urban transportation financing procedures, such as fund estimates, Call for Projects, fund programming and contract management, and the auditing process. In particular, the Local Assistance Program and Transportation Improvement Program in the Virginia Department of Transportation will be emphasized. Innovative financing mechanisms and procedures will also be incorporated. More recent state-of-the-practice funding mechanisms used by VDOT will be introduced through guest lectures by VDOT administrators and other practitioners.

URSP 659. Transportation Project Development and Evaluation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Introduces urban transportation project development and evaluation concepts, principles, methodologies and procedures. Related transportation laws, regulations and guidelines will be covered. Some case studies in the greater Richmond area will also be included to help students understand real-world transportation development and implementation processes.

URSP 662. Foundations for Development Planning. 3 Hours.
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. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: URSP 662 or permission of the instructor. 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. 3 Hours.
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 672. Food Systems, Rural Development and Landscape Conservation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An interdisciplinary analysis of the socioeconomic and environmental issues facing rural regions, mainly of the United States, and their relationship to the modern food system and other factors. Also examines policy and planning strategies that can help improve rural economic conditions, conserve rural resources and landscapes and achieve food system sustainability.

URSP 681. International Urban Policy and Planning. 3 Hours.
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 691. Topics in Urban and Regional Planning. 1-3 Hours.
Semester course; 1, 2 or 3 credits. 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. 3 Hours.
Semester course; 1 lecture and 4 laboratory hours. 3 credits. Prerequisites: All core courses except URSP 762 and 764. Involves students as a group in a community-based planning project.

URSP 762. Professional Plan. 6 Hours.
Semester course; 1 lecture and 10 laboratory hours. 6 credits. Prerequisites: URSP 761 and permission of instructor. 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 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 Hours.
2-6 credits. Prerequisites: Appropriate research methods course, a 3-credit URSP 797 and permission of instructor. Planning, preparation, completion, and presentation of a thesis or project. URSP 764 is an acceptable substitute for URSP 762 . Consent of instructor and chair required for this substitution.

URSP 794. Planning Practicum Seminar. 3 Hours.
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 Hours.
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.

URBAN STUDIES AND PLANNING LAB (URSZ)

URSZ 203. Physical Geography Laboratory: Weather, Climate and Biogeography. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Pre- or corequisite: URSP 203. Problem-solving and map-reading exercises related to earth-sun relationships, atmosphere, weather and climate, vegetation and soils.

URSZ 204. Physical Geography Laboratory: Geomorphology and Soils. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Pre- or corequisite: URSP 204. Problem-solving and map-reading exercises related to earth materials, tectonics, weathering, erosion and landforms.

VENTURE CREATION (VNTR)

VNTR 300. Venture Creation Skills. 3 Hours.
Semester course; 3 lecture hour. 3 credits. Students are introduced to and apply various skills important for real venture creation. A multidisciplinary orientation and approach are emphasized throughout the course.

VNTR 460. Venture Creation Project. 3 Hours.
Semester course; 3 lecture hour. 3 credits. Students will work in cross-disciplinary teams on a semester-long venture creation project. Topics and activities may include business model generation, customer discovery, customer validation, financial analysis and agile development.

VNTR 491. Special Topics in Venture Creation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. May be repeated for a maximum of six credits. Enrollment restricted to students with permission of adviser and da Vinci Center director prior to course registration. Study of current and emerging topics in the field of venture creation. Topics may vary from semester to semester.

VNTR 492. Independent Study in Venture Creation. 1-3 Hours.
Semester course; 1-3 hours. 1-3 credits. May be repeated for a maximum total of six credits by students pursuing a da Vinci Center certificate. Enrollment restricted to students with junior standing and permission of adviser and da Vinci Center director. Intensive study or research under supervision of a faculty member in an area not covered in depth or contained in the regular curriculum.

WORLD STUDIES (WRLD)

WRLD 203. Cultural Texts and Contexts: ____. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Through the analysis and interpretation of literary, cinematic and other cultural texts, this course explores the ways cultural and national identities have been shaped, imagined and contested in various regions of the world. While responding to the readings and films as artistic manifestations or social documents, students will also become familiar with the aesthetic, political and social contexts in which the works were and are produced. See the Schedule of Classes for specific topics to be offered each semester. Crosslisted as: INTL 203.

WRLD 210. International Social Justice Studies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An overview of the issues, themes, disciplines, and areas of research and teaching that comprise international social justice studies in a variety of global contexts.

WRLD 220. Human Rights and Literature. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A cross-cultural survey of human rights violations. The moral, political and pragmatic dimensions in the international response to violations are investigated including transnational organizations that document abuses as expressed in memoirs, eyewitness accounts, literature and film.

WRLD 230. Introduction to World Cinema. 3 Hours.
Semester course; 5 lecture/screening hours. 3 credits. An overview of the main theoretical frameworks, critical concepts and debates devoted to non-Hollywood world cinemas, with special emphasis on the rethinking of national cinema and the problematizing of identity in an increasingly transnational era. Broad interdisciplinary readings in film theory, film history and cultural studies will be supplemented by case studies of particular cinemas and filmmakers, so as to convey an appreciation of the main international movements in the history of cinema.

WRLD 291. Topics in World Languages and Cultures. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May be repeated with different content for a maximum of 6 credits. A study of a specialized topic in world cultures and languages. See the Schedule of Classes for specific topics to be offered each semester.

WRLD 302. Communicating Across Cultures. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Designed to increase understanding of the foundational concepts of communication and intercultural dialogue. Examines (among others) such concepts as individualism, collectivism, ethnocentrism, xenophobia, uncertainty avoidance, nonverbal communication and stereotyping.

WRLD 310. Mediterranean Cultural Geography. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An in-depth analysis of the Mediterranean region, its distinctive and defining features (physical, climatic and sociopolitical) and its paradigmatic role in global politics and economy.

WRLD 311. Civilization of the Mediterranean. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Exploration of the Mediterranean from pre-history to modernity, with an emphasis on cross-cultural engagement. Aims at exploring the interaction and cross-cultural fertilization between societies and cultures of the lands of the Middle Sea: North Africa, Middle East and southern Europe.

WRLD 330. Introduction to Film Studies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: WRLD 230 or permission of instructor. An overview of film studies with special attention given to the debates informing the periodization of film history, the critical paradigms of the major film theories and the elements of a cinematographic language from both a technical and aesthetic standpoint.

WRLD 359. International Media Coverage: The Middle East. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: MASC 101 or MASC 151 with a minimum grade of C. This interdisciplinary course explores the media's role in covering cultural, political, religious and other issues in the Middle East. Students will examine the role and impact of the media in both the United States and Middle East in shaping global and regional public opinion. Using webcam and online technology, VCU students will discuss cross-cultural perspectives with students from the other U.S. universities and universities in the Middle East. Crosslisted as: MASC 359.

WRLD 391. Topics in World Languages and Cultures. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May be repeated with different content for a maximum of 6 credits. An in-depth study of a specialized topic in world cultures and languages. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

WRLD 422. National Cinema. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Course can be repeated with different themes up to a total of 6 credits. Prerequisite: WRLD 230 or 330 or permission of instructor. Tracing the development of cinematic traditions in selected nations, this course focuses on the thematic selections and stylistic techniques particular to that particular cinematographic culture. See the Schedule of Classes for the specific theme to be offered each semester.

WRLD 430. Film and the City. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: permission of instructor. Focuses on cinematic representations of cities worlwide, so as to probe the increasingly cross-cultural dynamics of urban landscapes. Films discussed will span the entire history of cinema across genres and national traditions.

WRLD 490. Seminar in World Cultures and Languages. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Restricted to seniors in world cultures and languages with at least 85 credit hours earned toward the degree. Research and analysis of a selected topic in world cultures and languages in a seminar setting.

WRLD 491. Topics in World Languages and Cultures. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May be repeated with different content for a maximum of 6 credits. An intensive and comprehensive examination of specialized areas of interest in world cultures and languages. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

WRLD 493. World Cultures Internship. 1-3 Hours.
Semester course; variable hours. 1-3 credits (40 clock hours per credit). May be repeated for a maximum of 6 credits, however only 3 credits can count toward the major concentration. Prerequisites: completion of 9 credits of upper-level (300- or above) course work toward any non-foreign-language concentration within the School of World Studies, and permission of the internship coordinator. Student must be in good academic standing with a minimum major GPA of 2.25. Designed for the advanced student to gain workplace experience in internationally oriented public and private organizations and agencies.

WRLD 499. Senior Capstone Seminar. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Prerequisite: completion of 6 credits of 400-level courses in the major and senior standing. Open only to students enrolled as majors in the School of World Studies, including anthropology, religious studies, and world cultures and languages. Capstone seminar summarizing and synthesizing studies in World Studies programs. Preparation for entry into career search. Organization and polishing of written works representing skills aquired in programs. Assembly of individual portfolio as means of assessment and career tool.

WRLD 530. Concepts in World Cinema. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Can be repeated for credit with different themes. Prerequisites: permission of instructor and/or graduate standing. Exploration of aspects of film theory combined with a study of cinema across national traditions and movements. Each semester a different thematic focus is engaged to illuminate issues in film composition and reception. Themes will include: the Holocaust, film and screen theory in the digital era, decolonizing the gaze: Black African and Caribbean cinema.

WRLD 535. World Filmmakers. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Can be repeated for credit with different themes. Prerequisites: permission of instructor and/or graduate standing. Centers on the distinct yet interrelated roles of directors (as individual "authors" or as part of a movement or tradition), studios, audiences, national film industries, etc. in the production, development and interpretation of screen media. Each semester a different vantage point, i.e. gender, is used to open new perspectives on film, a critical evaluation of national film traditions and the elements of cinematographic style. Topics include: women filmmakers in world cinema, Spanish and Latin American filmmakers, filmmakers of the "New German Cinema.

WRLD 593. Internship With French Film Festival. 3 Hours.
Semester course; 8 hours per week in festival office during semester and 8 hours per day during festival in Byrd Theatre. 3 credits. Provides students practical hands-on experience working in the French Film Festival office. Students will research and write questions to ask French actors, directors and cinematographers during the festival. The students edit a final audiovisual project of their actor/director interviews. Students work closely with the founders/directors of the French Film Festival.

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