830 Securities Regulation (3) Basic structure and operation of the federal securities laws, including legal issues associated with: primary and secondary public and private securities offerings; Section 11 of the Securities Act of 1933, as amended, Rule 10b-5 under the Securities Exchange Act of 1934, as amended, and other antifraud provisions; periodic reporting and other disclosure requirements; the regulation of proxy solicitations, tender offers, and securities transactions involving officers, directors, and other insiders; and the regulation of stock markets and professional service providers in the securities industry. (DE) Prerequisite or (DE) Corequisite: 627.

833 Representing Enterprises (3-5) Capstone course for concentration in business transactions. Simulated business transactions and completion of major planning drafting projects. Transactional aspects of new business formation, acquisition of existing business, development of real estate project, various financing transactions and corporate reorganization.

Repeatability: Not repeatable. May be taken once for 3-5 hours. (DE) Prerequisite(s): 818, 826, 827, 840, 842, 940, and 972. Recommended Background: Completion of all courses for concentration in business transactions.

Comment(s): Up to two of the prerequisites may be taken as corequisites.

834 Antitrust (3) Federal antitrust laws; monopolization, price-fixing, group boycotts, and anticompetitive practices generally; government enforcement techniques and private treble damage suits.

840 Commercial Law (4) Basic coverage of most significant provisions of Uniform Commercial Code: security interests in personal property (Art. 9 of U.C.C. and relevant Bankruptcy Code provisions); commercial paper, including checks, notes and other negotiable instruments (Arts. 3 and 4 of U.C.C.); sales of goods, including coverage of portions of Art. 2 of U.C.C. not covered in Contracts.

842 Contract Drafting Seminar (2) Practical fundamentals of drafting contracts of different types.

843 Debtor-Creditor Law (3) Basic elements of federal bankruptcy law: claims, property of estate, automatic stay, trustee's avoidance powers, assumption and rejection of contracts, priority of distributions, and distinction between liquidation and rehabilitation. Enforcing judgments outside of bankruptcy.

844 Business Reorganizations and Workouts (3) An examination of reorganization under chapter 11 of the United States Bankruptcy Code from petition date to confirmation of a plan of reorganization as well as coverage of the use of extensions, compositions, workouts and other non-bankruptcy methods of adjusting the rights or parties to business transactions. Although not required as prerequisites, an understanding of the subject matter of Commercial Law and especially Debtor/Creditor law is strongly recommended. The course satisfies the expository writing requirement.

847 Advanced Constitutional Law (2-3) Advanced study of issues in American constitutional law. Specific course offerings vary. Subjects include: constitutional structure of American governmental institutions, federalism, separation of governmental powers; relationship between legislative and executive branches, relationship among states and between states and federal government, and constitutional amendment process; state constitutional law, Tennessee constitution and differences between state and federal constitutional law; Bill of Rights and 14th Amendment to Constitution; constitutional rights as protected by Bill of Rights and 14th Amendment.

Repeatability: May be repeated if topic differs. Maximum 9 hours. (DE) Prerequisite(s): 812.

848 Civil Rights Actions (3) Analysis of the use of extensions, compositions, workouts and other non-bankruptcy methods of adjusting the rights or parties to business transactions. Although not required as prerequisites, an understanding of the subject matter of Commercial Law and especially Debtor/Creditor law is strongly recommended. The course satisfies the expository writing requirement.

855 Adjudicatory Criminal Procedure (3) Pre- and post-trial procedures in criminal case: bail; preliminary hearing; grand jury; prosecutorial discretion; discovery; speedy trial; plea bargaining; jury trial; and double jeopardy. Federal Rules of Criminal Procedure.

859 Criminal Law Seminar (2) Advanced problems in criminal law and administration of justice.

862 Family Law (3) Survey of laws affecting formal and informal family relationships: premarital disputes; ante nuptial contracts; creation of common law and formal marriage; legal effects of marriage; support obligations within family; legal separation, annulment, divorce, alimony, and property settlements; child custody and child support; abortion; illegitimacy.

863 Children and the Law (3) Legal relationships between children, families and state; juvenile justice; foster care; adoption; educational issues: special education; child abuse and neglect; health care and income maintenance; advocacy for children and families.

866 Environmental Law and Policy (3) Study, through methods of public policy analysis, of responses of legal system to environmental problems: environmental litigation; Clean Air Act; Clean Water Act; National Environmental Policy Act; and selected regulatory issues.

867 Environmental Law Seminar (2) Selected topics in environmental law.

868 Natural Resources (3) Considers how our society allocates and regulates the use of natural resources, including national parks, national forests, coastal resources, minerals, timber, and wildlife.

873 American Legal History (3) Selected topics in American legal history.

877 Jurisprudence (3) Critical or comparative examination of legal theories, concepts, and problems: legal positivism; natural law theory; legal realism; idealism; historical jurisprudence; utilitarianism; Kantianism; sociological jurisprudence; policy science; and critical studies.

879 Law and Economics (3) Relationship between legal and economic thought; application of basic economic concepts to legal problems; economics in legal decision making; scholarly support for and criticism of economic analysis of law. Designed for students with no undergraduate background in economics or mathematics.

881 Law and Literature (3) Reading literary works, development of philosophy and reading technique applicable to both law and life.

886 Public International Law (3) Law-creating processes and doctrines, principles and rules of law that regulate mutual behavior of states and other entities in international system.

887 International Business Transactions (2-3) Doing business with foreign persons and in foreign countries; acquisition and use of property within foreign country; regulation of international business transactions by international organizations and foreign governments; analysis of international conventions and laws of foreign countries affecting business and comparison of those conventions and laws with United States law.

Repeatability: Not repeatable. May be taken once for 2-3 hours.

895 Labor Relations Law (3) Political, social and economic influences in development of federal labor relations laws; employee rights of self-organization; union and employer unfair labor practices; strikes, lockouts, boycotts, and collective bargaining processes; enforcement of collective agreements; individual rights of employees; federal preemption and state regulation.

896 Law of the Workplace (3) Explores federal and state regulation of the employment relationship. Focuses on state common-law doctrines, particularly the employment “at-will” doctrine and its erosion through contract (e.g., employee handbooks), tort (e.g., fraud and defamation), and public policy claims. Addresses limits on employee conduct, including non-compete agreements and trade secret protections; laws dealing with whistleblowers, retaliation, and workplace privacy; and constitutional protections of employees’ free speech and free association rights. Considers federal legislation on minimum wage and overtime, family and medical leave, and ERISA.

897 Employment Discrimination Law (3) Surveys the major federal statutes dealing with discrimination in employment, including the Civil Rights Act of 1964, the Equal Pay Act, the Age Discrimination in Employment Act, and the Americans with Disabilities Act. Considers discrimination based on an employee’s status (e.g., race, sex, sexual orientation, religion, age, and disability), sexual harassment, reverse discrimination, and affirmative action. Examines some practical aspects of practice in this area, particularly administrative requirements for pursuing discrimination litigation.
905 Advocacy Clinic (6) Supervised fieldwork requiring students to assume substantial responsibility for representing clients with various civil and criminal legal problems. Exploration and development of fundamental professional skills involved in practicing law: interviewing and counseling clients, negotiating with other attorneys, planning for transactions and dispute resolutions, initiating and defending claims, conducting factual investigations, and presenting evidence. Credit Restriction: May not receive credit for both 905 and 946 or both 905 and 947. (DE) Prerequisite(s): 920. Comment(s): Third-year standing required.

908 Mediation Clinic (3) Mediation process, theory, strategy, tactics and skills through readings, simulations, and service as mediators in general sessions court and other settings: mediation ethics, relationship of mediation to other dispute resolution methods, roles of attorneys in mediation, and writing of mediation agreements. (DE) Prerequisite(s): 914, or participation in ABA Representation in Mediation Competition or substantial prior mediation training demonstrated to the satisfaction of the instructor.

909 Non-profit Corporations (3) Examines federal and state laws that govern non-profit corporations and offers practical clinical experience representing local corporations. Teams of students conduct "legal audits" of local non-profit organizations, prepare documents for clients, draft corporate documents, and help clients resolve legal problems.

914 Alternative Dispute Resolution (3) Survey course on various alternatives to the conventional trial process. Introduces several of the more popular alternatives, including negotiation, mediation, and arbitration. Satisfies planning and drafting requirement.

915 Conflict of Laws (3) Jurisdiction of foreign judgments, and conflict of laws.

916 Federal Courts (3) Jurisdiction of federal courts; conflicts between federal and state judicial systems.

918 Remedies (3) Judicial remedies: damages, restitution, and equitable relief; availability, limitations and measurement of various remedies; comparison of contract, tort and property-related remedies.

920 Trial Practice (3) Litigation through simulation, trial problems and preparation: basic trial strategy; professional responsibility; fact investigation and witness evaluation; discovery and presentation of evidence; selection and instruction of juries; opening and closing arguments. Written work: pleadings, motions, interrogatories or memorandum. (DE) Prerequisite(s): 813 (except students in advocacy concentration). (DE) Corequisite(s): 813 for students in the advocacy concentration.

921 Pre-Trial Litigation (3) Civil pre-trial process. Drafting of actual pre-trial documents in civil cases; complaints to administrators and directors, draft corporate documents, and help clients resolve legal problems.

922 Advanced Trial Advocacy (3) Study and development of trial skills: trial preparation, advanced direct and cross-examination, expert witnesses, jury selection, jury instruction, technology in courtroom, and motion practice. (DE) Prerequisite(s): 920.

923 Complex Litigation (3) Advanced civil procedure course dealing with the special problems that arise in litigation involving multiple claims and multiple parties - permissive and compulsory joinder; intervention; disposition of duplicative or related litigation; class actions; discovery in large cases; judicial control of complex litigation; res judicata and collateral estoppel problems.

927 Interviewing, Counseling and Negotiation (3) Development of conceptual and practical frameworks for understanding interviewing, counseling and negotiation, and lawyer's role in tasks. Readings of different methods, strategies and perspectives from recent literature involving lawyering skills. Simulations and videotape critiques, drafting of documents. Relevant ethical issues and techniques of dispute resolution. Comment(s): Not open to students who have taken 904 or 905.

928 Case Development and Resolution (4) Theory and development of skills for case development and management: interviewing, counseling, and fact investigation. Ways of resolving disputes without litigation. Comment(s): Not open to students who have taken 927.

935 Gratuitous Transfers (3) Gifts; will substitutes; nature, creation, termination and modification of trusts; intestate succession; execution, revocation, probate and contest of wills; statutory protections against disinheritance; and introduction to powers of appointment, basic problems of will construction, powers of attorney, and planning for disability and death.


940 Land Finance Law (3) Financing devices: mortgages, deeds of trust and land contracts; problems of priorities; transfer of secured interests when debt assumed or taken subject to security interest; default, exercise of equity of redemption and/or statutory right of redemption; mechanics' and material men's liens; contemporary developments in areas as condominiums, cooperatives, housing subdivisions, and shopping centers.

941 Land Acquisition and Development Seminar (2) Simulated representation of various parties: sellers, buyers, construction lenders, permanent lenders, architects, contractors, subcontractors and consultants, in development of real estate project. Negotiation and drafting of documents essential in large commercial development. (RE) Prerequisite(s): 940.

943 Land Use Law (3) Private land use controls: nuisance, easements, real covenants, equitable servitude and home owner associations; public land use controls: zoning, subdivision controls, eminent domain, and regulatory takings.

946 Business Law Clinic (6) Supervised fieldwork assuming substantial responsibility for representing clients with various business and transactional matters. Exploration and development of fundamental professional skills involved in practicing business and transactional law. Interviewing and counseling clients, negotiating with other attorneys and parties, planning, negotiating and documenting transactions and dispute resolutions, conducting factual investigations and legal audits of businesses, and monitoring and ensuring compliance with federal, state and local statutes, rules and regulations.

947 Prosecution Externship (6) Supervised fieldwork required to be admitted to practice as prosecutor and to assume substantial responsibility for prosecution of criminal cases in state or federal courts. Classes on Tennessee or federal criminal law and procedure and prosecution function. Under direct supervision of full-time, experienced prosecutor and other professional prosecutors in office. Assist in investigation of crimes, interview and preparation of witnesses, drafting of relevant documents, negotiation and formal presentation of guilty pleas, presentation of cases to grand jury, and representation of government in preliminary hearings and felony trials. Credit Restriction: Students may not receive credit for both 947 and 905. (DE) Prerequisite(s): 818, 826, 827, and 972. (826 may be waived for those with sufficient business background.) (DE) Prerequisite or (DE) Corequisite: 842.

954 Copyright Law (3) Considers copyright theory, doctrine, and practice and how the law is changing in response to globalization and advances in information technology. Topics include the subject matter of the copyright, the exclusive rights provided by the Copyright Act, substantive and procedural aspects of infringement actions, and remedies. Satisfies expository writing requirement.

955 Patent Law (3) Covers the major aspects of patent law, primarily as applied in the U.S. Patentability, including patentable subject matter, utility, enablement and written description, novelty, and nonobviousness; infringement; ownership and licensing; and remedies. Emphasizes essential legal principles, useful as background for non-patent lawyers and as a foundation for patent lawyers. Recommended Background: Intellectual property course. Comment(s): Science or engineering background not required.

956 Entertainment Law (3) Role of law and lawyer in entertainment industry. Course content varies. Music industry: music copyright laws; role of law and lawyer in management of music industry. Other entertainment industries: labor unions; and performing right organizations.

957 Law, Science and Technology (3) Legal implications of advanced technologies: adaptation of law to challenges posed by new kinds of knowledge and new ways of doing things. Biotechnology, regulation of scientific research, space law, legal issues relating to new information technologies, nanotechnologies, and others designated by instructor.

958 Women and The Law (3) Treatment and status of women in American legal system; women as political actors, as family members, as participants in workforce, as targets of violence and as members of legal profession; introduction to current competing approaches to gender justice.
959 Intellectual Property (3) Intellectual property and related interests under federal and state law; patents; trademarks; trade secrets; copyright; right of public; unfair competition.

962 Law and Medicine Seminar (2) Effects of legal rules on delivery and quality of medical care; nature of physician-patient relationship; unauthorized practice of medicine; medical education, licensing and specialization; hospital staff privileges; medical malpractice liability; standard of care, professional causation, defenses, and damages; protection of patient autonomy; Consent, informed consent, conception and abortion, choice of treatment, and death and dying; control of communicable diseases; organ transplantation and medical resource allocation.

963 Health Care Law and Regulation (3) Surveys legal issues confronting the American health care system, considering federal and state law. Topics include quality control; licensing and accreditation; access to health care, including private health insurance, managed care, Medicare and Medicaid, and emergency health care; privacy regulations; relationships between health care entities and physicians; fraud and abuse regulations; antitrust considerations; and research restrictions. Satisfies expository writing requirement if student elects to write a paper.

964 Health Care Policy (2) Considers ethical perspectives on health care policy, relating to decisions both on individual patient care and on systemic resources. Emphasis is on the utilization of bioethics, including how these ethical perspectives may inform analysis of current issues in health care law and policy and how they are expressed in the national policy debate. Topics include organizing and financing health care, quality and accountability in health care, equality and discrimination in access to health care, privacy issues raised by new technology, legal and ethical issues in managed care, and tort reform. Satisfies the perspectives requirement.

965 Community Development (3) Considers legal issues faced by under-represented constituencies. Students work on law-related field projects under lawyer supervision, collaborating with organizations that serve or advocate for the under-represented in and around Knoxville. Projects may include legal research, legislative drafting and advocacy, creation of educational materials or events, empirical research, and recording of oral histories.

966 Community Legal Education (3) Considers how to advance the law-related education of under-represented constituencies. Under lawyer supervision, students work on law-related education projects for the under-represented in and around Knoxville. Projects may include classes, classroom talks, and the creation, development or production of law-related written materials, skits, interactive workshops, videos, or Web pages. Satisfies the perspectives requirement.

967 Media Impact on Justice (3) Explores the impact that the media has on the perception and reality of justice in the United States, including its impact on courts, counsel, legislatures, and executive branches.

972 Income Taxation of Business Organizations (3) Survey and comparative analysis of federal patterns of income taxation of partnerships, subchapter C corporations, subchapter S corporations, and limited liability companies; introduction to transactional analysis and business planning. Required written exercises: drafting of portions of partnership agreements, opinion letters, and legal memoranda.

(DE) Prerequisite(s): 818.

973 Wealth Transfer Taxation (3) Taxation of gratuitous transfers of wealth during life (gift tax) and at death (estate tax) and of generation skipping transfers.

(DE) Prerequisite or (DE) Corequisite(s): 935.

975 Tax Theory (3) Method and purposes of governmental revenue collection through examination of economic and political theory; comparative analysis of various actual and proposed patterns of taxation: income tax, consumption tax, sales tax, and value-added tax. Required preparation of expository essay on aspect of tax theory chosen by student.

Comment(s): Limited enrollment.

978 Transactional Tax Planning (3) Advanced study of taxation of business organizations, treatment of business acquisitions, tax planning for financially troubled entities, and review of recent transactions involving cutting-edge tax planning and shaping changes in law.

(DE) Prerequisite(s): 818 and 972.

(Comment(s): Limited enrollment.

980 Insurance (3) Types of insurance: life, property, health, accident and liability insurance; regulation of insurance industry; interpretation of insurance contracts; insurable interest requirement; conditions, warranties and representations; coverage and exclusions; duties of agents; excess liability, subrogation; and bad faith actions against insurers. Liability insurance defense problems: duty to defend, notice and cooperation issues, and conflicts of interest.

983 Products Liability (3) Scope of doctrine and theories of recovery; potential plaintiffs and defendants; statutory and contractual limitations on recovery; damages; causation; and defenses.

985 Workers’ Compensation (3) Workers’ Compensation system for compensating victims of work-related accidents and diseases; requirements for covered employer-employee relationship; accidental or occupational diseases arising out of and in course of employment; causation, nature of medical and disability benefits; exclusivity of compensation remedy against employer and co-employees; and rights and liabilities of non-employers; administrative and procedural aspects of Workers’ Compensation practice; and various law reform measures.

990 Issues in the Law (3) Selected topics.

Repeatability: May be repeated. Maximum 40 hours.

991 Issues in the Law Seminar (2) Selected topics.

Repeatability: May be repeated. Maximum 40 hours.

993 Directed Research (1-2) Independent research and writing under direct supervision of faculty member. Proposals must be approved by the supervising faculty member and by the dean or the dean’s designee.

Repeatability: May be repeated. Maximum 8 hours.

Comment(s): Second-year standing required.

994 Independent Study (1-4) Independent study under direct supervision of faculty member. Proposals must be approved by the supervising faculty member and by the dean or the dean’s designee.

Repeatability: May be repeated. Maximum 12 hours.

995 Transactions: The Tennessee Journal of Business Law (1-2) Performance of duties of staff member or editor of Transactions: The Tennessee Journal of Business Law. Responsibilities vary each semester: writing of case synopsis, writing of article, and/or performing other assigned duties related to operation. Members of Transactions who are not on major editorial board receive one hour of credit for successfully completing two consecutive semesters of service. Members of senior editorial board receive two hours of credit for each full year of satisfactory service.

Grading Restriction: Satisfactory/No Credit grading only.

Repeatability: May be repeated. Maximum 4 hours.

Credit Restriction: Does not count toward total number of elective upper-division courses taken Satisfactory/No Credit.

996 Law Review (1) Performance of duties as staff member or editor of Tennessee Law Review. Responsibilities vary each semester as specified in Tennessee Law Review Policy Manual: writing of case note, comment or article, and/or performance of other assigned duties related to operations of Tennessee Law Review. Completion of potentially publishable comment or article for Tennessee Law Review satisfies expository writing requirement.

Grading Restriction: Satisfactory/No Credit grading only.

Repeatability: May be repeated. Maximum 4 hours.

Credit Restriction: Does not count toward total number of elective upper-division courses taken Satisfactory/No Credit.

997 Moot Court (1) Participation as member of faculty-supervised interscholastic moot court competition.

Grading Restriction: Satisfactory/No Credit grading only.

Repeatability: May be repeated. Maximum 4 hours.

Repeatability: May be repeated. Maximum 4 hours.

998 Planning and Drafting Project (1) Preparation and completion of planning and drafting project under faculty supervision in conjunction with substantive courses when such planning and drafting option is provided by course instructor.

Repeatability: May be repeated. Maximum 4 hours.

Legal Studies (617)

430 United States Constitutional Law: Sources of Power and Restraint (3) (See Political Science 430.)

431 United States Constitutional Law: Civil Rights and Liberties (3) (See Political Science 431.)

435 Criminal Law and Procedure (3) (See Political Science 435.)

442 Administrative Law and Regulatory Policymaking (3) (See Political Science 442)

445 Administration of Justice (3) (See Political Science 445.)
451 Criminal Justice (3) (See Sociology 451.)
455 Society and Law (3) (See Sociology 455.)
490 Language and Law (3) (See English 490.)
496 The Rhetoric of Legal Discourse (3) (See English 496.)

Life Sciences (621)

500 Thesis (1-15)
Grading Restriction: P/NP only.
Repeatability: May be repeated.

502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed.
Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated.
Credit Restriction: May not be used toward degree requirements.

505 Research Rotation (2) Laboratory rotations with faculty member on clearly defined projects. Written proposal and oral report.
Repeatability: May be repeated. Maximum 8 hours.

507 Bioinformatics and Computational Biology (1-3) Topics to be covered include the application of computing, modeling, data analysis, and information technology to fundamental problems in the life sciences.
Repeatability: May be repeated. Maximum 12 hours.

510 Special Topics in Life Sciences (1-3) Specializations in biotechnology; cellular, molecular, and developmental biology; environmental toxicology; ethnology; plant, physiology and genetics; and physiology.
Repeatability: May be repeated. Maximum 9 hours.

515 Introduction to Genome Science and Technology I (1) Introduction to research in genome science and technology concentration.
Grading Restriction: Satisfactory/No Credit grading only.

516 Introduction to Genome Science and Technology II (1) Science and ethics of practice of science.
Grading Restriction: Satisfactory/No Credit grading only.

520 Genome Science and Technology I (4) Overview of genomics, advanced genetics principles.

521 Genome Science and Technology II (4) Analytical technologies and special techniques.

540 Colloquium (1) Invited speakers. Topics announced in advance.
Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated. Maximum 12 hours.

541 Colloquium (1) Invited speakers. Topics announced in advance.
Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated. Maximum 12 hours.

590 Foreign Study (1-15)
Repeatability: May be repeated. Maximum 15 hours.

592 Off-Campus Study (1-15)
Repeatability: May be repeated. Maximum 15 hours.

593 Independent Study (1-15)
Repeatability: May be repeated. Maximum 15 hours.

595 Special Topics in Genome Science and Technology (1-3) Tutorials or lectures in variety of special topics to be chosen by instructor.
Repeatability: May be repeated. Maximum 12 hours.

596 Special Topics in Genome Science and Technology (1-3) Tutorials or lectures in variety of special topics to be chosen by instructor.
Repeatability: May be repeated. Maximum 12 hours.

600 Doctoral Research and Dissertation (3-15)
Grading Restriction: P/NP only.
Repeatability: May be repeated.

615 Journal Club in Genome Science and Technology (1) Reading and discussion based on current literature.
Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated. Maximum 12 hours.

695 Advanced Topics in Genome Science and Technology (1-3) Tutorials or lectures on variety of advanced topics to be chosen by instructor.
Repeatability: May be repeated. Maximum 12 hours.

696 Advanced Topics in Genome Science and Technology (1-3) Tutorials or lectures on variety of advanced topics to be chosen by instructor.
Repeatability: May be repeated. Maximum 12 hours.

Linguistics (623)

400 Topics in Linguistics (3)
Repeatability: May be repeated. Maximum 6 hours.

411 Linguistic Anthropology (3) (See Anthropology 411.)

423 The Development of Diachronic and Synchronic Linguistics (3) Development of western linguistic thought from the Hebrews and Greeks through modern times. Readings from Boas, Sapir, Bloomfield, and others.
Recommended Background: 9 hours of courses required for undergraduate linguistics concentration (300-level or above) or consent of instructor.

425 Introduction to Descriptive Linguistics (3) (See French 425.)

426 Methods of Historical Linguistics (3) (See German 426.)

429 Romance Linguistics (3) (See French 429.)

431 Topics in Hispanic Linguistics (3) (See Spanish 430.)

435 Structure of the German Language (3) (See German 435.)

436 History of the German Language (3) (See German 436.)

471 Sociolinguistics (3) (See English 471.)

472 American English (3) (See English 472.)

474 Teaching English as a Second or Foreign Language I (3) (See English 474.)

476 Second Language Acquisition (3) (See English 476.)

477 Pedagogical Grammar for ESL Teachers (3) (See English 477.)

485 Special Topics in Language (3) (See English 485.)

490 Language and Law (3) (See English 490.)

510 Special Topics (3)
Repeatability: May be repeated. Maximum 6 hours.

575 Issues in Second/Foreign Language Rhetoric and Composition (3) (See English 575.)

Logistics (626)

502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed.
Grading Restriction: Satisfactory/No Credit grading only.
Credit Restriction: May not be used toward degree requirements.

503 Statistics and Operations Management (3) (See Operations and Management Science 540.)

546 Logistics and Supply Chain Strategy (3) Development of strategy for logistics systems and supply chain processes. Executive-level integration of logistics strategy with marketing, production, finance, and other decision areas.
(De) Prerequisite(s): 510 and Business Administration 511, 512, 513, and 514.

547 Global Logistics and Supply Chain Management (3) Logistics strategy in global firm: materials management, international sourcing and procurement, global production and distribution, import/export activity, design and operation of supply chains in global environment.
(De) Prerequisite(s): 510 and Business Administration 511, 512, 513, and 514.

593 Independent Study (3-6) Directed research and study.
Repeatability: May be repeated. Maximum 6 hours.
Registration Permission: Consent of instructor.

599 Special Topics in Logistics (3-6) Seminar designed to study specific current problem areas in logistics. Topic announced prior to offering.
Repeatability: May be repeated. Maximum 6 hours.
Registration Permission: Consent of instructor.

600 Doctoral Research and Dissertation (3-15)
Grading Restriction: P/NP only.
Repeatability: May be repeated.

611 Theoretical Foundations (3) (See Marketing 611.)

612 Quantitative Research Methods (3) (See Marketing 612.)

613 Supply Chain Management Thought (3) Survey of concepts and research methods of interorganizational systems. Supply chains will be studied from multiple perspectives including the following: institutional design and structure, transaction cost economics, operations and logistics cost economics, exchange behaviors and strategies, supply chain relationship types, and evaluation of supply chain performance.
614 Evolution of Logistics Thought (3) Survey of concepts, frameworks, theory, research issues, and empirical research in content areas related to logistics and supply chain management. Conceptual foundations, issue controversies, and future directions.

615 Survey of Models in Marketing and Logistics Research (3) Survey of models and methodologies and their application in logistics and marketing research, topical coverage at discretion of instructor.

693 Independent Study (1-6) Directed research on subject of mutual interest to student and staff member. Repeatability: May be repeated. Maximum 6 hours. Registration Permission: Consent of instructor.

Management (625)

440 Organizational Psychology (3) (See Psychology 440.)

502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed. Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated. Credit Restriction: May not be used toward degree requirements.

521 Human Resource Management (3) Personnel functions and human resources management. Community relations, recruiting, selection, training, performance evaluation, wage and salary administration, legal framework as it affects personnel.

551 Management of New Ventures (3) Integration of various functional disciplines and their application to general management of ventures formed both within larger corporations and independently. Preparation of a venture plan, case analysis.

571 International Management (3) Analysis of environment of international business firms and impact of internal and external factors on managerial decisions.

593 Directed Independent Study (1-3) Topic of mutual interest. Available only by prearrangement with supervising faculty member. Grading: Satisfactory/No Credit or letter grade. Repeatability: May be repeated. Maximum 6 hours.

595 Selected Topics in Current Management Issues (3) In-depth consideration of current issues. Managerial impact of emerging topics. Registration Permission: Consent of instructor.

600 Doctoral Research and Dissertation (3-15) Grading Restriction: P/NP only. Repeatability: May be repeated.

Management Science (627)

500 Thesis (1-15) Grading Restriction: P/NP only. Repeatability: May be repeated.

502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed. Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated. Credit Restriction: May not be used toward degree requirements.

526 Advanced Applications of Systems Modeling and Simulation (3) (See Industrial Engineering 526.)

531 Mathematical Programming (3) Linear programming solution procedures, duality, sensitivity, and parametric analysis, linear-fractional, piecewise-linear, separable and integer programming, transportation linear programs. Recommended Background: Fundamentals of matrix algebra course.

532 Stochastic Models in Management Science (3) Discrete-time Markov chains, Poisson processes, continuous-time Markov chains, renewal theory, and queueing theory. (DE) Prerequisite(s): Statistics 563 and mathematical analysis course or consent of instructor.

533 Computational Mathematical Programming (3) Computational aspects of mathematical programming models, in particular for large systems. (DE) Prerequisite(s): 531 and proficiency in computer language.

534 Management Science Methods in Business (3) Application of methods from 531, 532, and 533 to real world problems in business/industry.

551 Leveraging Information Through Descriptive and Prescriptive Modeling (3) Concepts and tools for emulating business operations (descriptive modeling) and for determining optimal operational or tactical strategies (prescriptive modeling). Visualization, optimization, and simulation concepts reinforced through hands-on experience with technologies: geographic information systems (GIS), spreadsheet-based models, simulation packages, and supply chain optimization software.

593 Management Science Problems (1-6) Directed study on subject of mutual interest. Repeatability: May be repeated. Maximum 9 hours.

600 Doctoral Research and Dissertation (3-15) Grading Restriction: P/NP only. Repeatability: May be repeated.

631 Integer Programming (3) Theoretical and computational aspects of linear programming with integer variables, branch and bound, cutting plane, and group theoretical algorithms. (DE) Prerequisite(s): 531 or equivalent.

651 Nonlinear Optimization (3) Kuhn-Tucker theory in nonlinear programming, solution procedures for constrained and unconstrained nonlinear programs, search techniques, quadratic programming, duality and sensitivity analysis. (Same as Industrial Engineering 602.) (DE) Prerequisite(s): 531 or equivalent and proficiency in computer language.

681 Special Topics (3) Repeatability: May be repeated. Maximum 9 hours. (DE) Prerequisite(s): 531 and 532. Registration Permission: Consent of instructor.

691 Management Science Seminar (1) Subjects selected from current literature. Grading Restriction: Satisfactory/No Credit grading only.

692 Management Science Seminar (1) Subjects selected from current literature. Grading Restriction: Satisfactory/No Credit grading only.

Marketing (632)

502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed. Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated. Credit Restriction: May not be used toward degree requirements.

510 Principles of Marketing Management for Non-MBA Students (3) For students from other disciplines interested in obtaining knowledge of marketing discipline at graduate level.

520 Marketing and Customer Value (3) Frameworks, techniques, and processes required for customer relationship management and demand planning in organizations. Twin problems of analyzing markets and customers and translating these analyses into actionable marketing strategies. (DE) Prerequisite(s): Business Administration 511, 512, and 513 or consent of instructor.

530 MBA Marketing Concentration (6) Product management: Complex, interdisciplinary nature of product development and product management. Strategic issues during product life cycle, from idea conception to product development to commercialization to eventual product disposal. Integrated communications: Strategies and tactics associated with communicating value to customers. One-to-one marketing approaches, role of personal selling in communication mix, and advertising and promotions management. Global marketing management: Cross-national forces that enable firms to design and maintain competitive marketing and supply chain networks across multiple geographic locations. (DE) Prerequisite(s): 520 and Business Administration 511, 512, 513, and 514.

593 Independent Study (3) Directed research and study. Repeatability: May be repeated. Maximum 6 hours. Recommended Background: MBA core. Registration Permission: Consent of instructor.

599 Special Topics Seminar (3) Topics vary: market forecasting, market segmentation, services marketing, marketing channels, and related issues. Repeatability: May be repeated. Maximum 6 hours. Registration Permission: Consent of instructor.

600 Doctoral Research and Dissertation (3-15) Grading Restriction: P/NP only. Repeatability: May be repeated.

611 Theoretical Foundations (3) Theoretical foundations and frameworks common to business research. Historical and philosophy of science perspectives. (Same as Logistics 611.)
612 Quantitative Research Methods (3) Quantitative research process: problem formulation, Measurement reliability, validity and scale development, Experimental design and analysis, survey design and analysis, sampling, ethical considerations, and international issues in quantitative research. (Same as Logistics 612.)

613 Qualitative Research Methods (3) Examination of qualitative research theoretical foundations and methodologies. Application of qualitative research methods to theory building research. Topics include formulating research questions, designing qualitative research studies, sampling, data generation techniques, data analysis techniques, evaluating qualitative research, and writing qualitative research reports.

614 Contemporary Marketing Thought (3) Representative topics comprising content of marketing knowledge; macromarketing, markets, channels, and competitive behavior; marketing strategy; marketing mix tools; and ethical issues in marketing. Examination of research for contributions to advancing knowledge and opportunities for new research. Offered every other year.

Registration Permission: Consent of instructor.

615 Consumer Behavior Research (3) Theoretical perspective and research processes describing people in their roles as buyers, users, and evaluators of goods and services. Includes coverage of both end user consumers and industrial buyers. Topics of interest include motivation, personality, attitude formation and change, information processing, choice, decision making for buying and selling activities as well as operational management decision-making processes, consumption, post-purchase consumption, cultural and demographic differences, consumer socialization, and ethical considerations. Offered every other year.

Registration Permission: Consent of instructor.

616 Measurement (3) Measurement and measurement process: design and development of tools, process of testing, and determination of reliability and validity.

617 Special Topics (3) Topics vary: marketing strategy, advanced consumer behavior, research methodology, influence and persuasion theory and strategy, pricing issues, international marketing issues, and non-profit organization marketing issues. Offered every other year.

Repeatability: May be repeated. Maximum 6 hours.

Materials Science and Engineering (638)

405 Structural Characterization of Materials (4) X-ray diffraction and fluorescence; scanning and transmission electron microscopy; microanalytical techniques.

421 Mechanical Behavior of Materials II (3) Description of stress and strain. Linear elastic constitutive equations; isotropic and anisotropic moduli in various materials. Yield criteria; brittle fracture; crazing; plastic strain constitutive equations. Forming operations and limit criteria.

(DE) Prerequisite(s): 302 and Engineering Science 321.

429 Introduction to Ceramic Matrix Composites (3) Characteristics of composites, ceramic matrix composites. Macromechanics and materials design. Overview of fabrication techniques; microstructural characterization. Physical and mechanical property evaluation; current and potential applications.

(DE) Prerequisite(s): 201 and Engineering Science 321.


(DE) Prerequisite(s): 201.

472 Fundamental Principles of Composite Materials (3) Physical principles basic to the design, manufacture, and application of fiber reinforced polymers, metals and ceramics.

(DE) Prerequisite(s): 302 or equivalent.

474 Biomaterials (3) Metals, polymers and ceramics utilized in orthopedic, cardiovascular, and dental surgical implant devices; corrosion and degradation problems. Material properties of primary importance; tissue response to synthetic materials.

(DE) Prerequisite(s): 201.


(DE) Prerequisite(s): 201.

484 Introduction to Maintainability Engineering (3) (See Nuclear Engineering 484.)

500 Thesis (1-15)

Grading Restriction: P/NP only. Repeatability: May be repeated.

502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed.

Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated. Credit Restriction: May not be used toward degree requirements.

503 Graduate Seminar in Materials Science and Engineering (1)

Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated. Maximum 6 hours.

504 Graduate Seminar in Polymer Engineering (1)

Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated. Maximum 6 hours.

505 Engineering Analysis (3) (See Chemical Engineering 505.)

509 Multidisciplinary Project (1) (Same as Industrial Engineering 509.)

511 Fundamentals of Materials Science and Engineering I (3) Chemical bonding, structures, defects, scattering, thermodynamics, diffusion, phase diagrams, microstructures, and phase transformations.

512 Fundamentals of Materials Science and Engineering II (3) Physical properties: electrical and thermal conduction, elementary quantum physics, band theory, dielectric materials, magnetic and optical properties. Mechanical behavior: stress and strain at a point, elastic constitutive equations, phenomenological bulk behavior, and deformation mechanisms.


(DE) Prerequisite(s): 511.

516 Mechanical Metallurgy (3) Deformation and fracture of metals and alloys: dislocation theory, strengthening mechanisms, macro-scale descriptions of plasticity, fracture mechanics, fatigue, and time-dependent behavior.

(DE) Prerequisite(s): 512.

522 Defects in Crystals (3) Analytical and experimental analysis of defect interactions in solids.

(DE) Prerequisite(s): 421 or consent of instructor.

524 Metallurgical Thermodynamics (3) Applications of chemical thermodynamics to metallurgical problems: refining, oxidation, surface treatments, alloy systems.

(DE) Prerequisite(s): 570 or equivalent.

525 Welding Metallurgy (3) Welding processes; physical metallurgy of welding; phase transformations; heat flow; residual stresses; theories of hot cracking, cold cracking and porosity formation; applications to process utilization.

526 Welding Metallurgy (3) Welding processes; physical metallurgy of welding; phase transformations; heat flow; residual stresses; theories of hot cracking, cold cracking and porosity formation; applications to process utilization.

531 Advanced Corrosion (3) Analyses of corrosion processes in terms of polarization measurements and Pourbaix diagram. Influence of environmental and mechanical factors contributing to pitting, crevice, fretting, wear, fatigue and stress corrosion.

(DE) Prerequisite(s): 470 or consent of instructor.
644 Optoelectronic Processes in Polymeric Materials (3) This course introduces fundamental molecular orbital and energy band theories and discusses (1) optical and electronic properties of polymeric materials, (2) principles, design and characterization of polymer optoelectronic devices, and (3) applications of laser spectroscopy in polymer characterization. The focus is to understand electron related processes and optoelectronic characterizations of polymeric materials and devices. The fundamentals of laser spectroscopy are also explained in determining structure-property relationships in polymer research.

(ΔE) Prerequisite(s): 543 or equivalent.
Registration Permission: Consent of instructor.

672 Introduction to Transmission EM and Electron Diffraction (3) Fundamentals of electron scattering, reciprocal space, the Ewald Sphere construction. Basic electron optics, operation of the transmission electron microscope TEM (includes some laboratory sessions) and sample preparation. The kinematical theory of imaging of perfect and imperfect crystals in the TEM. Problems with the kinematical theory. Introduction to the dynamical theory of TEM imaging. The effect of inelastic scattering in the TEM. Fundamentals of analytical electron microscopy. The Scanning Transmission Electron Microscope (STEM) and its relation to the TEM.

(ΔE) Prerequisite(s): 405 or 511 or 572.
Registration Permission: Consent of instructor.

673 Introduction to Scanned Probe Microscopies (3) A survey of techniques for surface imaging and characterization. Young's Topografiner field emission, and the beginning of scanning tunneling microscopy (STM). Practical operation of the STM (includes laboratory sessions). Image resolution and interpretation in the STM, analytical STM imaging. The theory and control of feedback loops in SPM. The generalized Scanning Probe Microscope (SPM) and the Atomic Force Microscope (AFM). Theory of operation of AFM, limits to resolution, and image interpretation (includes laboratory session). Important variants of the SPM including scanning capacitance, scanning near field optical, and scanning thermal microscopes. The metrology of nanoscale structures.

Registration Permission: Consent of instructor.

676 Advanced Topics in Materials Science and Engineering (3) Latest developments and/or advanced special topics. Repeatability: May be repeated. Maximum 9 hours.
Registration Permission: Consent of instructor.

678 Seminar in Recent Advances in Materials Science and Engineering (3) Directed and independent study of advanced topics.
Repeatability: May be repeated. Maximum 6 hours.
Registration Permission: Consent of instructor.

Mathematics (641)

400 History of Mathematics (3) Development of major ideas in mathematics from ancient to modern times and the influence of these ideas in science, technology, philosophy, art, and other areas. Includes at least one in-class essay examination and 3,000 words of writing outside class-room.

(ΔE) Prerequisite(s): 251 or 257 and 300.

403 Mathematical Methods for Engineers and Scientists (3) Matrix computations, numerical methods, partial differential equations, Sturm-Liouville Theory and special functions as used in engineering and science.
Credit Restriction: Does not satisfy major requirements for the mathematics major (Bachelor of Science or Master of Science).

(ΔE) Prerequisite(s): 231, 241, and familiarity with operating system and programming language.

404 Applied Vector Calculus (3) Topics from multivariable and vector calculus, line and surface integrals, divergence theorem and the theorems of Gauss and Stokes.
(ΔE) Prerequisite(s): 241 or 247.

405 Models in Biology (3) Difference and differential equation models of biological systems.
Credit Restriction: May not be applied toward graduate degree.
(ΔE) Prerequisite(s): 142 or 148 or 152.

411 Mathematical Modeling (3) Construction and analysis of mathematical models used in science and industry. Projects emphasized.
Recommended Background: Courses in differential equations and linear algebra.

421 Combinatorics (3) Introduction to problems of construction and enumeration for discrete structures such as sequences, partitions, graphs, finite fields, geometries, and experimental designs.
(ΔE) Prerequisite(s): 323.

423 Probability (3) Axiomatic probability, univariate and multivariate distributions, conditional distributions and expectations, moment generating functions, laws of large numbers and central limit theorem.
(ΔE) Prerequisite(s): 241 and 323.

424 Stochastic Processes (3) Markov chains, Poisson processes and Brownian motion. Other topics as selected by instructor.
(ΔE) Prerequisite(s): 423.

425 Statistics (3) Standard statistical distributions, independence of mean and variance for a Gaussian sample, basic limit theorems; point and interval estimation, tests of statistical hypotheses, Neyman-Pearson theorem; likelihood ratio and other parametric and nonparametric tests.
(ΔE) Prerequisite(s): 423.

(ΔE) Prerequisite(s): 200 or 251 or 257 or 231.

435 Partial Differential Equations (3) Separation of variables, Fourier series, solution of Laplace, wave, and heat equations.
(ΔE) Prerequisite(s): 241 and 247 or 247.

443 Complex Variables (3) Introduction to the theory of functions of a complex variable, including residue theory and contour integrals.
(ΔE) Prerequisite(s): 241 or 247.

445 Advanced Calculus I (3) Introduction to the theory of sequences, series, differentiation, and Riemann integration of functions of one or more variables.
(ΔE) Prerequisite(s): 241 or 247 and 300.

446 Advanced Calculus II (3) Continuation of 445.
(ΔE) Prerequisite(s): 445.

447 Honors: Advanced Calculus I (3) Honors version of 445.
(ΔE) Prerequisite(s): 341.

448 Honors: Advanced Calculus II (3) Continuation of 447.
(ΔE) Prerequisite(s): 447.

453 Matrix Algebra II (3) Advanced topics in matrix theory including Jordan canonical form.
(ΔE) Prerequisite(s): 251 or 257.

455 Abstract Algebra I (3) Introduction to algebraic structures such as groups, rings, fields, vector spaces, and linear transformations.
(ΔE) Prerequisite(s): 251 or 257 and 300.

456 Abstract Algebra II (3) Continuation of 455.
(ΔE) Prerequisite(s): 455.

457 Honors: Abstract Algebra I (3) Honors version of 455.
(ΔE) Prerequisite(s): 351.

458 Honors: Abstract Algebra II (3) Continuation of 457.
(ΔE) Prerequisite(s): 457.

460 Geometry (3) Axiomatic and historical development of neutral, Euclidean, and hyperbolic geometry stressing proof technique and critical reasoning. Models of Non-Euclidean geometries.
(ΔE) Prerequisite(s): 300.

461 Topology (3) Includes topology of line and plane, separation properties, compactness, connectedness, continuous functions, homeomorphisms, continua and topological invariants.
(ΔE) Prerequisite(s): 241 or 247 and 300.

462 Differential Geometry (3) Classical differential geometry of curves and surfaces: Frenet frames, first and second fundamental forms, Gauss curvature and mean curvature, geodesics and parallel transport, the Gauss-Bonnet theorem, geometry of the hyperbolic plane. Recommended Background: Multivariable calculus (241 or 247).

471 Numerical Analysis (3) Introduction to computation, instabilities, and rounding. Interpolation and approximation by polynomials and piecewise polynomials. Quadrature and numerical solution of initial and boundary value problems of ordinary differential equations, stiff systems. (Same as Computer Science 471.)
Recommended Background: Course in basic numerical methods.

472 Numerical Algebra (3) Direct and iterative methods for systems of linear equations. Solution of single nonlinear equation and nonlinear systems. Orthogonal decomposition, least squares and algebraic eigenvalue problem. (Same as Computer Science 472.)
Recommended Background: Course in basic numerical methods and linear algebra.

475 Industrial Mathematics (3) Modeling, analysis, and computation applied to scientific/technical/industrial problems.
Recommended Background: Course in differential equations and familiarity with an operating system and a programming language.
490 Readings in Mathematics (1-3) Open to superior students. Independent study with faculty guidance. 
Repeatability: May be repeated. Maximum 9 hours. 
Comment(s): Consent of faculty mentor to supervise independent work required. 
Registration Permission: Consent of department head.

499 Seminar in Mathematics (1-3) Topics vary. Requires out-of-class projects and in-class presentations by students. Students must register for the number of credit hours announced for a particular seminar. 
Repeatability: May be repeated. Maximum 9 hours. 
Registration Permission: Consent of instructor.

500 Thesis (1-15) 
Grading Restriction: P/NP only. 
Repeatability: May be repeated.

502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed. 
Grading Restriction: Satisfactory/No Credit grading only. 
Repeatability: May be repeated. 
Credit Restriction: May not be used toward degree requirements.

504 Discrete Mathematics for Teachers (3) Mathematical logic and methods of argument, sets, functions and relations, combinatorics. Normally, the first graduate course for students seeking Master of Mathematics degree. 
Credit Restriction(s): May not apply toward mathematics major (Master of Science). 
Recommended Background: 1 year of calculus or equivalent. 
Comment(s): For students in Master of Mathematics program and for students in graduate programs in the College of Education, Health, and Human Sciences.

505 Analysis for Teachers (3) Development of differential and integral calculus, proofs of basic theorems. 
Credit Restriction(s): May not apply toward mathematics major (Master of Science). 
Recommended Background: 1 year of calculus or equivalent. 
Comment(s): For students in Master of Mathematics program and for students in graduate programs in the College of Education, Health, and Human Sciences.

506 Algebra for Teachers (3) Algebraic structures: integral domains and fields and their applications to algebra of integers and polynomials. 
Credit Restriction(s): May not apply toward mathematics major (Master of Science). 
Recommended Background: 1 year of calculus or equivalent. 
Comment(s): For students in Master of Mathematics program and for students in graduate programs in the College of Education, Health, and Human Sciences.

Credit Restriction(s): May not apply toward mathematics major (Master of Science). 
Recommended Background: 1 year of calculus or equivalent. 
Comment(s): For students in Master of Mathematics program and for students in graduate programs in the College of Education, Health, and Human Sciences.

509 Seminar for Teachers (3) 
Repeatability: May be repeated. Maximum 12 hours. 
Credit Restriction(s): May not apply toward mathematics major (Master of Science). 
Comment(s): For Students in Master of Mathematics program and for students in graduate programs in the College of Education, Health, and Human Sciences. 
Registration Permission: Consent of instructor.

510 Applied Mathematics Laboratory (1) Computer applications in applied mathematics: software packages for matrix analysis, symbolic algebra, and differential equations. 
Repeatability: May be repeated. Maximum 2 hours. 
(DE) Corequisite(s): 511.

511 Methods in Applied Mathematics I (3) Fundamentals and techniques associated with discrete models of physical, engineering and biological systems: difference equations, networks and graphs, optimization, and other topics. 
Recommended Background: Courses in advanced calculus and linear algebra.

512 Methods in Applied Mathematics II (3) Fundamentals and techniques associated with continuous models of physical, engineering, and biological systems: development, solution and qualitative analysis of ordinary and partial differential equations, and calculus of variations. 
(DE) Prerequisite(s): 511.

Recommended Background: Advanced courses in ordinary and partial differential equations and advanced calculus.

514 Mathematical Principles of Fluid Mechanics II (3) Continuation of 513. 
(DE) Prerequisite(s): 513.

515 Analytical Applied Mathematics I (3) Analysis of advanced techniques in modern context for applied problems: dimensional analysis and scaling, perturbation theory, variational approaches, transform theory, wave phenomena and conservation laws, stability and bifurcation, distributions, integral equations. 
Recommended Background: Courses in advanced calculus, linear algebra, and either advanced differential equations or 512.

516 Analytical Applied Mathematics II (3) Continuation of 515. 
(DE) Prerequisite(s): 515.

517 Mathematical Methods in Physics I (3) (See Physics 571.)

518 Mathematical Methods in Physics II (3) (See Physics 572.)

519 Seminar in Applied Mathematics (1-3) 
Repeatability: May be repeated. Maximum 12 hours.

521 Enumerative Combinatorics I (3) Sieve methods, recursion, generating functions, and permutation groups applied to enumeration of discrete structures. Incidence algebras and combinatorics of partially ordered sets.

522 Enumerative Combinatorics II (3) Continuation of 521. 
(DE) Prerequisite(s): 521.

523 Probability I (3) Probability spaces and random variables, expectation, characteristic functions, convergence of random variables. 
Recommended Background: One year of advanced calculus and 323.

524 Probability II (3) Continuation of 523. Law of large numbers, central limit theorem, conditional expectation, martingales. Other topics as selected by instructor. 
(DE) Prerequisite(s): 523.

525 Statistics I (3) Formulation of statistical models, sufficiency; methods of estimation and optimal theory, asymptotic efficiency; the confidence procedures and hypothesis testing, uniformly most powerful tests; Bayesian statistics. 
Recommended Background: One year of advanced calculus and 425.

526 Statistics II (3) Continuation of 525. Estimation and tests in general linear models; non-parametric models, rank methods for comparison, robust tests. Other topics as selected by instructor. 
(DE) Prerequisite(s): 525.

527 Stochastic Modeling (3) Variable topics in probability applied to real world situations. Topics may include queueing theory, branching processes, Monte Carlo simulation, stochastic finance and other topics as selected by instructor. 
Recommended Background: One year of advanced calculus and one year of undergraduate probability or mathematical statistics.

529 Seminar in Stochastics (1-3) 
Repeatability: May be repeated. Maximum 12 hours.

Recommended Background: One year of advanced calculus and undergraduate differential equations.

532 Ordinary Differential Equations II (3) Continuation of 531. The nonlinear theory of differential equations including Liapunov stability, critical point analysis, and Poincare-Bendixon theory. 
(DE) Prerequisite(s): 531.

534 Calculus of Variations (3) Necessary and sufficient conditions for weak and strong extrema in one-dimensional variation problems; Lagrangian mechanics. Multiple integrals. Basic elements of direct methods. 
Recommended Background: At least one senior-level course in differential equations or advanced calculus. Mathematical maturity.

Recommended Background: One year of advanced calculus.

(DE) Prerequisite(s): 535.
537 Mathematical Principles of Continuum Mechanics I (3) Conservation principles, equations of equilibrium and motion for fluids and elastic solids, constitutive relations and stress, convexity properties, bifurcation phenomena, existence theory.
   Recommended Background: Courses in advanced calculus and advanced differential equations.

538 Mathematical Principles of Continuum Mechanics II (3) Continuation of 537.
   (DE) Prerequisite(s): 537.

539 Seminar in Differential Equations (1-3)
   Repeatability: May be repeated. Maximum 12 hours.

540 Real Analysis (3) Measure theory, Lebesgue integration, Hölder and Minkowski inequalities, Radon-Nikodym theorem, Fubini's theorem.
   Recommended Background: One year of advanced calculus.

546 Complex Analysis (3) Holomorphic functions, Cauchy's theorem, Maximum Modulus theorem, Schwarz's lemma, normal families, Riemann mapping theorem.
   (DE) Prerequisite(s): 545.

547 Applied Linear Analysis (3) Banach and Hilbert spaces, linear operators and spectral theory, Sobolev spaces, applications.
   (DE) Prerequisite(s): 545.

549 Seminar in Analysis (1-3)
   Repeatability: May be repeated. Maximum 12 hours.

551 Modern Algebra I (3) Groups and rings.
   Recommended Background: One year of undergraduate abstract algebra.

552 Modern Algebra II (3) Continuation of 551; modules, fields and Galois theory.
   (DE) Prerequisite(s): 551.

555 Number Theory I (3) Introduction to algebraic number theory.
   Recommended Background: One year of undergraduate abstract algebra.

556 Number Theory II (3) Continuation of 555.
   (DE) Prerequisite(s): 555.

559 Seminar in Algebra (1-3)
   Repeatability: May be repeated. Maximum 12 hours.

561 Topology I (3) Topological spaces and continuous functions, separation axioms, product and quotient topologies, connectedness, compactness, complete metric spaces.
   Recommended Background: One year of advanced calculus.

562 Topology II (3) Continuation of 561. Fundamental group and covering spaces.
   (DE) Prerequisite(s): 561.

   Recommended Background: One year of advanced calculus.

568 Riemannian Geometry II (3) Continuation of 567.
   (DE) Prerequisite(s): 567.

569 Seminar in Topology and Geometry (1-3)
   Repeatability: May be repeated. Maximum 12 hours.

   Recommended Background: Courses in advanced calculus and basic numerical analysis.

   (DE) Prerequisite(s): 571.

574 Finite Element Methods (3) Finite element techniques for solution of boundary and initial-boundary value problems. Variational formulation. Finite dimensional subspaces and their approximating properties; rates of convergence. Computer implementation. (Same as Computer Science 574.)
   Recommended Background: Courses in partial differential equations, linear algebra and numerical analysis.

575 Matrix Theory and Techniques in Numerical Analysis (3) Advanced topics in study of iterative and direct methods for large systems of linear equations; sparse matrix analysis, relationship to modern computer architectures. (Same as Computer Science 575.)
   Repeatability: May be repeated. Maximum 9 hours.
   Recommended Background: Courses in linear algebra and numerical analysis.

576 Linear and Nonlinear Programming (3) Linear programming, the simplex and interior methods. Integer, convex, stochastic and other topics in nonlinear programming. Applications to real world problems.
   Recommended Background: Courses in numerical algorithms, linear algebra and advanced calculus.

577 Optimization (3) Mathematical foundations of constrained and unconstrained optimization. Lagrange multipliers, the Farkas lemma, the Kuhn-Tucker-Karush theorem. Analysis of major algorithms and applications to real world problems.
   Recommended Background: Courses in numerical algorithms, linear algebra and advanced calculus.

   Recommended Background: A course in partial differential equations or 512 or 515, and familiarity with an operating system and a programming language.

579 Seminar in Numerical Mathematics (1-3)
   Repeatability: May be repeated. Maximum 12 hours.

581 Mathematical Ecology I (3) Deterministic and stochastic models of populations, communities, and ecosystems. (Same as Ecology and Evolutionary Biology 581.)
   (DE) Prerequisite(s): 431 and 453.

582 Mathematical Ecology II (3) Continuation of 581. (Same as Ecology and Evolutionary Biology 582.)
   (DE) Prerequisite(s): 581.

583 Mathematical Evolutionary Theory (3) Population genetics and evolutionary ecology. (Same as Ecology and Evolutionary Biology 585.)
   (DE) Prerequisite(s): 431 and 453.

585 Optimal Control Theory (3) Deterministic optimal control. Examples involving calculus of variations, optimal trajectories, and engineering control problems. Introduction to stochastic control.
   Recommended Background: One year of advanced calculus and undergraduate differential equations.

589 Seminar in Mathematical Ecology (1-3)
   Repeatability: May be repeated. Maximum 12 hours.

593 Independent Study (1-12)
   Repeatability: May be repeated. Maximum 12 hours.

598 Graduate Reading in Mathematics (1-3) Independent study with faculty guidance.
   Repeatability: May be repeated. Maximum 6 hours.
   Registration Permission: Consent of instructor.

599 Seminar in Mathematical Presentations (1)

600 Doctoral Research and Dissertation (3-15)
   Grading Restriction: P/NP only.
   Repeatability: May be repeated.

617 Geometry of Groups (3) Geometry of Lie groups, symmetric spaces and discrete groups. Topics vary.
   Repeatability: May be repeated. Maximum 12 hours.
   (DE) Prerequisite(s): 561 and 562 or 567 and 568.

619 Seminar in Applied Mathematics (1-3)
   Repeatability: May be repeated. Maximum 12 hours.

623 Advanced Probability I (3) Selected topics in modern theory of probability and stochastic processes.
   Repeatability: May be repeated. Maximum 12 hours.
   (DE) Prerequisite(s): 523 and 524.

624 Advanced Probability II (3) Continuation of 623.
   Repeatability: May be repeated. Maximum 12 hours.
   (DE) Prerequisite(s): 623.

629 Seminar in Combinatorics (1-3)
   Repeatability: May be repeated. Maximum 12 hours.

635 Advanced Partial Differential Equations I (3) Selected topics in classical and modern theoretical partial differential equations.
   Repeatability: May be repeated. Maximum 12 hours.
   (DE) Prerequisite(s): 535 and 536.

636 Advanced Partial Differential Equations II (3) Continuation of 635.
   Repeatability: May be repeated. Maximum 12 hours.
   (DE) Prerequisite(s): 635.
Repeatability: May be repeated. Maximum 6 hours. (DE) Prerequisite(s): 545. (DE Corequisite(s): 546 or 443.)

642 Functional Analysis II (3) Continuation of 641.
Repeatability: May be repeated. Maximum 6 hours. (DE) Prerequisite(s): 641.

645 Advanced Analysis I (3) Selected topics in real, complex, or discrete analysis.
Repeatability: May be repeated. Maximum 12 hours. (DE) Prerequisite(s): 545 and 546.

646 Advanced Analysis II (3) Continuation of 645.
Repeatability: May be repeated. Maximum 12 hours. (DE) Prerequisite(s): 645.

649 Seminar in Analysis (1-3)
Repeatability: May be repeated. Maximum 12 hours. (DE) Prerequisite(s): 551 and 552.

651 Advanced Modern Algebra I (3) Selected topics in algebra, algebraic geometry, or number theory.
Repeatability: May be repeated. Maximum 12 hours. (DE) Prerequisite(s): 561 and 562.

652 Advanced Modern Algebra II (3) Continuation of 651.
Repeatability: May be repeated. Maximum 12 hours. (DE) Prerequisite(s): 651.

659 Seminar in Algebra (1-3)
Repeatability: May be repeated. Maximum 12 hours. (DE) Prerequisite(s): 561 and 562.

661 Modern Topology I (3) Selected topics in topology.
Repeatability: May be repeated. Maximum 12 hours. (DE) Prerequisite(s): 561 and 562.

662 Modern Topology II (3) Continuation of 661.
Repeatability: May be repeated. Maximum 12 hours. (DE) Prerequisite(s): 661.

663 Algebraic Topology I (3) Homology, cohomology and homotopy theories: duality theorems and Hurewicz isomorphism theorem.
Repeatability: May be repeated. Maximum 9 hours. (DE) Prerequisite(s): 561 and 562. Recommended Background: One year of abstract algebra.

664 Algebraic Topology II (3) Continuation of 663.
Repeatability: May be repeated. Maximum 9 hours. (DE) Prerequisite(s): 663.

667 Modern Geometry I (3) Selected topics in Riemannian geometry and geometric analysis.
Repeatability: May be repeated. Maximum 12 hours. (DE) Prerequisite(s): 561 and 562 or 567 and 568.

668 Modern Geometry II (3) Continuation of 667.
Repeatability: May be repeated. Maximum 12 hours. (DE) Prerequisite(s): 667.

669 Seminar in Topology and Geometry (1-3)
Repeatability: May be repeated. Maximum 12 hours. (DE) Prerequisite(s): 571 and 572.

673 Advanced Topics in Numerical Partial Differential Equations (3)
Theoretical aspects of finite difference and finite element methods for initial and boundary value problems.
Repeatability: May be repeated. Maximum 12 hours. (DE) Prerequisite(s): 571 and 572.

679 Seminar in Numerical Mathematics (1-3)
Repeatability: May be repeated. Maximum 12 hours. (DE) Prerequisite(s): 581 and 582.

681 Advanced Mathematical Ecology I (3) Selected topics in theoretical and applied mathematical ecology: population, community, ecosystem ecology and applied topics such as demography, ecotoxicology, epidemiology, environmental change, and resource management. (Same as Ecology and Evolutionary Biology 681.)
Repeatability: May be repeated. Maximum 6 hours. (DE) Prerequisite(s): 581 and 582.

682 Advanced Mathematical Ecology II (3) Continuation of 681. (Same as Ecology and Evolutionary Biology 682.)
Repeatability: May be repeated. Maximum 6 hours. (DE) Prerequisite(s): 681.

Mathematics Education (642)
485 Teaching of Mathematics, Grades 7-12 (3) Preparation of teaching plans, evaluation, materials for teaching mathematics. Teaching simulation and directed observation in schools.
Comment(s): Admission to teacher education required.

522 Programs and Materials in School Mathematics (3) Examination, development and use of materials for creating an active learning environment for learning mathematics for all ages.

523 Diagnosis and Correction of Children's Difficulties in Learning Mathematics (3) Children's difficulties in learning mathematics and procedures for helping classroom teachers correct difficulties.
(DE) Prerequisite(s): 522 or consent of instructor.

530 Teaching Mathematics to Young Children: K-4 (3) Unit planning, daily planning, grouping and other strategies of teaching mathematics. Course is for those with little preparation in teaching elementary school mathematics.

543 Teaching Mathematics in Middle School: 5-8 (3) Unit planning, daily planning, grouping and other strategies of teaching mathematics. Course is for those with little preparation in teaching elementary school mathematics.


581 Mathematics Curriculum (3) Past, present and future issues influencing mathematics curriculum in schools, elementary through college. Teacher's role in curriculum development and implementation. Rationales for curriculum decisions.

583 Teaching Mathematics in Senior High Schools and Community Colleges (3) Topics appropriate for high school and community/junior college mathematics curriculum. Special problems related to enrichment, problem solving, and use of microcomputers. Opportunities for special projects.

622 Research Trends in Mathematics Teacher Education (3) Analysis of current research trends in mathematics teacher education and impact of such research on development of teachers both pre-service and in-service.
Recommended Background: Minimum 9 hours of 500-level mathematics education courses.

683 Advanced Studies in Mathematics Education (3) Analysis of current research in mathematics education and implications of research for classroom practice.
Recommended Background: 2 graduate courses in mathematics education.

Mechanical Engineering (650)
Not all the courses listed below are available at both the University of Tennessee, Knoxville, and UTSC campuses.

449 Mechanical Engineering Laboratory (3) Designing, conducting and reporting results of experimental exercises. Test standards and specifications. Analysis of data and formation of conclusions.
(DE) Prerequisite(s): 344 and 345. (DE Corequisite(s): 475.)

451 Control Systems (3) Analysis and design of feedback control systems using transient and frequency response techniques. Stability analysis in the time and frequency domain.
(DE) Prerequisite(s): 363.

452 Finite Element Analysis (3) Conversion of fundamental conservation principles in mechanics to simulation form via finite element implementation. Applications in heat transfer, solid mechanics, mechanical vibrations, fluid mechanics and heat/mass transport. Extensive computer lab experiments using Matlab-based and commercial software systems.
(DE) Prerequisite(s): 321, 344, and 363.

466 Elements of Machine Design II (3) Application of strength and properties of materials. Design factors, theories of failure to design of machine elements. Mini-design experiences.
(DE) Prerequisite(s): 321 and Materials Science and Engineering 201.

475 Thermal Engineering (3) Thermal systems with emphasis on turbo-machinery, heat exchangers, gas-vapor mixtures and psychrometry, and fuels and combustion. Chemical equilibrium and system analysis and design.
(DE) Prerequisite(s): 344.

483 Introduction to Reliability Engineering (3) (See Nuclear Engineering 483.)
494 Selected Topics in Mechanical Engineering (1-4) Problems and topics related to developments and practice in mechanical engineering. 

Repeatability: Not Repeatable. May be taken once for 1-4 hours.

Registration Permission: Consent of instructor.

495 Selected Topics in Mechanical Engineering (1-4) Problems and topics related to developments and practice in mechanical engineering. 

Repeatability: Not Repeatable. May be taken once for 1-4 hours.

Registration Permission: Consent of instructor.

500 Thesis (1-15) 

Grading Restriction: P/INP only.

Repeatability: May be repeated.

502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed.

Grading Restriction: Satisfactory/No Credit grading only.

Repeatability: May be repeated.

Credit Restriction: May not be used toward degree requirements.

504 Product Development Process (1) Basic elements in product development process and project management. Business and engineering interrelations to development and commercial manufacturing of new products. Multidisciplinary teams to explore possible new product opportunities. (Same as Industrial Engineering 506.) 

Registration Permission: Consent of instructor.


Recommended Background: Electronics and computer circuits course. 

Registration Permission: Consent of instructor.

506 Product Selection and Evaluation (2) Development of operational requirements and features for new product having potential for business venture. Market potential, design feasibility and manufacturing requirements. Design alternatives created and evaluated against set of performance requirements determined from market analysis. Preferred product concepts selected by end of second semester. (Same as Industrial Engineering 507.) 

(De) Prerequisite(s): 504.

507 Application of Linear Algebra in Engineering Systems (3) (See Chemical Engineering 507.)

508 Integrated Product, Process and Manufacturing System Design (3) (See Industrial Engineering 508.)

509 Multidisciplinary Project (1) (See Industrial Engineering 509.)

510 Prototype Development and Evaluation (3) Prototype of selected product made and tested against required operating conditions. Design changes implemented to meet customer’s needs. Fabrication drawings and manufacturing plans finalized for introduction of product to marketplace. Prototype development managed using project management plan. 

(De) Prerequisite(s): 555.


Recommended Background: Undergraduate heat transfer course.

512 Heat Transfer II (3) Analysis of steady-state and time-dependent heat conduction by numerical methods. Analysis of laminar and turbulent convection heat transfer in internal and external flows, forced and buoyancy driven flows. 

(De) Prerequisite(s): 541.

514 Phase Change Heat Transfer (3) Mechanisms and modeling of nucleation, transition and film boiling processes; critical heat flux; forced convection boiling and pool dry-out heat transfer; condensation processes; heterogeneous nucleation; dropwise and filmwise condensation; flow condensation; liquid-solid phase change processes; moving phase fronts; mathematical modeling. 

(De) Prerequisite(s): 544 and 511.


Recommended Background: Undergraduate fluid mechanics and heat transfer course.

519 Technology Product Development and Entrepreneurship (3) Technology and innovation, technology transfer, patent protection, legal formation and intellectual property, knowledge management, generation, and transmission, launching a technology based business, sources of capital, small business growth and operation. Multidisciplinary teams will develop a business based on a technological product. 

(De) Prerequisite(s): 506 or consent of instructor.

521 Thermodynamics I (3) Macroscopic thermodynamics, including First and Second Law analyses, availability, phase and chemical equilibrium criteria, combustion, gas mixtures, and property relations, determination of thermodynamic properties from molecular structure, spectroscopic data, kinetic theory, statistical mechanics, quantum physics, Schroedinger equation. 

(De) Prerequisite(s): 332.

522 Thermodynamics II (3) Macroscopic thermodynamics, including First and Second Law analyses, availability, phase and chemical equilibrium criteria, combustion, gas mixtures, and property relations, determination of thermodynamic properties from molecular structure, spectroscopic data, kinetic theory, statistical mechanics, quantum physics, Schroedinger equation. 

(De) Prerequisite(s): 332.

525 Combustion and Chemically Reacting Flows I (3) Fundamentals: thermochemistry, chemical kinetics and conservation equations; phenomenological approach to laminar flames; diffusion and premixed flame theory; single droplet combustion; deflagration and detonation theory; stabilization of combustion waves in laminar streams; flammability limits of premixed laminar flames; introduction to turbulent flames. 

(De) Prerequisite(s): 522 and 541 or consent of instructor.

526 Combustion and Chemically Reacting Flows II (3) Advanced topics: phenomenological approaches to turbulent flames; fundamentals of turbulent flow; application of probability density functions to turbulent flames; turbulent reacting flows with premixed and/or non-premixed reactions; spray combustion models; fluidized bed combustion; chemically reacting boundary layer flow; gas turbine and/or rocket motor combustors; furnaces; introduction to supersonic combustion and hypersonic flows. 

(De) Prerequisite(s): 525.

527 Thermal Systems Analysis I (3) Application of basic principles of heat transfer, fluid mechanics, and thermodynamics to develop solution models for parametric analysis of thermal systems problems via commercial software. 

(De) Prerequisite(s): 344.


(De) Prerequisite(s): 527.

530 Foundations of Nanomechanics (3) Fundamental aspects of small-scale mechanics and thermodynamics needed to understand properties and behavior of engineered nanoscale systems. Role of nanomechanics in the contemporary nanotechnology research. Essential practical tools used by engineers and researchers for the analysis and characterization of nanostructures, nanocomposite materials, and complex multiscale phenomena in solids and liquids. 

(De) Prerequisite(s): 321 and 331.

531 Advanced Biomechanics I (3) (See Biomedical Engineering 531.)

533 Dynamics (3) Kinematics and dynamics of particles in three dimensions. Rotating coordinate systems. Hamilton’s principle. Lagrange’s equations of motion. Kinematics and dynamics of rigid bodies. (Same as Aerospace Engineering 533; Engineering Science 533.) 

(De) Prerequisite(s): 391 or Mathematics 431 and an undergraduate vibrations course.

534 Mechanical Vibrations (3) Vibrations of linear, discrete, undamped and damped systems. Lagrange’s equations for holonomic systems. Modal analysis. Laplace transform. Response to mechanical transients. (Same as Aerospace Engineering 538; Biomedical Engineering 534; Engineering Science 534.) 

Recommended Background: An undergraduate vibrations course.

537 Mechanical Systems Analysis (3) Application of basic principles of rigid body dynamics, strength of materials, and continuum mechanics to development of models for parametric analysis of mechanical systems using commercial software. 

(De) Prerequisite(s): 231 and 321.

539 Continuum Mechanics (3) (See Engineering Science 539.)

541 Fluid Mechanics I (3) Derivation of equations governing flow of inviscid and viscous fluids (conservation of mass, Newton’s second law, conservation of energy). Equations of state and constitutive relations; Euler and Navier-Stokes forms and nondimensionalization. Exact solutions and introduction to potential and boundary-layer flows. (Same as Aerospace Engineering 541; Biomedical Engineering 541; Engineering Science 541.) Recommended Background: A fluid mechanics course.

542 Fluid Mechanics II (3) Equations of viscous fluid flows. Basic concepts and equations of turbulent flow. Separation, stability and transition. Laminar and turbulent boundary-layer flows. Exact, approximate, and numerical solutions. (Same as Aerospace Engineering 542; Engineering Science 542.) (DE) Prerequisite(s): 541.

547 Modern Linear Controls (3) Multivariable feedback systems; transfer function and state-space techniques; stability of linear systems; optimality and robustness; control system design. (DE) Prerequisite(s): 507 or equivalent.

551 Mechanical Engineering Design (3) Design of mechanical engineering devices and systems. Registration Permission: Consent of instructor.

552 Mechanical Engineering Design (3) Design of mechanical engineering devices and systems. Registration Permission: Consent of instructor.

555 Human Vibrations Analysis and Protection (3) (See Biomedical Engineering 555.)

559 Advanced Mechanics of Materials I (3) Elasticity in three dimensions: equations of equilibrium, strain-displacement relations, compatibility, constitutive equations. Energy methods. Beams on elastic foundation, unsymmetrical bending, shear center, beam-columns, buckling, plastic collapse. (Same as Aerospace Engineering 559; Biomedical Engineering 559; Engineering Science 559.) (DE) Prerequisite(s): 321.

561 Finite Elements for Engineering Applications (3) (See Engineering Science 551.)

562 Computational Fluid-Thermal Systems (3) (See Engineering Science 552.)

563 Computational Solid Mechanics (3) (See Engineering Science 553.)

567 Smart Structures and Materials (3) Constitutive modeling and characteristics of piezoelectric materials, electroactive materials, magnetostatic materials, shape memory alloys, electrothermoelectric and magnetothermoelectric transducers, and electroactive polymers. Energy methods for static and dynamic analysis of piezoelectric bimorph and other smart systems. (DE) Prerequisite(s): 321 and 363 or consent of instructor.

577 Neural Networks in Engineering (3) (See Nuclear Engineering 577.)

581 Rocket Propulsion I (3) Rocket propulsion fundamentals; thermodynamics of nonreacting and chemically reacting ideal gases, rocket nozzle design; ideal rocket performance parameters; rocket heat transfer; chemistry of propellants; liquid rocket engine systems; ground testing; introduction to solid propellant rockets. Registration Permission: Consent of instructor.

582 Rocket Propulsion II (3) Solid propellant rocket performance, homogeneous and heterogeneous propellant chemistry and combustion system performance, thermal decomposition and gas phase reaction models; effect of chamber pressure and additives on solid propellant burn rates, erosive burning; analysis of two-phase solid rocket exhaust flow. Introduction to nuclear and electric propulsion; electrical resistance and electric field (ion) engine performance, magnetohydrodynamic thrusters, traveling wave thrusters; exotic propulsion systems. Registration Permission: Consent of instructor.

584 Turbomachinery Systems I (3) Ideal cycle analysis of turbine engines, real cycle analysis, component performance analysis, component design and systems integration (inlets, nozzles, combustors, compressors, turbines), flowthrough theory, turbine engine component matching, transient operation, surge and rotating stall, engine control systems, structural considerations. Comment(s): First-year graduate standing required. Registration Permission: Consent of instructor.

585 Turbomachinery Systems II (3) Ideal cycle analysis of turbine engines, real cycle analysis, component performance analysis, component design and systems integration (inlets, nozzles, combustors, compressors, turbines), flowthrough theory, turbine engine component matching, transient operation, surge and rotating stall, engine control systems, structural considerations. Comment(s): First-year graduate standing required. Registration Permission: Consent of instructor.

586 Mechanics and Control of Robotic Manipulators (3) Fundamentals of robotic manipulation: kinematics and dynamics of manipulators, control systems design, trajectory planning, advanced force and impedance control strategies. (DE) Prerequisite(s): 451 and 533.

587 Dynamic Modeling and Simulation (3) Modeling and analysis of physical systems. Systems and parameter identification. Mathematical modeling methods and approximations. Digital simulation techniques and practices. Design and control applications. (Same as Biomedical Engineering 587.) (DE) Prerequisite(s): 363.

588 Introduction to Hybrid Electric Vehicles (3) Series, parallel, and dual configurations. Sizing and analysis of typical HEV components: motors, auxiliary power sources, on-board energy storage, and fuels. Steady-state HEV force and power modeling schemes. Power train design using various computer simulation tools. Registration Permission: Consent of instructor.

590 Selected Engineering Problems (2-6) Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated. Maximum 6 hours. Comment(s): Enrolment limited to students in the problems option. Registration Permission: Consent of advisor.


594 Culminating Integrated Project Report (3) Final phase of project development process. Multidisciplinary teams submit and defend comprehensive project report. Group project includes all engineering and business considerations needed to convince potential investors to fund proposed business venture. (Same as Chemical Engineering 594; Electrical and Computer Engineering 594; Industrial Engineering 594; Materials Science and Engineering 594; Nuclear Engineering 594.) Registration Permission: Consent of instructor.

595 Seminar (1) All phases of mechanical engineering, reports on current research at the University of Tennessee, Knoxville, and the University of Tennessee Space Institute. Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated. Maximum 20 hours.

599 Special Topics in Mechanical Engineering (1-3) Repeatability: May be repeated. Maximum 6 hours. Registration Permission: Consent of instructor.

600 Doctoral Research and Dissertation (3-15) Grading Restriction: P/NP only. Repeatability: May be repeated. Maximum 9 hours. Registration Permission: Consent of instructor.


613 Advanced Radiation Heat Transfer (3) Radiation heat transfer in absorbing, emitting and scattering media; interaction of thermal radiation with conduction and convection heat transfer. (DE) Prerequisite(s): 511 and 512.

615 Engineering Optics and Optical Techniques (3) Closely related optical theories to engineering applications for advanced optical measurements and diagnostic techniques. This course also provides knowledge for researchers in the areas of micro/nano/bio-fluidics and energy transport using and developing optical techniques. Registration Permission: Consent of instructor.
621 Advanced Topics in Mechanical Systems (3) Advanced theory and applications in control systems, dynamics, mechanics, strength of materials and vibrations. 
Repeatability: May be repeated. Maximum 9 hours.
Registration Permission: Consent of instructor.

631 Advanced Biomechanics II (3) (See Biomedical Engineering 631.)

642 Advanced Topics in Thermodynamics (3) Comparison of macroscopic and microscopic approach; equilibrium of pure substances, metastable states. Non-equilibrium thermodynamics.
Registration Permission: Consent of instructor.

(DE) Prerequisite(s): 540 and 542.

647 Nonlinear Control Systems (3) Qualitative behavior of nonlinear systems; Lyapunov stability theory; passivity and absolute stability theory; frequency domain methods; nonlinear feedback systems; nonlinear design techniques. 
(DE) Prerequisite(s): 547 or Electrical and Computer Engineering 512.

651 Advanced Topics in Computational Fluid Dynamics (3) (See Engineering Science 651.)

652 Advanced Computational Fluid Dynamics Practice (3) (See Engineering Science 652.)

659 Advanced Mechanics of Materials II (3) Plane stress and plane strain in rectangular and polar coordinates; stress functions. Torsion of noncircular sections. Diks. thick-walled tubes. thick-walled pressure vessels. Theory of rectangular and circular plates, with plates with holes, axisymmetric shells. Stress concentrations. (Same as Aerospace Engineering 659; Biomedical Engineering 659; Engineering Science 659.) 
(DE) Prerequisite(s): 559 or consent of instructor.

661 Advanced Vibrations (3) Analysis of linear and nonlinear single degree of freedom systems. Random vibration. Mechanical transients. 
(DE) Prerequisite(s): 534.

671 Advanced Topics in Applied Artificial Intelligence (3) (See Nuclear Engineering 671.)

(DE) Prerequisite(s): 586 or consent of instructor.

Medieval Studies (674)

401 Dante and Medieval Culture (3) (See Italian 401.)

402 Petrarch and Boccaccio (3) (See Italian 402.)

405 Medieval literature (3) (See English 401.)

406 Chaucer (3) (See English 402.)

410 Medieval French Literature (3) (See French 410.)

415 Medieval Architecture (3) (See Architecture 415.)

431 Medieval Art of the West, 800-1400 (3) (See Art History 431.)

441 Northern European Painting, 1350-1600 (3) (See Art History 441.)

451 The Art of Italy, 1250-1450 (3) (See Art History 451.)

475 Ancient and Medieval Political Thought (3) (See Political Science 475.)

510 Special Topics (3) 
Repeatability: May be repeated. Maximum 6 hours.

Microbiology (684)

410 Microbial Physiology (3) Examination of concepts in microbial physiology and the structure and function of microbial cells. 
(DE) Prerequisite(s): 310.

(DE) Prerequisite(s): 310.

429 Medical Microbiology Laboratory (2) Laboratory exercises in medically important areas of microbiology including microorganisms, pathogenesis, and immunology. 
(DE) Prerequisite(s): 319 and 430.

430 Immunology (3) Principles of inflammation and immunity; immunoglobulin structure and theories of formation and diversity. Complement, hypersensitivities, cell cooperation and recognitions in immune mechanisms; and soluble factors. 
(DE) Prerequisite(s): Biology 240.

440 Virology (3) Pathogenesis and molecular biology of viruses. 
(DE) Prerequisite(s): 310.

470 Microbial Ecology (3) Physiological diversity and taxonomy of microorganisms from natural environments. Emphasis on the functional role of microorganisms in natural and simulated ecosystems. 
(DE) Prerequisite(s): 470.

500 Thesis (1-15) 
Grading Restriction: P/NP only. 
Repeatability: May be repeated.

502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed. 
Grading Restriction: Satisfactory/No Credit grading only. 
Repeatability: May be repeated. 
Credit Restriction: May not be used toward degree requirements.

540 Genomics and Bioinformatics (3) Fundamentals of a new scientific discipline based on sequencing genomes (entire DNA) of individual organisms. Goals, principles and types of genome analysis are covered in a traditional lecture course. Computational tools for genome analysis (bioinformatics) are presented in both lecture and hands-on (computer-laboratory) settings. 
Credit Restriction: Students may not receive credit for both 420 and 520.

575 Applied Microbiology and Bioengineering (3) (See Chemical Engineering 575.)

577 Microbial Physiology (3) (See Biomedical Engineering 631.)

591 Foreign Study (1-9) 
Repeatability: May be repeated. Maximum 9 hours.

592 Off-Campus Study (1-9) 
Repeatability: May be repeated. Maximum 9 hours.

593 Independent Study (1-9) 
Repeatability: May be repeated. Maximum 9 hours.

595 General Seminar (1) Lectures and seminars by invited speakers, faculty, and graduate students. 
Grading Restriction: Satisfactory/No Credit grading only. 
Repeatability: May be repeated. Maximum 18 hours.

596 Laboratory Rotation (1) Familiarization with research areas in department through series of rotations in laboratories of individual faculty members. 
Grading Restriction: Satisfactory/No Credit grading only. 
Repeatability: May be repeated. Maximum 3 hours.

600 Doctoral Research and Dissertation (3-15) 
Grading Restriction: P/NP only. 
Repeatability: May be repeated.

601 Journal Club in Microbial Physiology (1) Readings and discussions based on current literature. 
Grading Restriction: Satisfactory/No Credit grading only. 
Repeatability: May be repeated. Maximum 18 hours.

602 Journal Club in Microbial Pathogenesis (1) Readings and discussions based on current literature. 
Grading Restriction: Satisfactory/No Credit grading only. 
Repeatability: May be repeated. Maximum 18 hours.

603 Journal Club in Immunology (1) Readings and discussions based on current literature. 
Grading Restriction: Satisfactory/No Credit grading only. 
Repeatability: May be repeated. Maximum 18 hours.

604 Journal Club in Virology (1) Readings and discussions based on current literature. 
Grading Restriction: Satisfactory/No Credit grading only. 
Repeatability: May be repeated. Maximum 18 hours.
Modern Foreign Languages and Literatures

482 Special Topics in Global Cinema (3) Content varies. Focus from global perspectives on directors, stars, film genres, national and regional cinema movements or other topics. Taught in English. (Same as Cinema Studies 582.)
Repeatability: May be repeated. Maximum 6 hours.

582 Special Topics in Global Cinema (3) Content varies. Focus from global perspectives on particular directors, stars, film genres, national and regional cinema movements, film theory/criticism, or other topics. Taught in English. (Same as Cinema Studies 582.)
Repeatability: May be repeated. Maximum 6 hours.

Music Education (707)

510 Foundations of Music Education (3) Historical, philosophical and aesthetic bases.
Registration Permission: Consent of instructor.

520 Research in Music Education (3) Definition of research problems, data collection and analysis, and research report writing. Application of knowledge of research techniques to analysis of existing research literature in music education.
Registration Permission: Consent of instructor.

550 Curriculum Development and Evaluation in Music Education (3) Principles of curriculum development applied to music education programs. Formulating objectives; construction of evaluation instruments; survey of appropriate literature.
Registration Permission: Consent of instructor.


570 Studies in Multicultural Music Education (3) Study of music literature, art and customs of various cultures appropriate for students in K-8. Strategies and techniques for teaching music at this level.

571 Musical Repertoire Laboratory (2) Examination and production of musicals appropriate for student in grades K-8. Addresses singing, dancing, acting, costumes, set design, traditional and non-traditional instrumental ensembles.
Repeatability: May be repeated. Maximum 12 hours.
Comment(s): Limited to students majoring or concentrating in art, dance or theatre.
Registration Permission: Consent of instructor.

574 Analysis for Teaching for Professional Development (2) Strategies to document and analyze effectiveness of teaching and professional development. Study and application of various approaches.
(De) Corequisite(s): 575.

575 Professional Internship in Teaching (1-8) Teaching and teaching-related experiences in professional settings in public schools.
Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated. Maximum 12 hours.
Comment(s): Admission to teacher education required. Enrollment limited to post-baccalaureate students in professional year program.
Registration Permission: Consent of School of Music.

580 Seminar in Music Education (3) Class investigation and individual reporting of pertinent topics and issues in music education.
Repeatability: May be repeated. Maximum 6 hours.
Registration Permission: Consent of instructor.

590 Special Topics in Music Education (1-3) Repeatability: May be repeated. Maximum 6 hours.
Registration Permission: Consent of instructor.

591 Clinical Studies (4) Group and individual seminar activities during full-time internship. Application and evaluation of professional core competencies. Completion and presentation of portfolio and analysis of teaching project.
(De) Corequisite(s): 575.

593 Special Problems in Music Education (3) Repeatability: May be repeated. Maximum 6 hours.
Registration Permission: Consent of instructor.

Music Ensemble (708)

502 Jazz-Saxophone Ensemble (1) Repeatability: May be repeated. Maximum 4 hours.
Comment(s): Requires audition or consent of instructor.

503 Small Jazz Ensemble (1) Repeatability: May be repeated. Maximum 12 hours.
Comment(s): Requires audition or consent of instructor.

504 Jazz Ensemble (1) Repeatability: May be repeated. Maximum 12 hours.
Comment(s): Requires audition or consent of instructor.

505 Studio Orchestra (1) Repeatability: May be repeated. Maximum 12 hours.
Comment(s): Requires audition or consent of instructor.

506 Trombone Choir (1) Repeatability: May be repeated. Maximum 12 hours.
Comment(s): Requires audition or consent of instructor.

510 Percussion Ensemble (1) Repeatability: May be repeated. Maximum 12 hours.
Comment(s): Requires audition or consent of instructor.

511 Marimba Choir (1) Repeatability: May be repeated. Maximum 12 hours.
Comment(s): Requires audition or consent of instructor.

515 Chamber Music Ensemble (1) Repeatability: May be repeated. Maximum 12 hours.
Comment(s): Requires audition or consent of instructor.

530 Chamber Singers (1) Repeatability: May be repeated. Maximum 12 hours.
Comment(s): Requires audition or consent of instructor.

540 Opera Theatre (1) Repeatability: May be repeated. Maximum 12 hours.
Comment(s): Requires audition or consent of instructor.

550 Concert Band (1) Repeatability: May be repeated. Maximum 12 hours.
Comment(s): Requires audition or consent of instructor.

552 Symphonic Band (1) Repeatability: May be repeated. Maximum 12 hours.
Comment(s): Requires audition or consent of instructor.

553 Wind Ensemble (1) Repeatability: May be repeated. Maximum 12 hours.
Comment(s): Requires audition or consent of instructor.
554 Varsity Band (1)  Repeatability: May be repeated. Maximum 12 hours.  Comment(s): Requires audition or consent of instructor.

559 Marching Band (1)  Repeatability: May be repeated. Maximum 12 hours.  Comment(s): Requires audition or consent of instructor.

570 Symphony Orchestra (1)  Repeatability: May be repeated. Maximum 12 hours.  Comment(s): Requires audition or consent of instructor.

580 Concert Choir (1)  Repeatability: May be repeated. Maximum 12 hours.  Comment(s): Requires audition or consent of instructor.

583 Men's Chorale (1)  Repeatability: May be repeated. Maximum 4 hours.  Comment(s): Requires audition or consent of instructor.

589 Women's Chorale (1)  Repeatability: May be repeated. Maximum 12 hours.  Comment(s): Requires audition or consent of instructor.

590 Advanced Instrumental Conducting (2)  Repeatability: May be repeated. Maximum 12 hours.  Comment(s): Requires audition or consent of instructor.

599 Accompanying (1)  Repeatability: May be repeated. Maximum 12 hours.  Comment(s): Requires audition or consent of instructor.

Music General (698)

500 Thesis (1-15)  Grading Restriction: P/NP only.  Repeatability: May be repeated.

501 Graduate Recital (2)

502 Registration for Use of Facilities (1-15)  Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed.  Grading Restriction: Satisfactory/No Credit grading only.  Repeatability: May be repeated.  Credit Restriction: May not be used toward degree requirements.

510 Music Bibliography (3)  Bibliographic methodology in music.

511 Lecture Recital (2)

520 Musical Styles (3)  Elements of design and their role in definition of musical styles.

521 Special Topics in Performance (1-3)  Repeatability: May be repeated. Maximum 12 hours.  Registration Permission: Consent of school director.

540 Secondary Applied Music (1)  May be taken by music majors desiring applied study on a 2nd or 3rd instrument.  Repeatability: May be repeated. Maximum 12 hours.  Comment(s): Requires audition and payment of applied music fee.

Music Instrumental (710)

490 Instrumental Conducting (3)  Knowledge and skills in instrumental conducting. Various periods and composers and relationship of different styles to the conductor's art. Musical analysis and practice in conducting.  (DE) Prerequisite(s): Music Education 320 or equivalent.

560 Orchestral Repertoire (1)  Intensive weekly master class focused on the performance of standard orchestral repertoire used in most orchestral auditions.  Repeatability: May be repeated. Maximum 6 hours.  Registration Permission: Consent of instructor.

580 Band History and Literature I (3)  Antiquity to 1900.  Registration Permission: Consent of instructor.

581 Band History and Literature II (3)  1900 to present.

583 Recitative for Instrumental Conductors (1)  Problems in conducting recitatives.  Grading Restriction: Satisfactory/No Credit grading only.  Registration Permission: Consent of instructor.

584 Practicum for Instrumental Conductors (1)  Intern experience in field other than area of major interest.  Grading Restriction: Satisfactory/No Credit grading only.

590 Advanced Instrumental Conducting (2)  Physical techniques of conducting, study and analysis of scores, rehearsal techniques. Attention to individual problems. Requires applied music fee.  Repeatability: May be repeated. Maximum 8 hours.  Registration Permission: Consent of instructor.

595 Instrumental Conducting Performance (1)  Preparation and juried performance of band or orchestral work(s).  Registration Permission: Consent of instructor.

Music Jazz (711)

410 Advanced Improvisation (3)  Development of individual skills and solving individual problems in jazz improvisation.  (DE) Prerequisite(s): 210 and 220.

420 Jazz Pedagogy (1)  Methods and materials relating to teaching of jazz, designing and administering jazz programs, and rehearsal techniques for jazz ensembles.  Registration Permission: Consent of instructor.

500 Thesis (1-15)  Grading Restriction: P/NP only.  Repeatability: May be repeated. Maximum 12 hours.

Music Keyboard (712)

410 Organ Practicum (1)  Improvisation, hymn playing, and accompanying on the organ.  Repeatability: May be repeated. Maximum 3 hours.  Comment(s): Requires organ proficiency at the 200 level.

420 Piano Literature I (3)  From 1750 to the middle 19th century.

430 Piano Literature II (3)  Middle 19th century to the present.

460 The Organ and Its Literature I (3)  Development of the organ and organ literature from the Middle Ages to approximately 1750. Problems of style and interpretation. Pedagogical literature and methods.  (DE) Corequisite(s): Musicology 110.  Registration Permission: Consent of instructor.

470 The Organ and Its Literature II (3)  Development of the organ and organ literature from 1750 to the present. Problems of style and interpretation. Pedagogical literature and methods.  (DE) Corequisite(s): Musicology 110.  Registration Permission: Consent of instructor.

480 Teaching Class Piano (3)  Historical survey and evaluation of teaching materials and methodology for college and/or adult beginning piano classes with collateral teaching experience.  Registration Permission: Consent of instructor.

485 Suzuki Piano Method I (2)  Study of the philosophy, procedures, and literature of the Suzuki Piano Methods Books 1 and 2.  Comment(s): 485 and 495 must be taken in sequence.  Registration Permission: Consent of instructor.

490 Internship (2)  Opportunity for pedagogy students to gain experience in teaching beginning students under the supervision of experienced instructors.  Contact Hour Distribution: Includes weekly discussion seminars.

491 Internship (2)  Opportunity for pedagogy students to gain experience in teaching beginning students under the supervision of experienced instructors.  Contact Hour Distribution: Includes weekly discussion seminars.

495 Suzuki Piano Method II (2)  Study of procedures and literature of the Suzuki Piano Method Books 3 and above.  Comment(s): 485 and 495 must be taken in sequence.  Registration Permission: Consent of instructor.

520 Piano Literature Seminar (3)  Topics vary.  Repeatability: May be repeated. Maximum 9 hours.

531 Recital Project (2)  Vocal recital. Preparation and accompaniment of full recital for accompanying concentrations only.  Registration Permission: Consent of instructor.

540 Advanced Piano Pedagogy (2)  Topics vary. Evaluation and study of methods and materials for teaching piano at all levels. Supervised laboratory teaching.  Repeatability: May be repeated. Maximum 8 hours.  Registration Permission: Consent of instructor.

541 Recital Project (2)  Instrumental recital. Preparation and accompaniment of full recital for accompanying concentrations only.  Registration Permission: Consent of instructor.

560 Organ Literature Seminar (3)  Topics vary.  Repeatability: May be repeated. Maximum 6 hours.

Music Performance (713)

403 Flute (1-3)  Repeatability: May be repeated. Maximum 8 hours.  (DE) Prerequisite(s): 304 and Music General 101.  Comment(s): Requires audition, registration for ensemble appropriate to degree program, and C or higher in 304.  Registration Permission: Consent of instructor.
404 Flute (1-3)
Repeatability: May be repeated. Maximum 8 hours.
(De) Prerequisite(s): 403 and Music General 101.
Comment(s): Requires audition, registration for ensemble appropriate to degree program, and C or higher in 403.
Registration Permission: Consent of instructor.

405 Oboe (1-3)
Repeatability: May be repeated. Maximum 8 hours.
(De) Prerequisite(s): 306 and Music General 101.
Comment(s): Requires audition, registration for ensemble appropriate to degree program, and C or higher in 306.
Registration Permission: Consent of instructor.

406 Oboe (1-3)
Repeatability: May be repeated. Maximum 8 hours.
(De) Prerequisite(s): 405 and Music General 101.
Comment(s): Requires audition, registration for ensemble appropriate to degree program, and C or higher in 405.
Registration Permission: Consent of instructor.

410 Bassoon (1-3)
Repeatability: May be repeated. Maximum 8 hours.
(De) Prerequisite(s): 311 and Music General 101.
Comment(s): Requires audition, registration for ensemble appropriate to degree program, and C or higher in 311.
Registration Permission: Consent of instructor.

411 Bassoon (1-3)
Repeatability: May be repeated. Maximum 8 hours.
(De) Prerequisite(s): 410 and Music General 101.
Comment(s): Requires audition, registration for ensemble appropriate to degree program, and C or higher in 410.
Registration Permission: Consent of instructor.

415 Clarinet (1-3)
Repeatability: May be repeated. Maximum 8 hours.
(De) Prerequisite(s): 316 and Music General 101.
Comment(s): Requires audition, registration for ensemble appropriate to degree program, and C or higher in 316.
Registration Permission: Consent of instructor.

416 Clarinet (1-3)
Repeatability: May be repeated. Maximum 8 hours.
(De) Prerequisite(s): 420 and Music General 101.
Comment(s): Requires audition, registration for ensemble appropriate to degree program, and C or higher in 420.
Registration Permission: Consent of instructor.

420 Saxophone (1-3)
Repeatability: May be repeated. Maximum 8 hours.
(De) Prerequisite(s): 321 and Music General 101.
Comment(s): Requires audition, registration for ensemble appropriate to degree program, and C or higher in 321.
Registration Permission: Consent of instructor.

421 Saxophone (1-3)
Repeatability: May be repeated. Maximum 8 hours.
(De) Prerequisite(s): 420 and Music General 101.
Comment(s): Requires audition, registration for ensemble appropriate to degree program, and C or higher in 420.
Registration Permission: Consent of instructor.

425 Horn (1-3)
Repeatability: May be repeated. Maximum 8 hours.
(De) Prerequisite(s): 326 and Music General 101.
Comment(s): Requires audition, registration for ensemble appropriate to degree program, and C or higher in 326.
Registration Permission: Consent of instructor.

426 Horn (1-3)
Repeatability: May be repeated. Maximum 8 hours.
(De) Prerequisite(s): 425 and Music General 101.
Comment(s): Requires audition, registration for ensemble appropriate to degree program, and C or higher in 425.
Registration Permission: Consent of instructor.

430 Trumpet (1-3)
Repeatability: May be repeated. Maximum 8 hours.
(De) Prerequisite(s): 331 and Music General 101.
Comment(s): Requires audition, registration for ensemble appropriate to degree program, and C or higher in 331.
Registration Permission: Consent of instructor.

431 Trumpet (1-3)
Repeatability: May be repeated. Maximum 8 hours.
(De) Prerequisite(s): 430 and Music General 101.
Comment(s): Requires audition, registration for ensemble appropriate to degree program, and C or higher in 430.
Registration Permission: Consent of instructor.

435 Trombone (1-3)
Repeatability: May be repeated. Maximum 8 hours.
(De) Prerequisite(s): 336 and Music General 101.
Comment(s): Requires audition, registration for ensemble appropriate to degree program, and C or higher in 336.
Registration Permission: Consent of instructor.

436 Trombone (1-3)
Repeatability: May be repeated. Maximum 8 hours.
(De) Prerequisite(s): 435 and Music General 101.
Comment(s): Requires audition, registration for ensemble appropriate to degree program, and C or higher in 435.
Registration Permission: Consent of instructor.

440 Baritone (1-3)
Repeatability: May be repeated. Maximum 8 hours.
(De) Prerequisite(s): 341 and Music General 101.
Comment(s): Requires audition, registration for ensemble appropriate to degree program, and C or higher in 341.
Registration Permission: Consent of instructor.

441 Baritone (1-3)
Repeatability: May be repeated. Maximum 8 hours.
(De) Prerequisite(s): 440 and Music General 101.
Comment(s): Requires audition, registration for ensemble appropriate to degree program, and C or higher in 440.
Registration Permission: Consent of instructor.

445 Tuba (1-3)
Repeatability: May be repeated. Maximum 8 hours.
(De) Prerequisite(s): 346 and Music General 101.
Comment(s): Requires audition, registration for ensemble appropriate to degree program, and C or higher in 346.
Registration Permission: Consent of instructor.

446 Tuba (1-3)
Repeatability: May be repeated. Maximum 8 hours.
(De) Prerequisite(s): 445 and Music General 101.
Comment(s): Requires audition, registration for ensemble appropriate to degree program, and C or higher in 445.
Registration Permission: Consent of instructor.

450 Percussion (1-3)
Repeatability: May be repeated. Maximum 8 hours.
(De) Prerequisite(s): 351 and Music General 101.
Comment(s): Requires audition, registration for ensemble appropriate to degree program, and C or higher in 351.
Registration Permission: Consent of instructor.

451 Percussion (1-3)
Repeatability: May be repeated. Maximum 8 hours.
(De) Prerequisite(s): 450 and Music General 101.
Comment(s): Requires audition, registration for ensemble appropriate to degree program, and C or higher in 450.
Registration Permission: Consent of instructor.

455 Voice (1-3)
Repeatability: May be repeated. Maximum 8 hours.
(De) Prerequisite(s): 356 and Music General 101.
Comment(s): Requires audition, registration for ensemble appropriate to degree program, and C or higher in 356.
Registration Permission: Consent of instructor.

456 Voice (1-3)
Repeatability: May be repeated. Maximum 8 hours.
(De) Prerequisite(s): 455 and Music General 101.
Comment(s): Requires audition, registration for ensemble appropriate to degree program, and C or higher in 455.
Registration Permission: Consent of instructor.

460 Violin (1-3)
Repeatability: May be repeated. Maximum 8 hours.
(De) Prerequisite(s): 361 and Music General 101.
Comment(s): Requires audition, registration for ensemble appropriate to degree program, and C or higher in 361.
Registration Permission: Consent of instructor.

461 Violin (1-3)
Repeatability: May be repeated. Maximum 8 hours.
(De) Prerequisite(s): 460 and Music General 101.
Comment(s): Requires audition, registration for ensemble appropriate to degree program, and C or higher in 460.
Registration Permission: Consent of instructor.

465 Viola (1-3)
Repeatability: May be repeated. Maximum 8 hours.
(De) Prerequisite(s): 366 and Music General 101.
Comment(s): Requires audition, registration for ensemble appropriate to degree program, and C or higher in 366.
Registration Permission: Consent of instructor.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Dependence</th>
<th>Prerequisites</th>
<th>Max Hours</th>
<th>Repeatability</th>
<th>Registration Permission</th>
<th>Comment(s)</th>
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<tr>
<td>468 Improvisation (1-2)</td>
<td>Improvisation</td>
<td></td>
<td>Music General 101</td>
<td>4</td>
<td>May be repeated. Maximum 4 times.</td>
<td>Consent of instructor.</td>
<td>Requires audition, credit restriction(s): May not be used to satisfy applied music requirement.</td>
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<td>503 Flute (1-4)</td>
<td>Flute</td>
<td></td>
<td>Music General 101</td>
<td>8</td>
<td>May be repeated. Maximum 8 hours.</td>
<td>Consent of instructor.</td>
<td>Requires audition.</td>
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<tr>
<td>505 Oboe (1-4)</td>
<td>Oboe</td>
<td></td>
<td>Music General 101</td>
<td>8</td>
<td>May be repeated. Maximum 8 hours.</td>
<td>Consent of instructor.</td>
<td>Requires audition.</td>
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<tr>
<td>510 Bassoon (1-4)</td>
<td>Bassoon</td>
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<td>May be repeated. Maximum 8 hours.</td>
<td>Consent of instructor.</td>
<td>Requires audition.</td>
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<tr>
<td>515 Clarinet (1-4)</td>
<td>Clarinet</td>
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<td>Music General 101</td>
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<td>May be repeated. Maximum 8 hours.</td>
<td>Consent of instructor.</td>
<td>Requires audition.</td>
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<tr>
<td>520 Saxophone (1-4)</td>
<td>Saxophone</td>
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<td>Music General 101</td>
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<td>May be repeated. Maximum 8 hours.</td>
<td>Consent of instructor.</td>
<td>Requires audition.</td>
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<tr>
<td>525 Horn (1-4)</td>
<td>Horn</td>
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<td>Consent of instructor.</td>
<td>Requires audition.</td>
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<tr>
<td>530 Trumpet (1-4)</td>
<td>Trumpet</td>
<td></td>
<td>Music General 101</td>
<td>8</td>
<td>May be repeated. Maximum 8 hours.</td>
<td>Consent of instructor.</td>
<td>Requires audition.</td>
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<tr>
<td>535 Trombone (1-4)</td>
<td>Trombone</td>
<td></td>
<td>Music General 101</td>
<td>8</td>
<td>May be repeated. Maximum 8 hours.</td>
<td>Consent of instructor.</td>
<td>Requires audition.</td>
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<tr>
<td>540 Baritone (1-4)</td>
<td>Baritone</td>
<td></td>
<td>Music General 101</td>
<td>8</td>
<td>May be repeated. Maximum 8 hours.</td>
<td>Consent of instructor.</td>
<td>Requires audition.</td>
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<tr>
<td>545 Tuba (1-4)</td>
<td>Tuba</td>
<td></td>
<td>Music General 101</td>
<td>8</td>
<td>May be repeated. Maximum 8 hours.</td>
<td>Consent of instructor.</td>
<td>Requires audition.</td>
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</tbody>
</table>
550 Percussion (1-4)
Repeatability: May be repeated. Maximum 8 hours.
Comment(s): Requires audition.
Registration Permission: Consent of instructor.

551 Accompanying and Coaching (1-4)
Repeatability: May be repeated. Maximum 8 hours.
Comment(s): Requires audition.
Registration Permission: Consent of instructor.

555 Voice (1-4)
Repeatability: May be repeated. Maximum 8 hours.
Comment(s): Requires audition.
Registration Permission: Consent of instructor.

560 Violin (1-4)
Repeatability: May be repeated. Maximum 8 hours.
Comment(s): Requires audition.
Registration Permission: Consent of instructor.

565 Viola (1-4)
Repeatability: May be repeated. Maximum 8 hours.
Comment(s): Requires audition.
Registration Permission: Consent of instructor.

570 Cello (1-4)
Repeatability: May be repeated. Maximum 8 hours.
Comment(s): Requires audition.
Registration Permission: Consent of instructor.

572 Electric Bass (1-4)
Repeatability: May be repeated. Maximum 8 hours.
Comment(s): Requires audition.
Registration Permission: Consent of instructor.

575 String Bass (1-4)
Repeatability: May be repeated. Maximum 8 hours.
Comment(s): Requires audition.
Registration Permission: Consent of instructor.

580 Piano (1-4)
Repeatability: May be repeated. Maximum 8 hours.
Comment(s): Requires audition.
Registration Permission: Consent of instructor.

583 Guitar (1-4)
Repeatability: May be repeated. Maximum 8 hours.
Comment(s): Requires audition.
Registration Permission: Consent of instructor.

585 Harpsichord (1-4)
Repeatability: May be repeated. Maximum 8 hours.
Comment(s): Requires audition.
Registration Permission: Consent of instructor.

590 Organ (1-4)
Repeatability: May be repeated. Maximum 8 hours.
Comment(s): Requires audition.
Registration Permission: Consent of instructor.

594 Composition (1-3)
Repeatability: May be repeated. Maximum 8 hours.
Comment(s): Requires audition.
Registration Permission: Consent of instructor.

595 Composition with Electronic Media (1-3)
Repeatability: May be repeated. Maximum 8 hours.
Comment(s): Requires audition.
Registration Permission: Consent of instructor.

599 Improvisation (1-4)
Repeatability: May be repeated. Maximum 8 hours.
Comment(s): Requires audition.
Registration Permission: Consent of instructor.

Music Technology (717)

540 Computer Music Transcription (3) Projects in notation, playback, and publication of music incorporating elements of word processing, graphic design, sequencing, and page layout. Study of MIDI protocol as applied to computer music workstation design. Credit Restriction: May not be applied toward the concentration in music theory with technology emphasis. Registration Permission: Consent of instructor.

545 Computer Projects (3) High-level programming languages used to design and implement computer-managed instruction; Internet development tools; writing of documentation for computer projects. (DE) Prerequisite(s): 540 or equivalent.

546 Technology in Music Research (3) Use of technology for research projects in music analysis or pedagogy: development and execution of research project. (DE) Prerequisite(s): 550.

Music Theory (714)

430 Counterpoint I (3) Study of species counterpoint in modal and tonal styles with emphasis on works of Palestrina and J.S. Bach. (DE) Prerequisite(s): 210 with a grade of C or higher.

440 Counterpoint II (3) Writing of contrapuntal forms of the 18th century and fugue analysis of works from the 18th through the 20th centuries. (DE) Prerequisite(s): 430 with grade C or higher.

450 Choral Arranging (2) Analysis of scores and writing of arrangements for choruses. (DE) Prerequisite(s): 210 and 240 with grade C or higher or consent of instructor.

520 Analytical Techniques (3) Analytical techniques, contemporary approaches. Tonal and neoclassical music. Registration Permission: Consent of instructor.

530 Music Theory Pedagogy (3) Techniques, methods, and materials involved in college-level theory programs. Use of technology and review of existing software. Registration Permission: Consent of instructor.

593 Independent Study (1-15)
Repeatability: May be repeated. Maximum 15 hours.
Registration Permission: Consent of director.

Music Voice (715)

410 Song Literature I (2) German songs. Credit Restriction: Graduate credit not available for students in vocal performance.

420 Song Literature II (2) French, Italian, Russian, Scandinavian, Czechoslovakian, British, and American art songs. Credit Restriction: Graduate credit not available for students in vocal performance.


510 Vocal Literature Seminar (3) Topics vary. Repeatability: May be repeated. Maximum 8 hours.

520 Performance Techniques for Singers (1) Improvisation, movement, and basic techniques for dramatic vocal performance. Repeatability: May be repeated. Maximum 2 hours. Comment(s): Restricted to students in vocal concentration.

530 Opera Performance (1) For satisfaction of performance requirement. May be fulfilled by undertaking a major operatic role or by demonstrating a cumulative performance record which may include a project approved and supervised by the voice faculty. Repeatability: May be repeated. Maximum 4 hours.
Registration Permission: Consent of instructor.

540 Opera Production (1-3) Repeatability: May be repeated. Maximum 6 hours.
Registration Permission: Consent of instructor.

550 Advanced Vocal Pedagogy I (2) Study of vocal production, examination of different methods.

560 Advanced Vocal Pedagogy II (2) Study of teaching materials, observation of studio teaching, analysis of vocal problems in selected students, and supervised teaching.

565 Special Projects in Vocal Pedagogy (3) Course is available only for graduate students in vocal pedagogy. Registration Permission: Consent of instructor.

579 Vocal Chamber Music Performance (1) For satisfaction of performance requirement. May be used to substitute for Music Voice 520 when approved and supervised by the voice faculty.
Registration Permission: Consent of instructor.
Musicology (706)

410 Studies in Genre (3) Historical, cultural, analytical, and musicological issues related to a single musical genre, style, or repertory. Topics vary.

420 History of Opera (3) The development of opera from its inception to the present. Readings and discussion focus on an understanding of the historical trajectory of opera, both as a musico-theatrical work and as a cultural practice.

430 History of the Symphony (3) Overview of orchestral repertories from 1600 to the present.

450 Composer Seminar (3) Biographical, historical, and cultural study of a composer, or a group of related composers. Topics vary.

460 Music Aesthetics (3) Nature of music and musical experience, sense perception and emotions, music, and the role of artist in society. Aesthetic viewpoint of individuals and historical eras through selected writings.

480 Music in Christian Worship (3) Hymnody, liturgies, and liturgical music.

540 Medieval and Renaissance Music (3) Musical phenomena from c. 900 to c. 1600, selected from chant, troubadour song, early polyphony, madrigal, mass, and motet. Genres considered against historical, cultural, analytical, and literary frameworks, including words-music relationships, the role of music in devotion, sacred and secular interchanges, oral and written transmissions.

550 Music in the Baroque Period (3) Aspects of western European art music, c. 1600 to c. 1750, from historical and cultural perspectives. Genre, national identities, the roles of voices and instruments, the emergence of tonality, issues of gender, and music’s role in social, religious, and performance practices.

560 Music in the Classic Period (3) The development of classical style from preclassic to the music of Haydn, Mozart and early Beethoven. Focus on aesthetic, cultural and social frameworks pertaining to various genres and composers. Selected vocal and orchestral works examined with respect to themes of appropriation, politics, narratives, and biographical references.

570 Music in the 19th Century (3) Music of the nineteenth century from Beethoven to the post-Romantics with a focus on aesthetic, cultural and social contexts. Opera, symphony, art song, piano works, and others examined against the frameworks of cultural theory, gender studies, orientalism, politics and philosophy.

580 Music in the 20th Century (3) Composers, repertories, and issues in twentieth-century art music of western Europe and the United States. New roles for composers and performers, confluences of ‘high’ and ‘low’ art forms, influences of technology, and music’s place in the formation of national, political, and gendered identities.

585 Topics in Music of the Americas (3) Historical or cultural study of a topic concerned with music and musical practice in the Americas. Topics vary.

590 Introduction to Ethnomusicology (3) Ethnomusicology as scholarly discipline. History, theories, and methodologies as applied to study of music in culture.

591 Seminar in Ethnomusicology (3) Exploration of a methodological, theoretical, or ethnographic topic in ethnomusicology. Topics vary.

592 Independent Study (1-15) Repeatability: May be repeated. Maximum 18 hours.

593 Seminar in Historical Musicology (3) Topics vary: specific musical genre, composer, or phenomenon.

Nuclear Engineering (716)

403 Nuclear and Radiological Engineering Laboratory II (3) Cross section measurements, diffusion properties of neutrons, shielding, dynamics and controls, alpha and beta spectroscopy, radiation fields and dosimetry.

404 Nuclear Fuel Cycle (3) Topics relative to nuclear fuel cycle including, mining, milling, fabrication, in-core management, reprocessing, waste disposal. Regulatory and radiation health issues and requirements.

406 Radiation Shielding (3) Types of radiation sources, fundamentals of gamma ray and neutron attenuation, biological effects, approximate methods of shield design, discrete ordinates, and Monte Carlo.


431 Radiation Protection (3) External and internal dosimetry, biological effects of radiation, radiation detection, radiation risk assessment.

470 Nuclear Reactor Theory I (3) Fundamentals of reactor physics relative to cross sections. Kinematics of elastic scattering. Reactor kinetics, reactor systems and nuclear data. Analytical and numerical methods applicable to general criticality problems, eigenvalue searches, perturbation theory, and multigroup diffusion equations.
483 Introduction to Reliability Engineering (3) Probabilistic failure models, parameter estimation (maximum likelihood, Bayes techniques). Model identification and comparison, accelerated life tests, failure prediction, system reliability, preventive maintenance and warranties. (Same as Chemical Engineering 483, Industrial Engineering 483; Mechanical Engineering 483.)

484 Introduction to Maintainability Engineering (3) Principles of maintenance and reliability engineering, and maintenance management. Topics include information extraction from machinery measurements, rotating machinery diagnostics, nondestructive testing, life prediction, failure models, lubrication oil analysis, establishing predictive maintenance program, and computerized maintenance management systems. (Same as Chemical Engineering 484; Industrial Engineering 484; Materials Science and Engineering 484; Mechanical Engineering 484.)

Registration Permission: Consent of instructor.

494 Special Topics in Nuclear Engineering (3) Problems related to recent developments and practice.

Repeatability: May be repeated. Maximum 6 hours.

Registration Permission: Consent of instructor.

500 Thesis (1-15)

Grading Restriction: P/Non-P only.

Repeatability: May be repeated.

502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed.

Grading Restriction: Satisfactory/No Credit grading only.

Repeatability: May be repeated.

Credit Restriction: May not be used toward degree requirements.

509 Multidisciplinary Project (1) (See Industrial Engineering 509.)

511 Transport Processes in Nuclear Engineering (3) Rheology of Newtonian and non-Newtonian fluids; integral and system conservation equations for single and multi-component fluids; in-depth development of differential conservation equations for mass, energy, and momentum; exact and approximate solutions of equations of motion; boundary layer analysis; numerical analysis of fluid flow and heat transfer.

512 Transport Processes in Nuclear Engineering (3) Rheology of Newtonian and non-Newtonian fluids; integral and system conservation equations for single and multi-component fluids; in-depth development of differential conservation equations for mass, energy, and momentum; exact and approximate solutions of equations of motion; boundary layer analysis; numerical analysis of fluid flow and heat transfer.

521 Nuclear Systems Dynamics and Control (3) Introduction to state variable methods for system dynamics and control analysis and application of these methods to nuclear plant dynamics, simulation and control problems.

522 Experimental Methods in Reactor Dynamics (3) Introduction to time domain and frequency domain techniques. Measurement, analysis, and interpretation of process signals for reactor surveillance and diagnostics. Introduction to time-series modeling.

(De) Prerequisite(s): 521.


543 Selected Topics in Nuclear Criticality Safety (3) Criticality safety computational and experimental methods for enrichment, fabrication, storage, reprocessing, and transport applications; overview of safety practices and regulatory requirements.

(De) Prerequisite(s): 421 or consent of instructor.

550 Radiation Measurements Laboratory (3) Physics and electronics associated with radiation detection and measurement, methods of data analysis. Applicability of particular detector measurements and fundamentals of radiation detection instrumentation operation.

(De) Prerequisite(s): 551.


(De) Corequisite(s): 301.

552 Radiological Assessment and Dosimetry (3) Transport of radionuclides in environment, food chain pathways, internal dosimetry and personnel dosimetry.

(De) Prerequisite(s): 551 or consent of instructor.

567 Medical Physics I (3) Ionizing radiation use in radiation therapy to cause controlled biological effects in cancer patients. Physics of interaction of various radiation modalities with body equivalent materials and physical aspects of clinical applications.

Contact Hour Distribution: Lecture and lab.

Registration Permission: Consent of instructor.

568 Medical Physics II (3) Physics of ionizing radiation therapy with emphasis on quality assurance, treatment planning, radiation protection, and special treatment procedures.

Contact Hour Distribution: Lecture and lab.

(De) Prerequisite(s): 567.


(De) Prerequisite(s): 470 or consent of instructor.

572 Nuclear System Design (3) Design and analysis of a nuclear system, interface with non-nuclear aspects of system design: system reliability and economics; class project.

Registration Permission: Consent of instructor.

577 Neural Networks in Engineering (3) Neural network technology for intelligent systems; radial basis neural computing, structure of neural computing systems, and programming. (Same as Biomedical Engineering 577; Engineering Science 577; Mechanical Engineering 577.)

Registration Permission: Consent of instructor.

578 Fuzzy Systems in Engineering (3) Fuzzy numbers, fuzzy environment, uncertainty and randomness, approximate reasoning, fuzzy models and structures, decision process in fuzzy environment, fuzzy computing, fuzzy logic controllers, fuzzy expert systems and other engineering applications. (Same as Engineering Science 578.)

579 Advanced Monitoring and Diagnostic Techniques (3) Fundamentals of machine monitoring and diagnosis and application of advanced statistical and artificial intelligence based techniques such as ridge regression, principal component analysis (PCA), linear and non-linear partial least squares (PLS), neural networks, and fuzzy logic.

(De) Prerequisite(s): Statistics 571.

Registration Permission: Consent of instructor.

581 Reactor Shielding (3) Application of analytic/deterministic solutions of Boltzmann transport equation to shield design problems. Spherical harmonics, moments method, discrete ordinates, adjoint calculations, coupled analysis, and fast reactor shield design.

(De) Prerequisite(s): 406 or equivalent.

582 Monte Carlo Analysis (3) General overview of the Monte Carlo method for solving problems in physics and engineering. Random sampling, evaluation of integrals, analog particle transport, techniques of variance reduction, forward and adjoint modes of analysis, importance function biasing, splitting/weight window survival biasing and contribution theory. Particular emphasis on solving neutral particle radiation transport problems using the MCNP code system.

Registration Permission: Consent of instructor.

585 Process System Reliability and Safety (3) Qualitative and quantitative techniques for assessing and improving process systems reliability and safety. Fault tree analysis and associated dependent failure analysis. (Same as Chemical Engineering 585.)

Registration Permission: Consent of instructor.

594 Culminating Integrated Project Report (3) (See Mechanical Engineering 594.)

597 Special Topics in Nuclear Engineering (3) Lectures and recitation on current advances in nuclear engineering.

Registration Permission: Consent of instructor.

598 Nuclear Engineering Practice (3-9) Experience in solving and reporting on engineering problems.

Grading Restriction: Satisfactory/No Credit grading only.

Repeatability: May be repeated. Maximum 15 hours.

Comment(s): Enrollment limited to alternative plan students.

Registration Permission: Consent of department.

600 Doctoral Research and Dissertation (3-15)

Grading Restriction: P/Non-P only.

Repeatability: May be repeated.

611 Selected Topics in Reactor Theory (3) Transport theory, control rod theory, stochastic methods. Selected topics from literature.

(De) Prerequisite(s): 572.

612 Selected Topics in Reactor Theory (3) Transport theory, control rod theory, stochastic methods. Selected topics from literature.

(De) Prerequisite(s): 572.
### Nursing (720)

**400 Aging and Society (3)** An examination of the health and social effects of longevity and the aging process including societal and personal attitudes about old age. Resources, trends, issues, and potentials of aging are explored. Volunteer community service, a service learning component, is required.

**402 Gerontology Practicum (3)** Off-campus supervised experience in gerontology. Offered as part of the gerontology minor.

**409 Genetic Disorders, Vulnerable Families and Health Advocacy (3)** Examination of health and social implications of Human Genome Project with emphasis on genetic disorders that result in chronic illness or disability. Strategies for building collaborative partnerships to effect health advocacy for vulnerable populations.

**500 Thesis (1-15)**
- Grading Restriction: P/NP only.
- Repeatability: May be repeated.
- Registration Restriction(s): Master of Science in Nursing – nursing major.

**501 Nursing Research: Methods, Design, and Analysis (3)** Basic principles of research process in application to clinical questions; critical evaluation of nursing and health-related research.

**502 Registration for Use of Facilities (1-15)** Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed.

**503 Advanced Health/Physical Assessment (3)** Development of advanced clinical reasoning and assessment skills to determine client health status and needs. Application of physiological, pathophysiological, and psychosocial concepts with implications for advanced practice nursing.

**504 Advanced Health/Physical Assessment (3)** Contact Hour Distribution: 2.5 didactic and .5 lab.

**505 Advanced Clinical Pharmacology (3)** Pharmacological agents utilized to treat common, recurrent health problems; indications, contraindications, side and interactive effects of commonly prescribed drugs.


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### Other Courses

**507 Concepts for Advanced Practice Nursing: Health Promotion and Health Policy (4)** Exploration of advanced nursing practitioners and their role in the dynamic health care system. Emphasis on health policy, health promotion and the organizational, social, ethical, political, economic, and technological factors that impact advanced practice nursing and the delivery/promotion of health care.

**510 Theoretical Foundations of Nursing (3)** Historical evolution of nursing science; nursing’s metaparadigm and selected philosophies, conceptual models and theories as structures which guide critical thinking in analysis, reasoning, and decision making for advanced practice nursing.

**511 Statistical Applications to Nursing Research (3)** Descriptive and inferential statistics: statistical concepts and applications to clinical settings and their applications to advanced practice nursing.

**512 Issues in Advanced Practice Nursing (1)** Seminar provides a forum for collaborative deliberation on issues impacting the practice of advanced practice nursing and helps advanced practice nursing student transition to their independent practice roles.

**513 Advanced Practice Role Seminar (1)** Seminar lays the foundation for the socialization of the advanced practice nurse in today’s dynamic and challenging health care delivery environment.

**515 Advanced Pathophysiology for Nursing Practice (3)** Advanced pathophysiologic and pathophysiologic concepts, principles, and theories applied to deviations of human systems.

**516 Advanced Pathophysiology: Neurological/Cardiovascular with Anesthesia Implications (2)** Review of anatomy and physiology and integration of pathophysiology involved in patients requiring anesthetic care for cardiac surgical procedures (both children and adults) with and without cardiopulmonary bypass, intercranial surgical procedures for vascular and masses occupying the neuroaxis, patients requiring somatosensory evoked potential monitoring, and patients requiring anesthesia for non-cardiac and non-neurological procedures who present with either neurologic and/or cardiovascular comorbidity.

**517 Advanced Pathophysiology: Respiratory/Renal with Anesthesia Implications (2)** Review of anatomy and physiology and integration of pathophysiology involved in administration of anesthesia for patients who present with renal or respiratory pathology. Pathological implications of acute and chronic renal failure, renal transplantation, pulmonary disease states: obstructive and restrictive diseases, one lung ventilation, and acute pulmonary disease states and their management.

**518 Advanced Pathophysiology: Obstetrics/Regional Anesthesia (2)** Review of anatomy and physiology and integration of pathophysiology involved in administration of regional anesthesia for patients who present with obstetric pathology. Regional anesthetic considerations for obstetric patient.

**519 Psychopharmacology in Advanced Practice (3)** Examination of the neurobiological basis of psychiatric illness and the use of psychopharmacological agents to modify symptoms and outcomes. Examination of the role of psychoactive medications in relation to the use of other psychotherapeutic interventions.

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**571 Advanced Topics in Radiation Protection (3)**

**611 Selected Topics in Radiation Protection (3)**

**621 Selected Topics in Radiation Protection (3)**

**625 Selected Topics in Radiation Protection (3)**

**626 Selected Topics in Radiation Protection (3)**

**671 Advanced Topics in Applied Artificial Intelligence (3)** Recent advances in engineering applications of artificial intelligence. *(Same as Engineering Science 671; Mechanical Engineering 671.)*

**672 Applications of Artificial Intelligence (3)**

**675 Advanced Topics in Applied Artificial Intelligence (3)** Recent advances in engineering applications of artificial intelligence. *(Same as Engineering Science 671; Mechanical Engineering 671.)*
522 Integrated Health Science for Anesthesia (3) Fundamental principles of chemistry and physics as related to practice of nurse anesthesia. An introduction to the scientific principles upon which anesthesia management is based. The focus of this course (part one of a two-part series) is on the sound basic principles of safe anesthesia delivery for the beginning practitioner. 
Registration Restriction(s): Master of Science in Nursing – nursing major/nurse anesthesia concentration.

523 Advanced Principles of Nurse Anesthesia Practice (2) Advanced concepts/principles of anesthetic management and legal implications of nurse anesthesia practice. 
Registration Restriction(s): Master of Science in Nursing – nursing major/nurse anesthesia concentration.

524 Basic Principles of Anesthesia I (3) An introduction to the scientific principles upon which anesthesia management is based. The focus of this course (part two of a two-part series) is on the sound basic principles of safe anesthesia management for the beginning practitioner. 
Registration Restriction(s): Master of Science in Nursing – nursing major/nurse anesthesia concentration.

525 Basic Principles of Anesthesia II (3) A continuation of 524 which builds upon the previous course to provide advanced elementary scientific principles upon which nurse anesthetists implement plans of care which have been developed. The focus of this course (part two of a two-part series) is on the sound basic principles of safe anesthesia management for the beginning practitioner. 
Registration Restriction(s): Master of Science in Nursing – nursing major/nurse anesthesia concentration.

526 Professional Issues in Nurse Anesthesia (2) Exploration of historical and current issues surrounding nurse anesthesia education, practice, and the profession. 
Registration Restriction(s): Master of Science in Nursing – nursing major/nurse anesthesia concentration.

527 Nursing of Women and Children: Clinical Experience in Children’s Health (1-5) Clinical experience in the role of pediatric nurse practitioner or clinical nurse specialist in variety of health care settings serving children. 
Grading Restriction: Satisfactory/No Credit grading only. 
Repeatability: May be repeated. Maximum 15 hours. 
Registration Restriction(s): Master of Science in Nursing – nursing major.

528 Well Child Care: Assessment of Growth, Development, and Behavior (2) Comprehensive and preventative care for the well child. Appropriate screening tests and related development theories. Focus is on the well child ages 0 to 21 years. 
Registration Restriction(s): Master of Science in Nursing – nursing major.

529 Clinical Practice: Adult and Older Adult (1-5) Clinical experience in the role of the adult or gerontological nurse practitioner, or adult or gerontological clinical nurse specialist in a variety of health care settings serving the adult and older adult populations. 
Contact Hour Distribution: All practicum. 
Repeatability: May be repeated. Maximum 18 hours. 
Registration Restriction(s): Master of Science in Nursing – nursing major.

530 Adult Health Nursing I (2) Advanced nursing practice for health promotion, health assessment, and maintenance of adult clients. Application of theory and research to advanced practice nursing in a variety of settings. 
Registration Restriction(s): Master of Science in Nursing – nursing major.

531 Adult Health Nursing II (2) Continuation of 530. Emphasis on health restoration and management of advanced practice nursing care to adult clients with complex health problems and their families. Application of theory and research to advanced practice nursing in a variety of settings. 
Registration Restriction(s): Master of Science in Nursing – nursing major.

Contact Hour Distribution: 2 didactic and 3 practicum/field supervision. 
Reg. Restriction(s): Master of Science in Nursing – nursing major.

533 Homeland Security I (5) Advanced planning and leadership in response to human-made and natural disasters, as well as mass casualties related to terrorism or breach of homeland security. 
Contact Hour Distribution: 2 didactic and 3 practicum/field supervision. 
Reg. Restriction(s): Master of Science in Nursing – nursing major.

534 Homeland Security II (5) Continuation of Homeland Security I, providing emphasis on incident management, including ethical issues, and the impact of culture and psychology on the human response to terrorism, disaster, mass casualty events, and large population emergencies. 
Contact Hour Distribution: 2 didactic and 3 practicum/field supervision. 
Reg. Restriction(s): Master of Science in Nursing – nursing major.

535 Homeland Security III (7) Application of advanced practice knowledge and skills to assess preparedness for mass casualty and homeland security disasters, toxic exposures or terrorist activity; to mobility available resources; and effectively use communication to integrate local response into broader area, national, and international response. 
Contact Hour Distribution: 2 didactic and 5 practicum/field supervision. 
Reg. Restriction(s): Master of Science in Nursing – nursing major.

536 Homeland Security IV (8) Advanced care concepts provided to those affected by specific types of disasters, toxic exposures, terrorist events, or large population emergencies. 
Contact Hour Distribution: 2 didactic and 6 practicum/field supervision. 
Reg. Restriction(s): Master of Science in Nursing – nursing major.

537 Global Issues in Health Care Delivery During Disaster (3) Examination of topics relevant to health care delivery and international humanitarian assistance in disaster, mass casualty events, and large population emergencies. Topics include ethics; international human rights; interface of culture, politics, and religion; psychological impact on survivors, aid workers, and health professionals; vulnerable populations. 
Reg. Restriction(s): Master of Science in Nursing – nursing major.

538 Gerontological Nursing I (2) Advanced nursing practice for health promotion, health assessment, and maintenance of older adults. Application of theory and research to advanced practice nursing in a variety of settings. 
Reg. Restriction(s): Master of Science in Nursing – nursing major.

539 Gerontological Nursing II (2) Continuation of 538. Emphasis on health restoration and management of advanced practice nursing care for older adult clients with complex health problems and their families. Application of theory and research to advanced practice nursing in a variety of settings. 
Reg. Restriction(s): Master of Science in Nursing – nursing major.

544 Clinical Nurse Anesthesia Practicum/Seminar I (2-11) Integration and application of theoretical foundations and development of clinical skills in nurse anesthesia practice under supervision of Certified Registered Nurse Anesthetist (CRNA) and/or anesthesiologist. 
Repeatability: May be repeated. Maximum 11 hours. 
Comment(s): Admission to nurse anesthesia concentration required. The nurse anesthesia practicums/seminars must be taken in sequence.

545 Clinical Nurse Anesthesia Practicum/Seminar II (2-11) Integration and application of theoretical foundations and development of clinical skills in nurse anesthesia practice under supervision of Certified Registered Nurse Anesthetist (CRNA) and/or anesthesiologist. 
Repeatability: May be repeated. Maximum 11 hours. 
Reg. Restriction(s): Master of Science in Nursing – nursing major.

546 Clinical Nurse Anesthesia Practicum/Seminar III (2-11) Integration and application of theoretical foundations and development of clinical skills in nurse anesthesia practice under supervision of Certified Registered Nurse Anesthetist (CRNA) and/or anesthesiologist. 
Repeatability: May be repeated. Maximum 11 hours. 
Reg. Restriction(s): Master of Science in Nursing – nursing major.

547 Clinical Nurse Anesthesia Practicum/Seminar IV (2-11) Integration and application of theoretical foundations and development of clinical skills in nurse anesthesia practice under supervision of Certified Registered Nurse Anesthetist (CRNA) and/or anesthesiologist. 
Repeatability: May be repeated. Maximum 11 hours. 
Reg. Restriction(s): Master of Science in Nursing – nursing major.
548 Clinical Nurse Anesthesia Practicum/Seminar V (2-11) Integration and application of theoretical foundations and development of clinical skills in nurse anesthesia practice under supervision of Certified Registered Nurse Anesthetist (CRNA) and/or anesthesiologist.

Repeatability: May be repeated. Maximum 11 hours.

(RE) Prerequisite(s): 547.

Registration Restriction(s): Master of Science in Nursing – nursing major/nurse anesthesia concentration.

549 Clinical Nurse Anesthesia Practicum/Seminar VI (2-11) Integration and application of theoretical foundations and development of clinical skills in nurse anesthesia practice under supervision of Certified Registered Nurse Anesthetist (CRNA) and/or anesthesiologist.

Repeatability: May be repeated. Maximum 11 hours.

(RE) Prerequisite(s): 548.

Registration Restriction(s): Master of Science in Nursing – nursing major/nurse anesthesia concentration.

550 Nursing of Women and Children I (2) Advanced practice nursing of women, infants and children; health promotion and nursing interventions for actual or potential health problems of women, children, and families.

(RE) Prerequisite(s): 504 and 505.

(RE) Corequisite(s): 507.

(DE) Corequisite(s): 553 or 527 or 564.

Registration Restriction(s): Master of Science in Nursing – nursing major.

551 Nursing of Women and Children II (2) Continuation of 550. Advanced practice nursing of women, infants and children; role refinement of nurse practitioner or clinical specialist in health maintenance and restoration for women, children, and families.

(RE) Prerequisite(s): 550 and 501.

(DE) Corequisite(s): 553 or 527 or 564.

Registration Restriction(s): Master of Science in Nursing – nursing major.

552 Care of the Critically-Ill Neonate (2) Advanced practice nursing of women, infants and children; health promotion and nursing interventions for actual or potential health problems of women, children, and families.

(RE) Prerequisite(s): 550.

Registration Restriction(s): Master of Science in Nursing – nursing major.

553 Nursing Care of Women and Children: Clinical Experience in Women's Health (1-5) Clinical experience in the role of women's health care nurse practitioner or clinical nurse specialist in a variety of health care settings serving women.

Grading Restriction: Satisfactory/No Credit grading only.

Repeatability: May be repeated. Maximum 15 hours.

(RE) Corequisite(s): 550 or 551.

Registration Restriction(s): Master of Science in Nursing – nursing major.

554 Care of the Well Woman and Minor Acute Illnesses (2) Comprehensive and preventative care for the well woman and the woman with minor acute conditions. Focus is on women of all ages.

(RE) Corequisite(s): 550.

Registration Restriction(s): Master of Science in Nursing – nursing major.

555 Care of the Pregnant Woman (2) Physiology and pathophysiology of the pregnant woman. Recommended advanced nursing interventions in selected conditions. Focus is on the pregnant and newly delivered woman.

(RE) Corequisite(s): 550.

Registration Restriction(s): Master of Science in Nursing – nursing major.

556 Care of Complex Health Problems in Women (2) Physiotherapy and pathophysiology of the complex health problems common in women and the pregnant woman. Recommended advanced nursing interventions in selected health problems.

(RE) Corequisite(s): 550.

Registration Restriction(s): Master of Science in Nursing – nursing major.

560 Mental Health Nursing I (6) Theories of advanced therapeutic interventions for clients experiencing actual and potential mental health problems: advanced practice nursing in specialty of mental health; clinical practice with clients of various ages in acute care and community settings.

Contact Hour Distribution: 2 didactic and 4 practicum.

(RE) Prerequisite(s): 504.

(DE) Prerequisite(s): 505 and 515.

(DE) Prerequisite or (DE) Corequisite: 507 and 510.

Registration Restriction(s): Master of Science in Nursing – nursing major.

561 Mental Health Nursing II (7) Continuation of 560. Advanced practice nursing in community settings for families and groups with actual and potential mental health problems.

Contact Hour Distribution: 2 didactic and 5 practicum.

(RE) Prerequisite(s): 504 and 501.

(DE) Prerequisite or (DE) Corequisite: 582.

Registration Restriction(s): Master of Science in Nursing – nursing major.

562 Acute Illnesses in Children (2) Physiology and pathophysiology of acute minor illnesses in children and the recommended interventions in selected conditions for the APN. Focus is on ill children ages 0 to 21 years.

(RE) Corequisite(s): 550.

Registration Restriction(s): Master of Science in Nursing – nursing major.

563 Care of the Child with a Chronic Condition (2) Physiology and pathophysiology of chronic illnesses in children and the recommended interventions in selected conditions for the APN. Focus is on chronically ill children ages 0 to 21 years.

(RE) Corequisite(s): 551.

Registration Restriction(s): Master of Science in Nursing – nursing major.

564 Nursing of Women and Children: Clinical Experience in Infant's Health (1-5) Clinical experience in the role of neonatal nurse practitioner or clinical nurse specialist in a Level III intensive care nursery.

Grading Restriction: Satisfactory/No Credit grading only.

Repeatability: May be repeated. Maximum 15 hours.

(RE) Corequisite(s): 550 or 551.

Registration Restriction(s): Master of Science in Nursing – nursing major.

565 Teaching Practicum (1-6) Individually designed teaching experience in collegiate nursing program or nursing practice setting. Objectives to be developed collaboratively by student and faculty.

Grading: Satisfactory/No Credit or letter grade.

Repeatability: May be repeated. Maximum 6 hours.

(DE) Prerequisite or (DE) Corequisite: 566.

Registration Permission: Consent of instructor.

566 Educational Principles and Strategies (3) Exploration and analyses of selected education, curriculum; teaching-learning, measurement, and evaluation principles and theories as applied to instruction of undergraduate nursing students, staff development, and patient education.

Registration Permission: Consent of instructor.

567 Embryology and Neonatal Pathophysiology for Advanced Neonatal Nursing Practice (3) Pathophysiological challenges confronting infants born at preterm gestation and neonates with clinical disorders arising from alterations in embryogenesis. Emphasis on the role of neonatal advanced practice nurses in assessing subtle changes in the clinical condition in these infants.

(RE) Corequisite(s): 504 and 505.

Registration Restriction(s): Master of Science in Nursing – nursing major.

568 Care of the Neonate (2) Physiology and pathophysiology of the neonate and the recommended interventions in selected conditions for the advanced practice nurse. Focus is on the well infant and health consequences of congenital conditions, prematurity and illness.

(RE) Corequisite(s): 550.

Registration Restriction(s): Master of Science in Nursing – nursing major.

569 Care of the Ill Neonate (2) Physiology and pathophysiology of the neonate and the recommended interventions in selected conditions for the advanced practice nurse. Focus is on the ill neonate.

(RE) Corequisite(s): 550.

Registration Restriction(s): Master of Science in Nursing – nursing major.

570 Family Nurse Practitioner I (6) Application of advanced health/physical assessment and diagnostic reasoning in nursing management and primary care of individuals and their families with actual and potential acute health problems; clinical experience in role of family nurse practitioner in variety of settings.

Contact Hour Distribution: 2 didactic and 4 practicum.

(RE) Prerequisite(s): 504.

(DE) Prerequisite(s): 505 and 515.

Registration Restriction(s): Master of Science in Nursing – nursing major.

571 Family Nurse Practitioner II (3) Continuation of 570. Emphasizes increasing advanced nursing competencies in the management and primary care of individuals and their families in all developmental life stages.

(RE) Prerequisite(s): 570.

Registration Restriction(s): Master of Science in Nursing – nursing major.

572 Family Nurse Practitioner II Clinical (2) Continuation of 571. Clinical experience in a variety of settings emphasizing advanced nursing competencies in the management and primary care of individuals and their families in all developmental life stages.

Contact Hour Distribution: 2 practicum.

(RE) Prerequisite(s): 571.

Registration Restriction(s): Master of Science in Nursing – nursing major.
573 Family Nurse Practitioner III (8) Continuation of 572. Advanced nursing management of multiple/complex health problems of individuals and families in all developmental life stages; role refinement and exploration of major issues of the family nurse practitioner; clinical experience in a variety of settings.

Contact Hour Distribution: 2 didactic and 6 practicum.

(RE) Prerequisite(s): 501 and 572.
(DE) Prerequisite or (DE) Corequisite: 582.
Registration Restriction(s): Master of Science in Nursing – nursing major.

577 Special Topics (1-3) Topic is determined by faculty and student interest.

Repeatability: May be repeated. Maximum 6 hours.
Registration Permission: Consent of instructor.

582 Scholarly Inquiry for Advanced Practice Nursing (3) Non-thesis option. Utilization of research process through experiential or critical evaluation of science in area of interest. Conducted under faculty guidance and culminating in scholarly product.

Repeatability: May be repeated. Maximum 6 hours.
(DE) Prerequisite or (DE) Corequisite: 501 or consent of instructor.
Registration Restriction(s): Master of Science in Nursing – nursing major.

583 Directed Clinical Practice (1-10) Additional opportunities for advanced nursing practice. Objectives to be developed collaboratively by student and faculty.

Grading: Satisfactory/No Credit or letter grade.
Repeatability: May be repeated. Maximum 14 hours.
Comment(s): Enrollment in or completion of graduate-level courses in clinical nursing required.
Registration Restriction(s): Master of Science in Nursing – nursing major.

585 Seminar in Gerontology (1) (See Health 585.)

590 Nursing Administration: Macro-Analysis (6) Exploration, analysis, and application of selected organizational, management, and leadership theories and financial principles to delivery of nursing services. Structure, functions, organization, behaviors, and adaptive processes of health care organizations.

Contact Hour Distribution: 2 didactic and 4 practicum.
(RE) Prerequisite(s): 510.
(DE) Prerequisite or (DE) Corequisite: 501 and 507.
Registration Restriction(s): Master of Science in Nursing – nursing major.

591 Nursing Administration: Micro-Analysis (6) Utilization of human and financial resources, conflict resolution, and organizational development with application to mid-level and top-level nursing administration positions.

Contact Hour Distribution: 2 didactic and 4 practicum.
(RE) Prerequisite(s): 510.
(DE) Prerequisite or (DE) Corequisite: 501 and 507.
Registration Restriction(s): Master of Science in Nursing – nursing major.

592 Nursing Administration: Macroanalysis (2) Exploration, analysis, and application of selected organizational, management, and leadership theories and financial principles to delivery of homeland security nursing services. Structure, functions, organization, behaviors, and adaptive processes of health care organizations.

(RE) Prerequisite(s): 510.
(RE) Corequisite(s): 533.
Comments: This course is for students in the Homeland Security Nursing management track only
Registration Restriction: Master of Science in Nursing – nursing major.

593 Independent Study (1-3)

Repeatability: May be repeated. Maximum 6 hours.
Registration Permission: Consent of instructor.

600 Doctoral Research and Dissertation (3-15)

Grading Restriction: P/INP only.
Repeatability: May be repeated.
Registration Restriction(s): Doctor of Philosophy – nursing major.

601 Philosophy and Theory for Nursing Science (3) Philosophical and historical context of knowledge for nursing science; in-depth analysis of health-related theories as frameworks for knowledge-building; concept development in theory building.

Registration Restriction(s): Doctor of Philosophy – nursing major.

603 Nursing Research and Inquiry (3) Philosophical, theoretical, and methodological bases for nursing inquiry.

(RE) Prerequisite(s): 601.
Registration Restriction(s): Doctor of Philosophy – nursing major.

605 Middle-Range Theoretical Formulations for Nursing Science Development (3) Extant and emerging middle-range theories instrumental in nursing science development.

(RE) Prerequisite(s): 603.
(DE) Corequisite(s): 608.
Recommended Background: Inferential statistics course.
Registration Restriction(s): Doctor of Philosophy – nursing major.

606 Nursing Research Seminar (3) Selected topics pertaining to dissertation proposal process, research experience, and defense.

Registration Restriction(s): Doctor of Philosophy – nursing major.

607 Qualitative Nursing Research (3) Critique and application of qualitative nursing research methods.

(RE) Prerequisite(s): 603.

608 Quantitative Nursing Research (3) Critique and application of quantitative nursing research methods.

(RE) Prerequisite(s): 603.
Recommended Background: Multivariate statistics course.
Registration Restriction(s): Doctor of Philosophy – nursing major.

609 Research Practicum (1-3) Supervised individual or group research experience under guidance of faculty.

Grading: Satisfactory/No Credit or letter grade.
Repeatability: May be repeated. Maximum 12 hours.
Registration Permission: Consent of instructor.
Registration Restriction(s): Doctor of Philosophy – nursing major.

610 Nursing Science Seminar (2) Critical Analysis and synthesis of literature in selected focus area within nursing science.

Registration Restriction(s): Doctor of Philosophy – nursing major.

612 Health and Nursing Policy/Planning (3) Policies affecting nursing education and practice; health policies and political processes; interactions between health professionals, consumer groups, and government in health policy development and health planning activities.

Registration Restriction(s): Doctor of Philosophy – nursing major.

613 Nursing Leadership in Complex Systems (3) Analysis and evaluation of nursing leadership/management in complex professional, academic and health care systems.

Registration Restriction(s): Doctor of Philosophy – nursing major.

614 Nursing Preceptorship (1-3) Individually-designed practicum, field, or internship experiences in a variety of administrative, educational, research, or clinical practice settings.

Repeatability: May be repeated. Maximum 6 hours.
(Re) Prerequisite(s): 601.
Registration Restriction(s): Doctor of Philosophy – nursing major.

Nutrition (726)

500 Thesis (1-15)

Grading Restriction: P/INP only.
Repeatability: May be repeated.

502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed.

Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated.
Credit Restriction: May not be used toward degree requirements.

509 Graduate Seminar in Public Health (1) (See Public Health 509.)

511 Advances in Carbohydrate, Lipid and Protein Metabolism (4) The physiological impact of dietary carbohydrates, lipids and proteins, with an emphasis on nutritional and hormonal regulation of intermediary metabolism, bioenergetics and gene regulation.

Recommended Background: Advanced nutrition course.

512 Advances in Vitamin and Mineral Metabolism (3) Advances in the requirements, utilization, metabolism and physiological impact of micronutrients with an emphasis on vitamins and minerals in the context of human nutrition.

Recommended Background: Advanced nutrition course.

513 Community Nutrition I (3) Orientation to community; assessment of nutrition problems, needs, and resources; functional roles of public health nutritionist. Concurrent field experiences.

Recommended Background: Advanced nutrition course or consent of instructor.

514 Community Nutrition II (3) Planning, implementation, and evaluation of public health nutrition programs. Concurrent field experiences.

515 Field Study in Community Nutrition I (1-12) Personal participation in and analysis of state or regional community nutrition program. Location of in-depth study to be selected in consultation with instructor.

Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated. Maximum 12 hours.
(Re) Prerequisite(s): 513 and 514.
Registration Permission: Consent of instructor.

516 Maternal and Child Nutrition (3) Nutrition principles related to growth and development during pregnancy, infancy, and childhood to age 5, high risk conditions.

Recommended Background: Advanced nutrition course or consent of instructor.
517 Childhood and Adolescent Nutrition (3) Application of nutrition principles to school age children; effects of diseases on growth and health maintenance; nutritional assessment and counseling for nutrition. Recommended Background: Advanced nutrition course or consent of instructor.

518 Nutrition and Aging (3) Nutritional problems of adults; nutritional requirements, dietary intakes; effects of nutrition on biological aging. Recommended Background: Nutrition in disease course or consent of instructor.

521 Physiological Basis for Diet and Disease (3) Altered nutrient needs as result of metabolic changes that occur in selected disease states. Recommended Background: Nutrition in disease course or consent of instructor.

522 Nutrition Counseling (2) Individual eating habits and disorders, evaluation strategies for effectiveness of helping process. Recommended Background: Nutrition in disease course or consent of instructor.

540 Seminar in Nutrition (1) Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated. Maximum 6 hours.

541 Research Methods (2) Basic principles of planning, conducting, and interpreting nutrition and foodservice systems administration research. Recommended Background: 6 graduate hours in nutrition and food system administration and statistics.

544 Survey Methods in Food and Nutrition (2) Application of survey research methods to nutrition projects: assessment of food consumption, nutrient intake, nutritional status, sociocultural-economic parameters, food production and service. (DE) Prerequisite or (DE) Corequisite: 541.

547 Field Experience (3-9) Experience in food-related industry or agency under supervision of faculty member. Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated. Maximum 20 hours. Registration Permission: Consent of instructor.

548 Directed Study in Nutrition (1-3) Advanced study in nutrition. Repeatability: May be repeated. Maximum 6 hours. Registration Permission: Consent of instructor.

549 Special Topics (1-3) Recent advances in nutrition or food systems administration. Repeatability: May be repeated. Maximum 6 hours. Registration Permission: Consent of instructor.

600 Doctoral Research and Dissertation (3-15) Grading Restriction: P/INP only. Repeatability: May be repeated.

602 Advanced Topics in Nutrition Science (1-3) Comprehensive individual study and group discussion of topics related to current problems in nutrition. Repeatability: May be repeated. Maximum 12 hours. (DE) Prerequisite(s): 512 or consent of instructor.

Operations and Management Science (738)

540 Statistics and Operations Management (3) Analysis of methods and models for understanding supply chain flows processes. Introduction to management strategies and techniques applicable to design of systems in logistics and operations processes. (Same as Logistics 510.) (DE) Prerequisite(s): Business Administration 511, 512, and 513 or consent of instructor.

541 Operations Management (3) Techniques applicable to design of systems in operations planning and control in manufacturing and service industries. Modeling real-world systems through problem definition, supporting data structure design, model design, solution, implementation, and maintenance. (DE) Prerequisite(s): 540 or Logistics 510 or consent of instructor.

Philosophy (745)

400 Special Topics (3) Repeatability: May be repeated if topic differs. Maximum 6 hours.

411 Modern Religious Philosophies (3) (See Religious Studies 411.)

419 Science as Method (3) (See Ecology and Evolutionary Biology 419.)

420 Topics in History of Philosophy (3) One or more figures or movements from antiquity through mid-20th century. Repeatability: May be repeated. Maximum 9 hours. Recommended Background: 6 hours of philosophy courses or consent of instructor.

435 Intermediate Formal Logic (3) Metatheory of formal logic and philosophy of logic. Registration Permission: Consent of instructor.

440 Contemporary Ethical Theory (3) Repeatability: May be repeated if topic differs. Maximum 6 hours. Recommended Background: 6 hours of philosophy courses or consent of instructor.

443 Advanced Business Ethics (3) Advanced topics in business ethics. (DE) Prerequisite(s): One of the following – 241, 242, 243, 244, 245, 246, 340.

445 Advanced Environmental Ethics (3) Advanced topics in environmental ethics. Repeatability: May be repeated if topic differs. Maximum 6 hours. (DE) Prerequisite(s): One of the following – 241, 242, 243, 244, 245, 246, 340.

446 Advanced Bioethics (3) Advanced topics in bioethics. Repeatability: May be repeated if topic differs. Maximum 6 hours. (DE) Prerequisite(s): One of the following – 241, 242, 243, 244, 245, 246, 340.

472 Philosophy of Language (3) Problems of meaning, reference and truth. What is the relation between words and the world? How do sentences manage to be about the world? What is it for something to be true? Recommended Background: 3 philosophy courses 200 level or above.

473 Philosophy of Mind (3) Problems of mind and body in relation to consciousness and personal identity. Recommended Background: 6 hours of philosophy courses or consent of instructor.

500 Thesis (1-15) Grading Restriction: P/INP only. Repeatability: May be repeated.

502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed. Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated. Credit Restriction: May not be used toward degree requirements.

510 Philosophical Research (1-15) Paper workshop (writing, revising papers, getting papers ready to publish). Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated. Maximum 15 hours. Credit Restriction: May not be applied toward degree requirements.

520 Topics in Ancient or Medieval Philosophy (3) Intensive critical work on major philosopher or school. Repeatability: May be repeated. Maximum 9 hours.

522 Topics in Modern Philosophy (3) Intensive critical work on major philosopher or school. Repeatability: May be repeated. Maximum 9 hours.

524 Topics in 20th-Century Philosophy (3) Intensive critical work on major philosopher or school. Repeatability: May be repeated. Maximum 9 hours.

528 Topics in Contemporary Philosophy (3) Intensive critical work on themes in late 20th-century philosophy. Repeatability: May be repeated. Maximum 9 hours.

540 Topics in Ethics or Value Theory (3) Repeatability: May be repeated. Maximum 9 hours.

542 Topics in History of Ethics (3) Dominant movements in history of ethics. Repeatability: May be repeated. Maximum 9 hours.

543 Topics in Business Ethics (3) Content may vary. Repeatability: May be repeated if content differs. Maximum 9 hours.

544 Topics in Applied Ethics (3) Content may vary. Repeatability: May be repeated. Maximum 9 hours.

545 Topics in Environmental Ethics (3) Content may vary. Repeatability: May be repeated if content differs. Maximum 9 hours.

546 Topics in Bioethics (3) Content may vary. Repeatability: May be repeated if content varies. Maximum 9 hours.

549 Practicum in Applied Ethics (1-3) Repeatability: May be repeated if content differs. Maximum 9 hours. Credit Restriction: Does not count toward hours required for the degree.

575 Topics in Metaphysics and Epistemology (3) Repeatability: May be repeated. Maximum 9 hours.

577 Topics in Philosophy of Mind (3) Relation of mental to physical and the role of words in discourse about mental activities, thinking and feeling. Repeatability: May be repeated. Maximum 9 hours.

585 Special Topics (3) Repeatability: May be repeated. Maximum 9 hours.
490 Senior Seminar (1-3) Topics of current interest. Repeatability: May be repeated with consent of department. Maximum 6 hours.

500 Thesis (1-15) Grading Restriction: P/NP only. Repeatability: May be repeated.

501 Graduate Research Participation (3) Advanced research techniques under supervision of staff research director whose research area coincides with interests of student. Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated with consent of department. Maximum 18 hours. Comment(s): Open to all graduate students in good standing. Registration Permission: Consent of department and research director.

502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed. Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated. Credit Restriction: May not be used toward degree requirements.

503 Physics Colloquium (1) Lectures and discussion on current research topics. Continuous registration required for current graduate students. Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated. Maximum 6 hours.

505 Physics of Fluids (3) Fluid physics, overview of fluid mechanics and associated computational techniques; general description of laminar and turbulent flows; subsonic, supersonic and hypersonic flows; continuum, transitional and free-molecular flows; pipe flow, nozzle flow and sonic orifice; expansion flows; reacting and nonreacting flowfields; shock-tube physics; and introduction to method of characteristics and Monte Carlo computational techniques.

506 Experimental Methods (3) Introduction to experimental methods of spectroscopy through hands on operation of FTIR, Raman, NMR, photoelectron, laser and mass spectrometers. Principles and hazards of cw and pulsed lasers, radiation detectors, photomultiplier tubes, image intensifiers, image converters, high-vacuum systems including cryogenic-based devices, data acquisition techniques including lock-in amplifiers, box-car integrators, digital electronics methods and micro-computer data acquisition.

507 Contemporary Optics (3) Topics in geometrical, physical, Fourier, and nonlinear optics and introductory laser physics. Extensive use of computer calculations and design of practical and sophisticated optical systems.

508 Laser Physics (3) Mode analysis, stable and unstable resonators; rate equations and population inversion, saturation, relaxation oscillations, fluctuations and noise, laser stability; quantum theory of laser, photon coherence; mode-locking, Q-switching and frequency stabilization; specific laser types: semiconductor and solid-state, excimer, copper vapor and dye lasers.

511 Theoretical Physics I (3) Concepts and applications in applied physics. Topics: one-body, two-body and rigid body dynamics, ideal fluid, small oscillations and waves, elements of special relativity, electrostatics and magneto-static problems, and other modern applications of current interest, in areas of biophysics and astrophysics. Recommended Background: Familiarity with computational methods.

512 Theoretical Physics II (3) Concepts and applications in applied physics. Topics: electrostatic and magneto-static problems, EM waves, duality and quantization, absorption and emission, statistical ensemble and thermal equilibrium, and other modern applications of current interest, in areas of quantum chemistry, biophysics, optics, spectroscopy, and astrophysics. Recommended Background: Familiarity with computational methods.

513 Problems in Theoretical Physics I (3) Fundamentals of physics: classical mechanics (Newtonian mechanics, Lagrangian and Hamiltonian dynamics) and electrostatics and magnetostatics.

514 Problems in Theoretical Physics II (3) Fundamentals of physics: electrodynamics, relativity, and quantum mechanics.

521 Quantum Mechanics (3) Fundamental principles of quantum mechanics, angular momentum, electron spin, particles in electric and magnetic fields, perturbation theory, variational methods, scattering theory; second quantization, quantization of electromagnetic field, emission, absorption, and scattering of light, bremsstrahlung, pair creation and annihilation. Application of quantum mechanics to problems of atomic, molecular, nuclear, and solid state physics.
522 Quantum Mechanics (3) Fundamental principles of quantum mechanics, angular momentum, electron spin, particles in electric and magnetic fields, perturbation theory, variational methods, scattering theory; second quantization, quantization of electromagnetic field, emission, absorption, and scattering of light, bremsstrahlung, pair creation and annihilation. Application of quantum mechanics to problems of atomic, molecular, nuclear, and solid state physics.
(DE) Prerequisite(s): 521.

531 Classical Mechanics (3) Variational formulation, Lagrange’s and Hamilton’s equations, constraints, canonical transformations, Hamilton-Jacobi theory and action-angle variables.

532 Advanced Classical Mechanics (3) Advanced topics in classical mechanics, KAM theorem and Hamiltonian chaos, dissipative chaos. Topics may vary according to interest of students and instructor.
(DE) Prerequisite(s): 531.

541 Electromagnetic Theory (3) Review of electrostatics, magnetostatics, and quasi-static problems; Maxwell’s field equations and their solutions in dielectric and conducting media; electrodynamics and relativity, retarded potentials and gauge transformations, radiation produced by actions in dielectric and conducting media; electrodynamics and relativity, and quasi-static problems; Maxwell’s field equations and their solutions.
(DE) Prerequisite(s): 541.


561 The Theory of Relativity (3) Geometry of space-time, relativistic electrodynamics, particle mechanics and continuum mechanics, Einstein’s field equations, Schwarzschild solutions, the classical test of general relativity.
(DE) Prerequisite or (DE) Corequisite: 531 and 541.

571 Mathematical Methods in Physics I (3) Linear vector spaces, matrices, tensors, curvilinear coordinates, functions of a complex variable, partial differential equations and boundary value problems, Green’s functions, integral transforms, integral equations, spherical harmonics, Bessel functions, calculus of variations. (Same as Mathematics 517.)
Recommended Background: Advanced calculus and differential equations.

572 Mathematical Methods in Physics II (3) Advanced Problems. Topics may vary according to interests of students and instructor. (Same as Mathematics 518.)
(DE) Prerequisite(s): 571.

(DE) Prerequisite(s): 571 or consent of instructor.

591 Foreign Study (1-15)
Repeatability: May be repeated. Maximum 15 hours.

592 Off-Campus Study (1-15)
Repeatability: May be repeated. Maximum 15 hours.

593 Independent Study (1-15)
Repeatability: May be repeated. Maximum 15 hours.

594 Special Problems (3) Especially assigned theoretical or experimental work on problems not covered in other courses.
Repeatability: May be repeated. Maximum 9 hours.

599 Seminars (1-3) (a) Mechanics; (b) Radiation; (c) Heat and Thermodynamics; (d) Electricity and Magnetism; (e) Modern Physics.
Repeatability: May be repeated with consent of department. Maximum 18 hours.

600 Doctoral Research and Dissertation (3-15)
Grading Restriction: P/NP only.
Repeatability: May be repeated.

601 Atomic Physics (3) Survey of research problems and methods. Topics of current interest.
Comment(s): Intended for all graduate students.

602 Atomic Physics (3) Advanced problems.
Comment(s): For students specializing in the field.

605 Laser Spectroscopy (3) Applications of lasers to spectroscopy of atomic and molecular systems; absorption, laser-induced fluorescence, and Raman spectroscopy; molecular and atomic coherence, quantum beats, resonance fluorescence, photon echoes, self-induced transparency; saturation and Doppler-free spectroscopy; laser cooling and trapping.
(DE) Prerequisite(s): 521 and 541.

610 Quantum Optics (3) Quantum theory of emission and absorption of radiation; frequency-dependent susceptibility; coherence theory; field quantization and coherent photon states; interaction of radiation with atoms; photon optics, counting and higher-order coherence; atomic scattering phenomena.
(DE) Prerequisite(s): 522.

611 Advanced Quantum Mechanics and Field Theory (3) Survey of problems and methods. Topics of current interest.
Comment(s): Intended for all graduate students.

612 Advanced Topics in Quantum Field Theory (3) Renormalization, Lamb shift, anomalous magnetic moments, gauge theories, electroweak theory, quantum chromodynamics, grand unified theories, and advanced topics in laser physics and quantum optics. Topics vary according to interest of students, instructor, and present state of physics.
(DE) Prerequisite(s): 611 or consent of instructor.

615 Astrophysics and Cosmology (3) Stellar evolution: hydrostatic equilibrium, energy production and transport, star birth, main sequence, red giants, variable stars, and stellar explosions. General relativity and gravitational, white dwarfs, neutron stars, pulsars, and black holes.

616 Astrophysics and Cosmology (3) Galaxies and the interstellar medium. Active galaxies, quasars, and supermassive black holes. Large-scale structure, the expanding Universe, cosmologies, big bang, cosmic background radiation, inflation, dark matter, formation of structure, and fate of the Universe. The Planck scale and quantum gravity.

621 Nuclear Physics (3) Survey of research problems and methods. Topics of current interest.
Comment(s): Intended for all graduate students.

622 Nuclear Physics (3) Advanced problems.
Comment(s): Intended for students specializing in the field.

626 Elementary Particle Physics (3) Survey of elementary particle physics: experimental methods, conservation laws, invariance principles, and models of interactions.
Comment(s): Intended for all graduate students.

627 Elementary Particle Physics (3) Advanced topics – quark models, electroweak interactions, and unification of elementary forces.
Comment(s): Intended for students specializing in the field.

642 Advanced Topics in Modern Physics (3) Advanced theoretical or experimental topics not covered in other courses.
Repeatability: May be repeated with consent of department. Maximum 9 hours.

643 Computational Physics (3) Developing computer algorithms for solving representative problems in various fields of physics, celestial dynamics in astrophysics, boundary value problems in electromagnetism, atomic and nuclear structures, band structure in solid state physics, transport problems in statistical mechanics, Monte Carlo simulation of liquids, fitting and interpolation of data, correlation analysis, or optimization strategy.
(DE) Prerequisite(s): 521, 531, and 571.

671 Advanced Solid State Physics (3) Survey of research problems and methods. Topics of current interest.
Comment(s): Intended for all graduate students.

672 Advanced Solid State Physics (3) Advanced problems.
Comment(s): Intended for students specializing in the field.

Plant Sciences (791)

Contact Hour Distribution: 2 hours and 1 lab.
(DE) Prerequisite(s): 220, 330, and Environmental and Soil Sciences 210 or consent of instructor.
421 Native Plants in the Landscape (3) Native plants and plant communities as a basis for landscaping and environmental restoration. Weekly lecture coupled with either an outing or service practicum of invasive exotic plant removals or planting of natives. Study and work sites will primarily be demonstration projects of the University of Tennessee Environmental Landscape Design Lab. They include local schoolyard habitats, greenways, wetlands, streambanks, and shorelines.

427 Management and Administration of Public Horticulture Institutions (2) Management of resources in non-profit institutions, support organizations and communities. Theoretical framework and institutional mission; strategic planning and programming; financial accounting and budgeting; development and fund raising; personnel policies; volunteer development; marketing and publicity; legal issues; relationships between staff and governing boards; the use of information technology in management and governance systems; and conservation/ preservation roles in community development.

(DE) Prerequisite(s): 226.

429 Field Study of Public Horticulture Institutions (2) Extended 10-12 day field study of various public horticulture institutions such as botanical gardens, arboretums, historical grounds, zoos, conservatories, cemeteries, and nature preserves. Application and travel fee required.

(DE) Prerequisite(s): 226.


434 Fruit and Vegetable Crops (3) Botanical description, geographical distribution, general cultural practices of warm and cool season vegetables, small fruits, and deciduous tree fruits. A Saturday field trip is required.

Contact Hour Distribution: 2 hours lecture and one 2-hour lab.

(DE) Prerequisite(s): 120 and Biology 110 and 120.

435 Field and Forage Crops (2) Agronomic principles of crop production and management. Crop improvement, cropping systems, tillage, fertilization, pest management, harvest and utilization of major field and forage crops.

Contact Hour Distribution: 2 hours and 1 lab.

(DE) Prerequisite(s): 335.

436 Plant and Garden Photography (2) Principles and techniques of photography as they relate to plants and gardens. Study of equipment options and field shooting under various weather conditions and in different seasons.

Registration Permission: Consent of instructor.

437 Public Garden Operations and Management (2) An analysis of year-round operations and management of public gardens. Case studies involving time and labor management, budget development and management, implementation of volunteer programs, information dissemination methods for public outreach, management of grounds and facilities using the University of Tennessee Institute of Agriculture Gardens as a model.

(DE) Prerequisite(s): 226.

441 Advanced Turfgrass Management (2) Principles and scientific basis of turfgrass culture. Adaptation, ecology, physiology, climatic influences on grass culture. Clipping and water management; design.

Contact Hour Distribution: 1-hour lecture and one 1-hour lab.

(DE) Prerequisite(s): 240.

442 Turf Root-zone Construction (2) Construction and management of root-zones for home lawns, golf courses and athletic fields.

(DE) Prerequisite(s): 240.

446 Horticultural Therapy (3) Introduction to the application of horticulture as therapy for treatment, rehabilitation, and/or training of individuals with disabilities.

448 Horticultural Internet Technology (3) Creation and management of information resources for the internet with a focus on development of visual and oral communications skills through a series of individual and team exercises in writing, graphics, and public speaking.

(DE) Prerequisite(s): Communication Studies 210 or 240.

450 Specialty Landscape Construction (3) Methods of design, materials, and construction techniques for specialized components of the landscape industry. Irrigation systems, outdoor lighting, garden ponds and water features.

451 Plant Tissue Culture (3) (See Entomology and Plant Pathology 451.)

452 Environmental Plant Ecophysiology (3) Principles of weed interference, integrated management, and herbicide selectivity and behavior. Specific recommendations for various crop and non-crop situations.

(DE) Prerequisite(s): Environmental and Soil Sciences 210.

453 Plant Biotechniques (3) Lectures will discuss recombinant DNA technology, molecular assisted breeding of economically important crops, gene cloning, and transformation technologies. Examples will be given of food and ornamental crops, pharmaceuticals, and renewable energy sources produced using biotechnology as well as potential risks of this technology. Labs will include electrophoresis, tissue culture, plasmid preps, genomic DNA preps, PCR, plant transformation, and genomic techniques.

Contact Hour Distribution: 1-hour lecture and one 3-hour lab.

(DE) Prerequisite(s): 353 or Biology 240.

454 Environmental Plant Ecophysiology (3) Principles of weed interference, integrated management, and herbicide selectivity and behavior. Specific recommendations for various crop and non-crop situations.

(DE) Prerequisite(s): Environmental and Soil Sciences 210.

458 Turf Weed Management Lab (1) Laboratory addressing practices and principles presented in 457 from the standpoint of turf.

(DE) Prerequisite(s): Environmental and Soil Sciences 210.

459 Agronomy Weed Management Lab (1) Laboratory addressing practices and principles presented in 457, from the standpoint of agronomy.

(DE) Prerequisite(s): Environmental and Soil Sciences 210.

480 Advanced Landscape Design (4) Comprehensive application of landscape design skills to a variety of project experiences with an emphasis on landscape planning and analysis, planting design, and materials estimating.

Contact Hour Distribution: Two 3-hour labs.

(DE) Prerequisite(s): 280 and 380.

485 Computer Aided Landscape Design (3) Overview of Computer Aided Design (CAD) as it relates to landscape design and construction. Emphasis on development of landscape design drawings through utilization of LANDCAD software.

(DE) Prerequisite(s): 280, 380, and Agriculture and Natural Resources 290 or Computer Science 100.

494 Professional Horticultural Communications (3) Communication for public horticulturists through written, oral and visual media. Emphasis on communication skills using proper writing techniques and grammar for print media, brochure design using desktop publishing, slide show development, oral presentation, and video use for educational and informational presentations in ornamental horticulture.

(DE) Prerequisite(s): Agriculture and Natural Resources 290 or Computer Science 100.

500 Thesis (1-15) Grading Restriction: P/NP only. Repeatability: May be repeated.

501 Special Topics in Plant Sciences (1-3) Topics to be assigned. Repeatability: May be repeated. Maximum 6 hours. Registration Permission: Consent of instructor.

502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed.

Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated. Credit Restriction: May not be used toward degree requirements.

503 Non-Thesis Project (1-2) Library, field, or laboratory project under supervision of faculty member.

Repeatability: May be repeated. Maximum 4 hours. Comment(s): For students in non-thesis option only.

504 Seminar (1) Presentations and discussion of topics.

Repeatability: May be repeated. Maximum 2 hours.

505 Seminar Preparation (1) Application of speaking, writing, and organizational skills in preparation and presentation of scientific material to both scientific and general audiences. Preparation of abstracts for scientific presentations. Required of all entering graduate students during their first year of graduate study.

513 Fungal Epidemiology and Disease Control (2) (See Entomology and Plant Pathology 513.)

530 Integrated Pest Management (3) (See Entomology and Plant Pathology 530.)

532 Environmental Plant Ecophysiology (3) Physiological and ecological principles of plants and the relation of those principles to plant responses to the environment. Water relations, gas exchange, stress physiology, seed biology, plant competition, plant defense.

Recommended Background: Plant physiology course.
Political Science (801)


403 Survey of Planning (3) History of city development and of planning. U.S. experience in urban and other levels of planning. State of the art process, comprehensive plan, implementation devices. Planning issues in society. Credit Restriction: May not be applied toward requirements for the Master of Science in Planning.

425 Media and Politics (3) Examines the interrelationship between the political system and the media from a political science perspective.

430 United States Constitutional Law: Sources of Power and Restraint (3) Judicial review, constitutional powers of the President and Congress, federalism, sources of regulatory authority, and constitutional protection of political and economic rights. (Same as Legal Studies 430.)

431 United States Constitutional Law: Civil Rights and Liberties (3) Current issues in civil rights and liberties including: first amendment freedoms, equal protection, privacy and the rights of the accused. (Same as Legal Studies 431.)

435 Criminal Law and Procedure (3) An overview of substantive and procedural law in the criminal justice field with emphasis on constitutional questions and public policy issues. (Same as Legal Studies 435.)

441 Public Budgeting (3) The process, participants, and politics of government budgeting with emphasis on federal government budgeting. Includes an overview of budget reform measures and their effectiveness.

442 Administrative Law and Regulatory Policymaking (3) Legal and political dimensions of rulemaking, enforcement and adjudication by executive agencies. (Same as Legal Studies 442.)

445 Administration of Justice (3) Administration and processes of justice system, including judicial administration and decision making in trial and appellate courts. (Same as Legal Studies 445.)

446 Housing (3) Nature and demand for housing in the U.S. and abroad. U.S. experience. Private market processes and public influences. Problems of change in housing supply, impact of new technology, and governmental programs to increase supply and quality of housing.

451 Ethnic Conflict in Foreign Countries (3) Examines political and violent conflict among ethnic and national groups and the challenges these conflicts pose for democratization and democracies.

452 Black African Politics (3) Recent evolution and current political environment of black African nations. (Same as Africana Studies 452.)

454 Government and Politics of China and Japan (3) Political setting, structure, and political processes in China and Japan.

456 Latin American Government and Politics (3) Introduction to the political development of Latin America with an emphasis on contemporary politics. (Same as Latin American Studies 456.)

459 Government and Politics of Russia and Eastern Europe (3) System transformation, political processes, and governmental structure in Russia and Eastern European countries.

461 Policy Making in Democracies (3) Comparative approach to theory and process of making public policies.

463 Contemporary Middle East Politics (3) Governments and movements in the Middle East, their characteristics, bases, and interrelationships.

471 International Political Economy (3) The politics of international economics. Topics include globalization, development, trade, crime, the IMF, the WTO, the environment, and challenges to the status quo.

473 Negotiation, Bargaining and Diplomacy (3) Diplomacy, negotiation, and foreign policy decision making. Theories of diplomacy and negotiation are applied in a simulation focusing on issues from international crime and global economic stability to world health and the environment.

474 International Organization (3) Constitutional framework and key functions of the United Nations. Topics include collective security, peacekeeping, human rights, development, regional organizations, and the role of the Secretary-General.

475 Ancient and Medieval Political Thought (3) Major western political thinkers from Socrates to Marsilio of Padua. (Same as Medieval Studies 475.)

476 Modern Political Thought (3) Major western political thinkers from Machiavelli to Marx.
500 Thesis (1-15)  
Grading Restriction: P/NP only.  
Repeatability: May be repeated.

502 Registration for Use of Facilities (1-15)  
Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed.  
Grading Restriction: Satisfactory/No Credit grading only.  
Repeatability: May be repeated.  
Credit Restriction: May not be used toward degree requirements.

510 Scope and Methods in Political Science (3) Procedures of analysis in political science.

511 Research Design (3) Methods for planning and executing research, from case studies to experimental designs; development of research questions and hypotheses; measurement issues; and validity of inferences.

512 Quantitative Political Analysis (3) Methods and techniques in quantitative political analysis: univariate and bivariate statistics.

513 Quantitative Political Analysis (3) Methods and techniques in quantitative political analysis: multivariate model building.

514 Research and Methodology in Public Administration (3) Basic assumptions and techniques of research in public administration; measurement, analysis, and reporting of data.

520 Political Theory (3) Survey of major ideas, thinkers and works of Western political theory.

522 American Political Thought (3) Systematic examination of the normative and empirical theories of leading American political thinkers from the colonial period to the present.

530 American Government and Politics (3) Survey of literature, approaches to research and analysis, critical examination of major works, and overviews of research in various sub fields.  
Repeatability: May be repeated with consent of department. Maximum 9 hours.

531 Theory of Planning (3) Analysis of nature and objectives of planning process; role of planners and planning function in public decision making.

532 Presidency (3) Systematic examination of the structure, functions and powers of the American presidency as they have evolved from the founding to the present.

533 Congress (3) Formal, empirical and theoretical approaches to and models of the institutional workings of Congress and the behavior of legislators.

535 Public Opinion and Political Socialization (3) Explores the meaning and measurement of public opinion and contemporary research on the topic; including questions of rationality, tolerance, and party identification.

536 Campaigns, Elections, and Voting Behavior (3) Surveys theory and research of American campaigns and elections, with an emphasis on presidential and congressional contests.

537 Political Parties and Interest Groups (3) Theoretical and empirical examination of the structure, functions and operations of political parties and interest groups.

539 State and Local Government and Politics (3) Theoretical and empirical analysis of government, politics, policymaking and public administration at the state and local levels.

540 Courts and Judicial Processes (3) Examination of published research dealing with judicial behavior, judicial policymaking, and courts and political actors.  
Repeatability: May be repeated with consent of department. Maximum 9 hours.

544 Information Systems and Networks in Planning (3) Use and impact of computer-based information systems and global networks in planning and public management. Development of practical skills in design of planning-decision support systems, databases, Internet-based tools and geographic information systems (GIS).

545 Planning Research Methods (3) Overall structuring of social science research in planning practice; familiarity with structure of planning literature information sources, decision processes and tools, practice in posing research questions relevant to planning, evaluation methods.

547 Planning Technology (3) Relationships between information technology, society and planning. Overview of other advanced technologies, economic development, and associated social and planning issues.

548 Public Policy Process (3) Theoretical, formal and empirical analysis of the roles, functions and decision-making processes of public policymakers, including legislative, executive and judicial actors.

549 Environmental Policy (3) Overview of contemporary environmental policy and its evolution. Examines the roles of values in the environmental arena. Provides a framework for policy analysis and analytical tools for selection and choosing among policy options.

550 Public Administration (3) Overview of public administration theory and function.

552 Organization Theory (3) Appraisal of major theories of organization and their applicability to public sector.

555 Planning and Transportation (3) (See Civil Engineering 558.)

556 Policy Analysis (3) Strategies and techniques for identification and analysis of public problems and policy solutions.  
Repeatability: May be repeated with consent of department. Maximum 9 hours.

558 The Politics of Administration (3) Examination of public administration in context of American political system, policy making and political roles of public administrators and agencies.  
Repeatability: May be repeated with consent of department. Maximum 9 hours.

560 Public Financial Administration (3) Principles and techniques of public finance at state and local levels; budget preparation, execution and audit, risk management, capital planning, major tax structures, economic forecasting, cash management, and debt administration.

562 Public Management (3) Interpersonal and leadership skills, techniques and methods for planning, decision making, and implementation of management strategies in public sector.  
Repeatability: May be repeated with consent of department. Maximum 9 hours.


566 Ethics, Values, and Morality in Public Administration (3) Moral-ethical-value dilemmas confronting administrators in American political system.

569 Internship in Public Administration (3-9)  
Grading Restriction: Satisfactory/No Credit grading only.  
Repeatability: May be repeated with consent of department. Maximum 9 hours.  
Comment(s): Open to students participating in approved internship programs.

570 Comparative Government and Politics (3) Selected topics in modern governments.  
Repeatability: May be repeated with consent of department. Maximum 9 hours.

572 The Politics of Development (3) Selected topics dealing with political problems of less developed countries.  
Repeatability: May be repeated with consent of department. Maximum 9 hours.

574 Area Seminar in Comparative Government and Politics (3) Selected topics in area studies: African, Asia, Latin America, Middle East, Soviet Union and Eastern Europe or Western Europe.  
Repeatability: May be repeated with consent of department. Maximum 9 hours.

580 International Politics (3) Survey of literature and major aspects of international politics.  
Repeatability: May be repeated with consent of department. Maximum 9 hours.

581 Fundamentals of Planning (3) History of planning, structure and development of urban areas, operations of contemporary planning, trends and issues.


583 Economic Analysis and Development (3) Basic methods of policy analysis and planning. Planning for economic change in cities and regions. Economic development and planning process.

584 Environmental Planning (3) Role of planners and planning in maintenance of natural and built environment.

585 Planning Methods (4) Preparation of comprehensive plans for urban areas and regions. Development of baseline data and forecasts, formulation of alternative plans and strategies, and development of plan implementation programs.

586 Planning and Property Development (3) Process of urban physical growth and change; functioning of private sector real estate development and its relationship to planning. Partnership roles of public and private sectors in urban development and redevelopment.

587 Legal Aspects of Planning (3) Legal basis for planning and guiding community development. Legal tools of planning.

588 Sustainable Communities (3) Overview of sustainable communities. Project-based coursework in local community.

590 Practicum in Planning (3-6) Repeatability: May be repeated. Maximum 6 hours. Registration Permission: Consent of instructor.

591 Foreign Study (1-15) Repeatability: May be repeated. Maximum 15 hours.

592 Off-Campus Study (1-15) Repeatability: May be repeated. Maximum 15 hours.

593 Independent Study (1-15) Repeatability: May be repeated. Maximum 15 hours.

594 College Teaching in Political Science (1) Instructional effectiveness, techniques, organization, materials for teaching political science at college level. Grading Restriction: Satisfactory/No Credit grading only. Registration Permission: Consent of instructor.

595 Readings and Special Problems in Political Science (1-3) Repeatability: May be repeated. Maximum 15 hours. Registration Permission: Consent of instructor.

596 Workshops in Computer Applications (1) Training in software applications to support research and decision-making tasks in public service. Successful completion certifies proficiency of MPA students in use of software applications for personal computer. Grading Restriction: Satisfactory/No Credit grading only.

597 Special Topics in Planning (1-3) Repeatability: May be repeated. Maximum 6 hours. Registration Permission: Consent of instructor.

598 Problems in Planning (1-3) Repeatability: May be repeated. Maximum 6 hours. Registration Permission: Consent of instructor.

600 Doctoral Research and Dissertation (3-15) Grading Restriction: P/NP only. Repeatability: May be repeated.

610 Special Topics in Empirical Theory and Methodology (3) Advanced methods and procedures of analysis in political science. Repeatability: May be repeated with consent of department. Maximum 9 hours.

628 Topics in Political Theory (3) Selected issues and problems in normative political theory. Specific content determined by instructor. Repeatability: May be repeated with consent of instructor. Maximum 9 hours.

639 Special Topics in American Government and Politics (3) Advanced study of selected topics. Repeatability: May be repeated with consent of department. Maximum 9 hours.

641 Special Topics in Courts and Judicial Processes (3) Intensive examination of research literature dealing with particular aspects of judicial decision making.

654 Contemporary Public Policies (3) Problems in one or more public policy areas from a political and administrative perspective. Topics selected by instructor. Repeatability: May be repeated with consent of department. Maximum 9 hours.

660 Contemporary Perspectives on Public Administration (3) Development of theory in public administration: contemporary critiques and alternatives. Repeatability: May be repeated with consent of instructor. Maximum 9 hours.

668 Special Topics in Public Administration (3) Analysis of selected issues and problems in public administration. Repeatability: May be repeated. Maximum 9 hours.

670 Special Topics in Comparative Government and Politics (3) Research into selected topics. Repeatability: May be repeated with consent of department. Maximum 9 hours.

682 Theory and Analysis of U.S. Foreign Policy Processes (3) Theoretical approaches to decision making in foreign policy area and analysis of policy-making process. Repeatability: May be repeated with consent of department. Maximum 9 hours.

684 International Law (3) Provides the analytical tools necessary to evaluate the legality of events under international law. Presents the law relevant to politics, such as the use of force, human rights, war crimes, international courts, principles of jurisdiction, and air, space and sea law.

688 Special Topics in International Politics (3) Selected issues and problems in international politics. Specific content determined by instructor. Repeatability: May be repeated with consent of instructor. Maximum 9 hours.

**Portuguese (811)**

400 Portuguese for Speakers of Another Romance Language (3) Accelerated class for beginning students of Portuguese with strong background in another Romance language. Introduction to grammar, reading, and culture of Portugal and Brazil. Recommended Background: 3 hours at the 300-level in another Romance language.

430 Contemporary Brazilian Studies (3) Current Brazilian cultural, political and racial issues placed in a historical perspective with a comparative emphasis. Topics may vary. (Same as Latin American Studies 430.) Repeatability: May be repeated. Maximum 12 hours. Comment(s): Open to non-majors. Majors will write papers in Portuguese.

432 Topics in the Literature and Culture of the Portuguese-speaking World (3) Examination of the socio-political environment, literary works, and other important cultural practices of the Portuguese-speaking world. Topics may vary. (Same as Latin American Studies 432.) Repeatability: May be repeated. Maximum 12 hours. Recommended Background: At least one course at the 300-level.

**Psychology (830)**


409 Group Facilitation (3) Study of theory and technique through supervised experience in small groups. Repeatability: May be repeated. Maximum 6 hours. Recommended Background: General psychology course or consent of instructor.

410 Sensory Processes and Perception (3) Physiological and psychological theories of perception. Emphasis on audition and vision. (DE) Prerequisite(s): 385 or Mathematics 115 or Statistics 201 or graduate standing.

415 Psychology of Religion (3) History of the psychology of religion with an examination of various philosophical and empirical orientations. Exploration of the psychological function of religion for individuals and society. (Same as Religious Studies 415.) (DE) Prerequisite(s): 110 or consent of instructor.

420 History and Systems of Psychology (3) History of psychological thought. Classical approaches and recent developments. (DE) Prerequisite(s): 110 or consent of instructor or graduate standing.

424 Psychology and the Law (3) Psychological aspects of legal systems. (DE) Prerequisite(s): 110 or consent of instructor.

430 Health Psychology (3) Psychological factors related to health and illness, including stress, personality, and environment. Applications of psychological treatments to physical illness. (DE) Prerequisite(s): 110 or consent of instructor.


434 Psychology of Gender (3) Biological, psychological, and social factors in gender. Importance of gender roles and stereotypes for behavior and experience. (Same as Women’s Studies 434.) (DE) Prerequisite(s): 110 or consent of instructor.

440 Organizational Psychology (3) Social-psychological analysis of organizations, emphasizing role-theory and systems theory. (Same as Management 440.) (DE) Prerequisite(s): 110 and 360 or consent of instructor.

445 Measurement and Testing (3) Theory of test construction and psychological measurement. Statistical methods in measurement. Survey of existing tests. (DE) Prerequisite(s): 110 and 385 or Statistics 201 or consent of instructor.

450 Comparative Animal Behavior (3) (See Ecology and Evolutionary Biology 450,)
459 Comparative Animal Behavior Laboratory (3) (See Ecology and Evolutionary Biology 459.)
461 Physiological Psychology (3) Nervous system and physiological correlates of behavior. Biological basis of emotion, learning, memory and stress. (DE) Prerequisite(s): 110 or consent of instructor and one of the following sequences — Biology 101 and 102, Biology 130 and 140, or Anthropology 110 and 210.
470 Theories of Personality (3) Major theories of human personality and their development. (DE) Prerequisite(s): 110 or consent of instructor.
475 Adolescent Development (3) Theoretical perspectives and empirical research findings pertinent to adolescent development. (DE) Prerequisite(s): 110 or consent of instructor.
480 Theories of Learning (3) Classical and current approaches to learning and cognition. (DE) Prerequisite(s): 110 or consent of instructor.
482 Topics in Psychology (3) Intensive analysis of special topics, such as African-American psychology or evaluation of programs in the community. Repeatability: May be repeated. Maximum 6 hours. (DE) Prerequisite(s): 110 or consent of instructor.
489 Supervised Research (1-9) Repeatability: May be repeated. Maximum 12 hours. Registration Permission: Consent of instructor.
500 Thesis (1-15) Grading Restriction: P/NP only. Repeatability: May be repeated.
502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed. Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated. Credit Restriction: May not be used toward degree requirements.
505 Research Design (3) Techniques for planning and conducting research in controlled and natural settings: experiments, quasi-experiments, observational studies, surveys, and program-evaluations. Development of questions and hypotheses for study. Design of studies to maximize validity. Registration Permission: Consent of instructor.
508 Readings and Special Issues in Psychology (1-3) Repeatability: May be repeated. Maximum 9 hours.
509 Research Practicum (1-3) Required of first-year graduate students in psychology. Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated. Maximum 9 hours.
510 Topics in Psychology (3) Intensive examination of selected issues in psychology. Repeatability: May be repeated. Maximum 9 hours. Registration Permission: Consent of instructor.
511 Developmental Psychology (3) Normal processes of human socialization; physical, cognitive, and emotional development from conception through infancy, childhood, and adolescence. Repeatability: May be repeated. Maximum 6 hours. Registration Permission: Consent of instructor.
512 Life-Span Development (3) Theories and research concerning normal human development throughout life, adulthood and old age. Registration Permission: Consent of instructor.
513 Foundations of Psychology: Biological Factors, Perception, Learning, Thinking, Motivation (3) Intensive survey. Registration Permission: Consent of instructor.
515 Colloquium in Experimental Psychology (1) Research and practical issues in experimental psychology. Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated. Maximum 4 hours. and 210.
517 Foundations of Counseling Psychology (3) History, theory, research and practice of counseling psychology. Repeatability: May be repeated. Maximum 6 hours.
521 Analysis of Variance for Social Sciences (3) Analysis of variance and statistical theory: application within social science framework. Contrasts among means, trend analysis, analysis of covariance, analysis of factorial designs, and multivariate approaches to analysis of within subjects data.
522 Multiple Regression for Social Sciences (3) Complexities of regression analyses and theory: application within social science framework. Bivariate correlation and regression, multiple regression, analysis of variable sets, interactions among continuous predictors, reducing collinearity between main effects and application of multiple regression to testing procedures of mediation and moderation.
525 Psychopharmacology (3) Effects of psychoactive drugs on mood and behavior, emphasizing the mechanisms of drug action on neurotransmitter systems. Topics include the relationship between behavior and endogenous neurochemical activity, therapeutic agents used to treat mental disorders, and drugs of abuse. (DE) Prerequisite(s): 461. Recommended Background: Physiological psychology or neuropsychology course.
527 Behavioral Neurology (3) Disorders of nervous system, organic brain dysfunctions. Diagnosis and treatment. Registration Permission: Consent of instructor.
528 College Teaching in Psychology (3) Concepts, techniques, and materials for teaching psychology at college and/or university level. Supervised practice. Grading Restriction: Satisfactory/No Credit grading only. Registration Permission: Consent of instructor.
545 Advanced Animal Behavior (3) (See Ecology and Evolutionary Biology 545.)
546 Ethological Psychology (3) Basic ethology and comparative psychology. Implications for human behavior. (Same as Ecology and Evolutionary Biology 546.) Registration Permission: Consent of instructor.
547 Conceptual Foundations of Evolution and Behavior (3) Critical evaluation of seminal writings on theory and methods in comparative analysis of behavior. (Same as Ecology and Evolutionary Biology 547.)
550 Social Psychology (3) Survey of theory and research concerning interpersonal interaction and individual behavior in social context. Registration Permission: Consent of instructor.
554 Laboratory in Psychometrics (3) Further learning about psychometrics theories: item response theory (modern mental test theory), factor analysis, and applications of those methods using computer programs to simulated or empirical data. Repeatability: May be repeated. Maximum 6 hours. (DE) Prerequisite(s): 555.
555 Psychometrics (3) Basic concepts: factor analysis, scaling, test theories, probability models and their applications, computerized adaptive testing and other topics. Repeatability: May be repeated. Maximum 6 hours. (DE) Prerequisite(s): Statistics 537 and 538.
558 Interviewing and Observation (3) Sensitizing students to own feelings and beliefs and to feelings of interviewee, and analysis of language content, style, and body language. Exploration of various important aspects of interviewee’s life. (DE) Corequisite(s): 559. Comment(s): Admission to doctoral program in clinical psychology or consent of instructor required.
559 Laboratory in Interviewing and Observation (1) (DE) Corequisite(s): 558. Comment(s): Admission to doctoral program in clinical psychology or consent of instructor.
560 Psychology of Learning (3) Review of current evidence from research involving human and/or non-human animals. Repeatability: May be repeated. Maximum 6 hours. (DE) Prerequisite(s): 400. Registration Permission: Consent of instructor.
565 History and Systems of Psychology (3) History of philosophy concerning psychology. Major systems of psychology which emerged during 20th century. Comment(s): Graduate standing required.
567 Group Dynamics and Methods (3) (See Counselor Education 554.)
568 Prepracticum in Career Development (3) Didactic instruction and practice in counseling and career exploration. Comment(s): Admission to doctoral concentration in counseling psychology required.
569 Practicum in Counseling (3) (See Counselor Education 555.)
570 Personality: Theory and Research I (3) Advanced survey of psychodynamic and neo-Freudian approaches to personality; related research.

Comment(s): Admission to clinical psychology concentration or consent of instructor required.

571 Personality: Theory and Research II (3) Advanced survey of behavioral and humanistic approaches to personality; related research.

Comment(s): Admission to clinical psychology concentration or consent of instructor required.

573 Descriptive and Theoretical Psychopathology (3) Current psychiatric taxonomic system. Theories of etiology for various diagnostic categories. Examples from written case vignettes and recorded interviews.

Comment(s): Admission to clinical psychology concentration or consent of instructor required.

574 Cross-Cultural Counseling: Theory and Research (3) (See Counselor Education 570.)

576 Object Relations (3) European and American conceptions of normal and psychopathological development of object relations. Significance for psychotherapy, psychoanalysis, and psychoanalytic theory.

Comment(s): Admission to clinical psychology concentration or consent of instructor required.

579 Practicum in Individual Assessment, Counseling (3) Basic application of individually-administered, standardized assessment instruments: administration, scoring, and integrated interpretation. Supervision in adult evaluation, and referral/treatment planning. Instruments include WAIS; Stanford-Binet; MMPI, PAI, MCMI.

(DE) Prerequisite(s): 667 and 668.
Recommended Background: Formal tests and measurement or equivalent course.

580 Research Questions and Designs (3) Question-asking process in research and strategies or designs through which answers might be derived.

Comment(s): Admission to clinical psychology concentration or consent of instructor required.

593 Independent, Off-campus, or Foreign Study (1-9)

Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated. Maximum 9 hours.
Registration Permission: Consent of instructor.

594 Psychological Assessment I (3) Basic concepts and techniques of adult assessment: intelligence tests and personality tests.

Comment(s): Admission to clinical psychology concentration or consent of instructor required.

595 Psychological Assessment II (3) Basic concepts and techniques of adult assessment: intelligence tests and personality tests.

(DE) Prerequisite(s): 594 or consent of instructor.
Comment(s): Admission to doctoral concentration in clinical psychology or consent of instructor required.

596 Laboratory in Psychological Assessment (1)

Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated. Maximum 4 hours.
(DE) Corequisite(s): 594 or 595.
Comment(s): Admission to doctoral concentration in clinical psychology or consent of instructor required.

597 Developmental Psychopathology (3) Research and theory on pathways to psychological disorders and personal adjustment.

(DE) Prerequisite(s): 571 or consent of instructor.

598 Ethical Issues in Professional Psychology (3) Conceptual and practical application in human services and research.

Registration Permission: Consent of instructor.

599 Clinical Psychopathology (3) Formal use of descriptive categories used in the diagnosis of abnormal behavior.

(DE) Prerequisite(s): 597 or consent of instructor.

600 Doctoral Research and Dissertation (3-15)

Grading Restriction: P/NP only.
Repeatability: May be repeated.

601 Seminar in Psychology (3)

Repeatability: May be repeated. Maximum 12 hours.
Registration Permission: Consent of instructor.

607 Seminar in Applied Psychometrics (3)

Repeatability: May be repeated. Maximum 9 hours.
(DE) Prerequisite(s): 555 and 557.
Registration Permission: Consent of instructor.

610 Seminar in Applied Psychology (3)

Repeatability: May be repeated. Maximum 12 hours.
Registration Permission: Consent of instructor.

613 Seminar in Existential-Phenomenological Psychology (3)

Repeatability: May be repeated. Maximum 12 hours.
Registration Permission: Consent of instructor.

617 Seminar in Cognitive Science (3)

(DE) Prerequisite(s): 543.
Repeatability: May be repeated. Maximum 12 hours.
Registration Permission: Consent of instructor.

623 Seminar in Methods of Naturalistic Research (3)

(DE) Prerequisite(s): 546 or consent of instructor.

625 Advanced Study in Personality (3) Theory, research and conceptual analysis of studies with application to education and counseling.

(See as Counselor Education 635; Educational Psychology 635.)

Grading Restriction: Satisfactory/No Credit grading only.
Comment(s): Admission to doctoral program in psychology or consent of instructor required.

635 Ethical, Legal, and Professional Issues Psychology (3) Research, human services, teaching, and public policy. (Same as Counselor Education 635; Educational Psychology 635.)

Grading Restriction: Satisfactory/No Credit grading only.
Comment(s): Admission to clinical psychology concentration or consent of instructor required.

661 Seminar in Neuropsychology (3) Theory, research, and evaluation of neural bases of brain/behavior relationships, common syndromes and their behavioral and cognitive manifestations (e.g., neurodevelopmental syndromes, lifespan issues, etc.).

(DE) Prerequisite(s): 461 and 534.
Repeatability: May be repeated. Maximum 12 hours.

667 Assessment in Counseling Psychology I (3) Use and interpretation of measures commonly used in the practice of counseling psychology, including measures of cognitive ability, vocational, and personality assessment.

(DE) Prerequisite(s): 445 and Counselor Education 525.

668 Assessment in Counseling Psychology II (3) Advanced use and interpretation of measures commonly used in the practice of counseling psychology, including measures of cognitive ability, psychopathology, and personality.

(DE) Prerequisite(s): 667.

670 Psychotherapy I (3) Theories and principles.

Comment(s): Admission to doctoral concentration in clinical psychology or consent of instructor required.

671 Psychotherapy II (3) Theories and principles.

(DE) Prerequisite(s): 670.
Comment(s): Admission to doctoral concentration in clinical psychology or consent of instructor required.

672 Psychological Dysfunction (3) Classification methods in psychopathology and use of the DSM for differential diagnosis and treatment options appropriate for counseling psychology and other mental health professionals.

(DE) Prerequisite(s): 431.
Recommended Background: Courses in abnormal psychology and personality theories.

673 Laboratory in Psychotherapy (2)

Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated. Maximum 60 hours.
Corequisite(s): 670 or 671.
Comment(s): Admission to doctoral concentration in clinical psychology or consent of instructor required.

674 Practicum in Counseling Psychology (3) Supervised practice of individual counseling. Minimum 135 clock hours required each semester.

(DE) Prerequisite(s): 445 or equivalent and 569.
Comment(s): Admission to doctoral concentration in counseling psychology.
Registration Permission: Consent of instructor.

675 Advanced Theory and Practice in Group Counseling (3)

Theories and supervised practice.

(DE) Prerequisite(s): 674.
Registration Permission: Consent of instructor.

676 Field Placement in Counseling Psychology (3)

Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated. Maximum 12 hours.
(DE) Prerequisite(s): 674.
Comment(s): Admission to the doctoral concentration in counseling psychology required.

678 Theory and Practice of Counseling Supervision (3) Theory and practice of supervision in counseling.

Grading Restriction: Satisfactory/No Credit grading only.
(DE) Prerequisite(s): 674 or consent of instructor.
679 Internship in Counseling Psychology (1-6) Supervised employment in departmentally approved counseling psychology internship sites. 
Grading Restriction: Satisfactory/No Credit grading only. 
Repeatability: May be repeated. Maximum 12 hours. 
Comment(s): Admission to the doctoral concentration in counseling psychology required. 
Registration Permission: Consent of instructor. 

683 Seminar in Behavioral Medicine (3) Current research and theory concerning relationships between behavior and health. 
Repeatability: May be repeated. Maximum 12 hours. 
Registration Permission: Consent of instructor. 

695 Field Placement in Clinical Psychology (3) 
Grading Restriction: Satisfactory/No Credit grading only. 
Repeatability: May be repeated. Maximum 60 hours. 
Comment(s): Admission to the doctoral concentration in clinical psychology required. 
Registration Permission: Consent of instructor. 

696 Advanced Psychology Clinic Placement (1-3) 
Grading Restriction: Satisfactory/No Credit grading only. 
Repeatability: May be repeated. Maximum 24 hours. 
Comment(s): Admission to the doctoral concentration in clinical psychology or consent of instructor required. 
Registration Permission: Consent of instructor. 

Public Health (839) 

400 Consumer Health (3) (See Health 400.) 

493 Directed Independent Study (1-3) Individual study of selected issues. 
Repeatability: May be repeated. Maximum 6 hours. 
Registration Permission: Consent of instructor. 

502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed. 
Grading Restriction: Satisfactory/No Credit grading only. 
Repeatability: May be repeated. 
Credit Restriction: May not be used toward degree requirements. 

509 Graduate Seminar in Public Health (1) In-depth discussion of timely topics reflecting scope of public health as discipline and its interaction with many other academic and professional disciplines. Speakers both internal and external. (Same as Exercise Science 509; Nursing 509; Nutrition 509; Social Work 509.) 
Grading Restriction: Satisfactory/No Credit grading only. 
Repeatability: May be repeated. Maximum 4 hours. 

510 Environmental and Occupational Health (3) Health risks and complexities of personal and community environments impacting individual’s health and response to a diverse and dynamic world. Principles of occupational safety and health. Survey of contemporary environmental issues and their implications for healthful living. 
Comment(s): Admission to MPH or public health nutrition (MS) programs or consent of instructor required. 

520 Public Health Policy and Administration (3) Administrative considerations of community-based health care programs and public health practice. 
Health policy formulation, political environment and governmental involvement in health, legal responsibilities, and managerial concepts/techniques/process. 

521 Organization Theory and Health Care Delivery (3) Administrative and Organization theory related to health facilities; operation and management of community hospital. Case discussions and problem-solving exercises; managerial functions and skills. 


523 Management in Extended Care Settings (3) Managerial concepts and theoretical foundations essential to supervision and administration of domiciliary health services programs. Management and operation of health services programs for patients and clients in settings which provide activities of daily living and special psychosocial environmental needs. Programs of home health services, comprehensive medical rehabilitation, nursing homes, congregate living centers and similar type health programs. 
(DE) Prerequisite(s): 521 or consent of instructor. 

525 Financial Management of Health Programs (3) Financial management concepts and practices applied to health services programs. Fundamentals of budgeting, costing, financing, rate setting, financial reporting and control. Opportunities to apply techniques. 
(DE) Prerequisite(s): 520 or consent of instructor. 

530 Biostatistics (3) Application of descriptive and inferential statistical methods to health-related problems and programs. Microcomputer applications, use and interpretation of vital statistics and introductory research methodology preparatory for first course in epidemiology. 
Recommended Background: Introductory statistics course. 
Comment(s): Admission to MPH or public health nutrition (MS) programs or consent of instructor. 

540 Principles of Epidemiology (3) Distribution and determinants of health-impacting outcomes in specified populations, with application to control of health problems. Historical origins of discipline, hypothesis formulation, research design, data and error sources, measures of frequency and association, etiologic reasoning, disease screening, and injury control. 
(DE) Prerequisite or (DE) Corequisite: 530. 

(DE) Prerequisite(s): 540 or consent of instructor. 

544 Statistical Software for the Health Professional (3) An intermediate level, survey of three software packages used by public health professionals for data analysis, including Microsoft Excel, Epi Info, and SAS. For students in the applied epidemiology graduate certificate program, data management and analysis using the software packages are explored. As a continuation of biostatistics and the introduction and advanced courses in epidemiology, this capstone course emphasizes application. 
(DE) Prerequisite(s): 530, 540, and 542. 
Registration Permission: Consent of instructor. 

550 Principles and Practices of Community Health Education (3) Theoretical foundations for community health education; opportunities for skill development in variety of educational processes; and introduction to community health analysis. 

552 Community Health Problem Solving (4) Dynamics of community organization, community needs assessment, educational interventions, and application of program planning and evaluation techniques. Opportunity to practice skills in realistic setting. 


560 Theories and Techniques in Health Planning (4) Overview of health planning concepts and methodologies; systems-oriented planning process. Major elements of planning: formulation and conceptualization of problem, plan design, evaluation and implementation. Health problems of institutions, communities and selected population groups, appropriate diagnoses, and programs for addressing needs. 

580 Special Topics (3) 
Repeatability: May be repeated if topic differs. Maximum 6 hours. 
Registration Permission: Consent of instructor. 

587 Internship (3) Internship (community health education, gerontology, or health planning/administration) in either approved organization or research setting under supervision of designated preceptor. 
Grading Restriction: Satisfactory/No Credit grading only. 
Comment(s): MPH admission and one semester advance notice required. 
Registration Permission: Consent of major advisor. 

588 Internship (3) Internship (community health education, gerontology, or health planning/administration) in either approved organization or research setting under supervision of designated preceptor. 
Grading Restriction: Satisfactory/No Credit grading only. 
Comment(s): MPH admission and one semester advance notice required. 
Registration Permission: Consent of major advisor. 

589 Internship (3) Internship (community health education, gerontology, or health planning/administration) in either approved organization or research setting under supervision of designated preceptor. 
Grading Restriction: Satisfactory/No Credit grading only. 
Comment(s): MPH admission and one semester advance notice required. Available only for approved extended placements. 
Registration Permission: Consent of major advisor.
Required Background: Course in teaching of reading or consent of instructor.

534 Seminar in Reading Education (1-6)
Repeatability: May be repeated. Maximum 6 hours.

536 Psychology of Reading (3)
Reading act, relationship between learning theory and reading, role or reading in child’s overall intellectual development. Affective and cultural factors.
Recommended Background: 500-level course in reading education or consent of instructor.

537 Diagnosis and Correction of Classroom Reading Problems (3)
Procedures, methodologies and materials for diagnosing and correcting classroom reading problems.
Recommended Background: Course in reading education or equivalent teaching experience or consent of instructor.

538 Practicum in Diagnosis of Reading Problems (3)
Theoretical and practical applications of specific reading diagnostic instruments; testing of elementary and/or secondary school students, preparing case study reports, and conducting parent conferences.
Recommended Background: Course in diagnosis and correction of classroom reading problems or consent of instructor.

550 Public Relations Management (3)
Theories of leadership and management and organizational structure and functions of public relations agencies and departments in public, private, and non-profit sectors. Analysis and management of problems in communication between organizations and their publics with emphasis on ethics and standards of the profession.

553 Reading in Community College: Research and Theory (3)
Analysis of components of effective community college reading programs. Attention to research bases.
Recommended Background: Course in reading education or consent of instructor.

554 Developmental Reading Practicum (3)
Procedures, methodologies and materials for diagnosing and correcting classroom reading problems. Emphasis on middle and high school students who do not have sufficient reading skill to successfully engage in required reading.
Recommended Background: Course in diagnosis and correction of classroom reading problems or consent of instructor.

555 Developmental Reading Practicum (3)
Diagnosing and teaching children having developmental and corrective reading needs in regular classroom.
Recommended Background: Course in diagnosis and correction of reading problems or consent of instructor.

602 Seminar in Reading Education (1-6)
Repeatability: May be repeated. Maximum 6 hours.

603 Advanced Studies and Theoretical Models of Reading (3)
Research on reading processes. Current theoretical models related to how learners process print.
Recommended Background: 500-level courses in reading education or consent of instructor.

605 Organizing and Administering Reading Programs (3)
Diagnosing and teaching children having developmental and corrective reading needs in the regular classroom.
Recommended Background: Course in diagnosis and correction of reading problems or consent of instructor.

Reading and Leisure Studies (853)
415 Development of Recreation, Leisure, and Athletic Facilities (3)
Principles of designing, planning, equipping, and operating various facilities. Elements of risk management and safety are incorporated into the design process.
Recommended Background: 310 and Sport Management 350 or consent of instructor.

430 Organization and Administration of Leisure Services (3)
Principles of administration applied to provision of leisure services offered by public, private, non-profit, and/or commercial enterprises. Organizational structures, human resource management, diversity, evaluation, legal authority, introduction to budgeting and fiscal procedures, professional responsibility, and career management.
Recommended Background: 310 or Sport Management 350.

440 Dimensions of Commercial Recreation and Leisure Enterprises (3)
Organizational structures, delivery systems, financing private enterprises and operating selected profit centers in a variety of settings. Special attention is given to market performance and economic impact.
Recommended Background: 201 or consent of instructor.

450 Special Topics in Recreation and Leisure Studies (1-6)
Development of special topics in recreation/therapeutic recreation and leisure. Repeatability: May be repeated. Maximum 6 hours.
Rehabilitation Counseling (852)

530 Orientation to Rehabilitation (3) History, philosophy, legal and economic bases, current issues, and practices in public and private rehabilitation programs. Qualifications of service providers. Assessment, plan development, and provision of services to people who have disabilities and vocational handicaps. Identification, mobilization, and utilization of rehabilitation resources.

532 Case Load Management in Rehabilitation (3) Techniques and procedures involved in management of caseloads in Federal-State vocational rehabilitation agencies, private rehabilitation companies, and public or private rehabilitation facilities. Analysis of appropriate industrial management models related to rehabilitation programs.

533 Job Analysis, Development, and Placement (3) Determining employment-readiness of people with disabilities, identifying appropriate jobs for selected clients, and assisting clients in seeking, obtaining, and retaining employment. Job analysis, job modification and re-engineering, marketing, and employer-serving techniques; legislation impacting job placement; supported work; and use of occupational information.

537 Vocational Evaluation: Clinical Methods (3) Process, principles, and techniques used to assist individuals in determining and understanding their own work behavior and vocational potential. Selection and use of occupational exploration programs and work samples; application of situational tasks, job tryouts, and simulated work experiences in vocational evaluation. Clinical interpretation of data through formal staff conference, vocational counseling, and report writing.

538 Current Issues in Rehabilitation Counseling (3) An examination of current issues in rehabilitation counseling. Topics will include use of technology, professional issues in the public, private-not-for-profit and proprietary rehabilitation systems, ethical and professional behavior issues, and other topics selected by the instructor.

541 Psychosocial and Multicultural Aspects of Disability (3) Psychological impact of disability on person and family. Reaction to loss, coping with disability, and societal rehabilitation. Disability as a cultural phenomenon, impact of cultural differences on reaction and adjustment to disability. Cross cultural effects upon the rehabilitation counseling process and therapeutic relationship.

543 Physical Disabilities, Rehabilitation, and Employment (3) Etiological and clinical symptoms related to physically disabling conditions. Discussion of various body systems and common disorders and diseases. Emphasis on diagnosis, treatment, and functional and employment implications of physical disabilities. Skills necessary to communicate medical information to lay persons and understand the reports of medical professionals.

544 Cognitive Disabilities, Rehabilitation and Employment (3) Study of cognitive disabilities such as brain trauma, developmental disabilities, substance abuse, and mental illness. Disabilities will be discussed in the context of medical and psychiatric and diagnostic characteristics, functional effects, and rehabilitation and employment implications.

545 The Rehabilitation Interview (3) Interview as used in assessment and planning with people who have disabilities and vocational handicaps.

547 Practicum in Rehabilitation (3) Supervised experience in area of rehabilitation; application of concepts, principles, and skills.

549 Internship in Rehabilitation Counseling (3-6) Supervised practice in rehabilitation and counseling. 600 clock hours required for graduation. Repeatability: May be repeated. Maximum 9 hours.

579 Special Topics (1-3)
Grad: Satisfactory/No Credit or letter grade. Repeatability: May be repeated. Maximum 9 hours.

591 Research Project in Rehabilitation Counseling (3) Explore and research rehabilitation counseling issues directly related to employment, counselor functions, and/or treatment variables.

593 Independent Study (1-3)
Grad: Satisfactory/No Credit or letter grade. Repeatability: May be repeated. Maximum 6 hours.
**Religious Studies (863)**

**401 Texts and the Study of Texts (3)** Systematic introduction to the nature and function of (primarily, but not exclusively, oral and written) texts and textual traditions in the study of religion. How texts are made and used historically, how they are recovered and created by scholars, and how they are interpreted by religious communities and scholars.

**405 Modern Jewish Thought (3)** History, culture, and geography of the now Israeli portion of the Levant from 1850 to present. The founding of the modern state of Israel in 1948 and the political complexities of the Middle East. Israeli culture and literature. (Same as Judaic Studies 405.)

**411 Modern Religious Philosophies (3)** Religious implications of major Western thinkers and movements from Nicolas of Cusa to the 19th-century German Idealists. (Same as Philosophy 411.)

**415 Psychology of Religion (3)** (See Psychology 415.)

**425 Seminar in Western Religions (3)** Selected figures, themes, movements, and problems. Registration Permission: Consent of instructor. Repeatability: May be repeated. Maximum 6 hours.

**430 Seminar in American Religion (3)** Selected figures, themes, movements, and problems. Registration Permission: Consent of instructor. Repeatability: May be repeated. Maximum 6 hours.

**440 Seminar in Comparative Religion (3)** Selected figures, themes, movements, and problems. Registration Permission: Consent of instructor. Repeatability: May be repeated. Maximum 6 hours.

**490 Readings and Research in Religious Studies (3)** Registration Permission: Consent of instructor. Repeatability: May be repeated. Maximum 6 hours.

**499 Proseminar in Religious Studies (3)** For advanced students in religious studies, required for majors. Selected topics, e.g., nature and function of myth in religion, problem of evil, transcendence, theories of religion, hermeneutics, integrating various disciplines involved in study of religion. Registration Permission: Consent of instructor. Repeatability: May be repeated. Maximum 6 hours.


**505 Religious Texts and Contexts (3)** Critical study of texts and their interpretations: sacred texts, canons, commentaries, religious autobiographies, and religious themes in literature. Registration Permission: Consent of instructor. Repeatability: May be repeated. Maximum 6 hours.

**506 Historical Study of Religions (3)** Description and analysis of religious traditions, phenomena, and themes. Registration Permission: Consent of instructor. Repeatability: May be repeated. Maximum 6 hours.

**507 Religion, Power and Society (3)** Studies of religions in relation to social structure and political institutions: issues of gender, race, class, ethnicity, caste, slavery, religion and the state, globalization and human rights. Registration Permission: Consent of instructor. Repeatability: May be repeated. Maximum 6 hours.

**510 Introduction to Pedagogy of Religious Studies (3)** Conceptualization, methodology, and practice of teaching about religion and religions in the public university context. (DE) Prerequisite(s): 503. Registration Permission: Consent of instructor.

**513 Religion, the Arts, and the Media (3)** Material and expressive culture, religion and journalism, mass communication technologies, popular culture, issues of representation, cultural studies methodologies. Registration Permission: Consent of instructor. Repeatability: May be repeated. Maximum 6 hours.

**514 Religion and Healing (3)** Ecology of religion, nature, shamanism, healing of body and mind, spiritually, religious dimensions of medical ethics. Registration Permission: Consent of instructor. Repeatability: May be repeated. Maximum 6 hours.


**520 Readings in the Study of Religion (1-6)** Repeatability: May be repeated. Maximum 12 hours.

**532 Topics in the History of Religions (3)** Registration Permission: Consent of instructor.

**533 Topics in Religious Thought (3)** Registration Permission: Consent of instructor.

**550 Critical Explorations in Religious Studies (3)** Critical examination of selected phenomena of religion from contemporary theoretical or thematic perspectives. Required for MA students in philosophy major/religious studies concentration. Registration Permission: Consent of instructor. Repeatability: May be repeated. Maximum 6 hours.

**551 Comparative Historical Explorations in Religious Studies (3)** Critical examination of parallel or contrasting historical phenomena from two or more religious traditions. Required for MA students in philosophy major/religious studies concentration. Registration Permission: Consent of instructor. Repeatability: May be repeated. Maximum 6 hours.

**552 Off-Campus Study (1-15)** Repeatability: May be repeated. Maximum 15 hours.

**590 Research Seminar (1)** Research topics in retail and consumer sciences. Registration Permission: Consent of instructor. Repeatability: May be repeated. Maximum 2 hours.

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**Retail and Consumer Sciences (865)**

**412 e-Retailing (3)** Issues concerning the use of the Internet and related technologies to improve and/or transform retail businesses. Emphasizes analysis of consumer and product/service types in online retailing and the effective management of online catalogs. Also direct retailing methods that involve technology such as interactive TV and m-commerce (mobile).

( DE) Prerequisite(s): 210, 341, and Marketing 300.

**415 Retail Promotion (3)** In-store promotional activities. Development of retail promotion strategies. Evaluation of retail promotions. Supplementary focus on advertising and other methods to communicate in-store promotions. (DE) Prerequisite(s): 210, and Marketing 300.

**500 Thesis (1-15)** Grading Restriction: P/NP only. Repeatability: May be repeated.

**501 Professional Project (3-6)** Application-oriented, capstone project to show competence in major academic area. Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated. Maximum 6 hours. Credit Restriction: May not be used toward degree requirements.


Recommended Background: Retail management course.

**511 International Trade and Retail Analysis (3)** International trade and marketing concepts with implications for retail, services, and consumer. Theoretical and applied analysis. International retailing. Current issues.

**538 Consumer Product and Service Development (3)** Critical analysis of consumer product and service development process in services industry. Strategies for developing consumer products, services, programs, and service processes from conception to implementation and evaluation.

**541 Consumer Analysis in Services Management (3)** Analysis of consumer behavior in consumer products and services industry. Development of knowledge to positively impact services marketing organizations through marketing, environmental and product/services strategies based upon consumer behavior knowledge. Investigations of qualitative and quantitative methodologies to conduct elementary consumer research.

**562 Research Methods (3)** Fundamentals of science method, advancement of science, methodology and method of research. Issues and concepts of basic and applied research.

( DE) Prerequisite(s): Statistics 531 or equivalent.

**590 Research Seminar (1)** Research topics in retail and consumer sciences. Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated. Maximum 2 hours.
593 Directed Study (1-3) Individual problems in retailing and consumer sciences.  
Repeatability: May be repeated. Maximum 9 hours.  
Recommended Background: 9 hours of graduate coursework in retail and consumer sciences.

595 Special Topics in Retail and Consumer Sciences (1-3) Lecture, group discussion on specialized topics: retail industry structure, international trade, international retailing, consumer affairs, entrepreneurship, small business management, issues in retail management, issues in retail strategy, quality perception by consumers, product and service value, retailing to children, retailing and special populations, special research methods.  
Repeatability: May be repeated. Maximum 9 hours.  
Recommended Background: 9 graduate hours in consumer sciences.

600 Doctoral Research and Dissertation (3-15)  
Grading Restriction: P/NP only.  
Repeatability: May be repeated.

614 Theory in Retail Environment (3) Analysis and evaluation of theory in retail environment and its application to research in retailing.  
(De) Prerequisite(s): 562 or equivalent.

615 Retail and Consumer Sciences Literature and Thought (3) Evaluation of retail and consumer sciences literature with emphasis upon research literature, development of scholarly thought, and identification of potential areas of further study.  
(De) Prerequisite(s): 562 or equivalent.

616 Research Methods, Models and Measurement in Retail and Consumer Sciences (3) Quantitative and qualitative methods and analytical concepts in the research process. Formulation of models and measurement of consumer sciences constructs.  
(De) Prerequisite(s): 562 and Statistics 538.

625 Strategic Managerial Retailing (3) Decision-making orientation that integrates Strategic framework components with preparation and analysis of specific retail case situations.  
(De) Prerequisite(s): 510 or equivalent.

641 Retail Consumer Behavior (3) Theories and concepts from social science in relation to ultimate consumer’s behavior.  

695 Advanced Topics in Retail and Consumer Sciences (3) Lecture, group discussion, individual research on advanced topics and research areas of current significance to retail and consumer sciences.  
Repeatability: May be repeated. Maximum 9 hours.  
Recommended Background: 9 graduate hours in consumer sciences.

Russian (886)

401 Advanced Grammar, Conversation, and Composition (3)  
(De) Prerequisite(s): 312 or equivalent.

402 Advanced Grammar, Conversation, and Composition (3)  
(De) Prerequisite(s): 312 or equivalent.

425 Introduction to Descriptive Linguistics (3) (See French 425.)

426 Methods of Historical Linguistics (3) (See German 426.)

430 Selected Topics in Russian Literature (3)  
Repeatability: May be repeated if topic differs. Maximum 9 hours.

451 Senior Seminar (3) Intensive study of language, literary style, and literary criticism based on selected major novels.  
Comment(s): For majors in Russian; minors admitted at discretion of instructor.

452 Senior Seminar (3) Intensive study of language, literary style, and literary criticism based on selected major novels.  
Comment(s): For majors in Russian; minors admitted at discretion of instructor.

550 Studies in Russian Literature (3) Content varies.  
Repeatability: May be repeated. Maximum 9 hours.

591 Foreign Study (1-15)  
Repeatability: May be repeated. Maximum 15 hours.

592 Off-Campus Study (1-15)  
Repeatability: May be repeated. Maximum 15 hours.

593 Independent Study (1-15)  
Repeatability: May be repeated. Maximum 15 hours.

Safety (890)

406 Death, Dying and Bereavement (3) (See Health 406.)


Contact Hour Distribution: 3 hours and 2 labs.

452 Safety Principles and Practices (3) An introduction to the general principles, practices, and procedures in occupational and community safety. A survey of historical and present safety issues, problems, and practices addressing safety of individuals and groups in work-site, school, community, transportation, and industrial settings.

500 Thesis (1-15)  
Grading Restriction: P/NP only.  
Repeatability: May be repeated.

502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed.  
Grading Restriction: Satisfactory/No Credit grading only.  
Repeatability: May be repeated.  
Credit Restriction: May not be used toward degree requirements.

532 Behavioral Problems in Safety Education and Accident Prevention (3) Problems of behavior, causes of accidents, and application of principles of psychology in development of safe behavior in all segments of environment.

533 Problems and Research in Accident Prevention (3) Safety problems found in wide variety of accidents that occur in community; findings of current research in behavioral sciences as related to variation incidence of accidents.

534 Organization, Administration and Supervision of Safety Programs (3) National, state and local level programs; administrative, institutional, and supervisory aspects. Implementation of relevant programs.

535 Emergency Management (3) Civil and defense problems: tornadoes, floods, fires, mass civil disasters, and nuclear and personnel attack by alien countries.

536 Safety Instrumentation (3) Selection, calibration, maintenance, and use of sampling instruments available to safety practitioner for evaluating exposures of workers to physical stresses and airborne contaminants.

537 Advanced Emergency Management (3) Advanced study in emergency and hazard mitigation, planning, response and recovery. Theory and practice in identification of appropriate emergency warning systems, hazard assessment, facility inspection, plan development and implementation.

(De) Prerequisite(s): 535.

560 Fire Risk Management (3) Development, implementation, and management of comprehensive fire safety program. Basic fire risk management concepts, interpretation of codes and exposure to basic fire analysis techniques.

564 Personnel Policies in Safety Management (3) Contemporary practices in the organization and operation of safety and health programs.

572 Graduate Workshop in Safety (3) Special safety education problems. For advanced graduate students, teachers, supervisors, and administrators.

Repeatability: May be repeated. Maximum 12 hours.

590 Special Topics (1-3) Advanced study in selected disciplinary or professional area of safety education/management.

Repeatability: May be repeated. Maximum 12 hours.

592 Research Methods in Health (3) (See Health 590.)

593 Directed Independent Study (1-3) Individual identification and study of problem/issue in safety. Extensive reading and critical analysis of safety literature. Requires specific proposal to instructor before registration.

Repeatability: May be repeated. Maximum 12 hours.

601 Internship/Research in Safety and Health (3-6) Field experience. Significant problem identified, researched, and reported in acceptable form. (Same as Health 601.)

Repeatability: May be repeated. Maximum 6 hours.
School Psychology (901)
540 Seminar in School Psychology (3) Essentials of theory and practice of school psychology as professional specialty. Consideration of history and current issues in school psychology.
541 Psychoeducational Assessment (3) Direct, psychometric and naturalistic assessment methods in learning environments. Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated. Maximum 6 hours. (DE) Prerequisite(s): Counselor Education 525 or equivalent. Comment(s): Requires admission to school psychology major or consent of instructor.
542 Practicum in Psychoeducational Assessment (3) Application of assessment skills to clients in learning environments. Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated. Maximum 6 hours. (DE) Corequisite(s): 541. Comment(s): Requires admission to school psychology major or consent of instructor.
545 Psychoeducational Consultation (3) Use of two and three-person models of consultation in educational and therapeutic settings based on behavioral, ecological, social learning and cognitive-behavioral theories. Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated. Maximum 6 hours. (DE) Prerequisite(s): 545. Comment(s): Requires admission to the school psychology major or consent of instructor.
549 Internship in School Psychology (1-6) Supervised employment in unit approved school psychology internship sites. Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated. Maximum 12 hours. Comment(s): Requires admission to school psychology major. Registration Permission: Consent of instructor.
649 Advanced Internship in School Psychology (1-9) Supervised experience as school psychologist in unit-approved internship site for doctoral level students. Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated. Maximum 9 hours. Comment(s): Admission to doctoral school psychology concentration required. Registration Permission: Consent of instructor.
650 Professional Practice in School Psychology (1) Field setting to facilitate academic, social and interpersonal development of children and adults. School and mental health settings for intervention, consultation, prevention, and assessment services. Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated. Maximum 9 hours.
690 Psychopathology of Childhood (3) Descriptive and critical study of psychopathology of childhood and of systems of nomenclature applied to individuals with mental disorders: nomenclature provided in State Department of Education's Student Evaluation Manual and Diagnostic and Statistical Manual of Mental Disorders of American Psychiatric Association.
Science Education (899)
496 Teaching Science Grades 7-12 (3) Methods, materials, recent trends in science and environmental education programs for secondary schools. Comment(s): Admission to teacher education required.
509 Education for Sustainable Development: Making Connections (3) Holistic and interdisciplinary approach that encourages educators and learners to engage in dialogue in order to acquire through experiences and creativity skills and knowledge needed to maintain a balance between socio-economic, political and environmental goals.
510 Theoretical Foundations of Environmental Education (3) Study of history and philosophy of environmental education, pedagogical approaches, and current status, including model programs and standards for environmental education. Addresses implementation of environmental education in formal and non-formal educational settings. A technology-enhanced course with both online and fieldwork components.
531 Teaching Science to Young Children: K-4 (3) Recent trends in methods, materials and content in teaching science to students in grades K-4.
Science and Environment (890)
543 Teaching Science in the Middle Grades (3) Activities in this class are intended to promote the professional growth of pre-service and in-service science teachers by studying science curriculum and instructional strategies. In particular, methods of teaching contemporary science content in grades 4-8 will be explored.
545 Teaching Science in Elementary Grades (3) Activities in this class are intended to promote the professional growth of pre-service and in-service science teachers by studying science curriculum and instructional strategies. In particular, methods of teaching contemporary science content in grades K-4 will be explored.
554 Social Work (905)
Graduate students majoring in fields other than social work are admitted to certain social work courses with the approval of the College of Social Work and the student's major professor.
500 Thesis (1-15) Grading Restriction: P/NP only. Repeatability: May be repeated.
502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed. 
Grading Restriction: Satisfactory/No Credit grading only. 
Repeatability: May be repeated. 
Credit Restriction: May not be used toward degree requirements.

503 Foundations of Social Work Practice II (3) Generalist practice with family and small group systems. Ecological theory to frame understanding of such systems and their adaptation to environments. Various social work roles and intervention strategies pertaining to client systems. 

504 Foundations of Social Work Practice III (3) Basic theory, methods, problems, and strategies in implementing planned change within and among larger social systems; task groups, human service organizations, and community systems. Various practice roles: planner, program developer, supervisor, administrator, advocate and task group leader.

506 Social Work Research (3) Research methodologies with respect to evolution and application to social work theory and practice. History and philosophies of science; problem formulation; research design; ethics; instrument use and construction; data collection; analysis and reporting; and evaluation and utilization of research.

509 Graduate Seminar in Public Health (1) (See Public Health 509.)

510 Social Work and Social Welfare Policies and Programs (2) Historical and contemporary contexts of social welfare. The profession’s distinctive mission, history, values and ethical standards, and multiple roles with individuals, families, groups, organizations, and communities are examined using local to international comparisons. Key professional competencies, diversity, justice, critical thinking, and evidence-based practice are emphasized. Organizational, community, and legislated policies related to social issues, problems, and client systems using local to international contexts. Use of justice, power, social construction, and social work values and ethics in analyzing, influencing, developing, implementing, and advocating for policies and programs.

512 Social, Economic, and Political Environments (2) Examines the profound influences on and critical interfaces of client systems with the world in which we live. Incorporates local to international information about social, economic, and political trends and innovations, and about effects on social, political, and economic systems from ecological perspective. Interactions among biological, social, psychological, and cultural systems on development across life cycle. Effects of ethnic, racial, economic, gender, and sexual orientation variables.

514 Human Behavior in the Social Environment I (3) Life cycle from infancy through adolescence. Major social science theories that inform social work profession’s understanding of human behavior and social systems from ecological perspective. Interactions among biological, social, psychological, and cultural systems on development across life cycle. Effects of ethnic, racial, economic, gender, and sexual orientation variables.

515 Human Behavior in the Social Environment II (3) From young adulthood through senescence. Major social science theories that inform social work profession’s understanding of human behavior and social systems from ecological perspective. Interactions among biological, social, psychological, and cultural systems on development across life cycle. Effects of ethnic, racial, economic, gender, and sexual orientation variables.

516 Social Welfare Policy and Services (3) Development of contemporary social policy at local, state, national, and international levels. Contribution of social work professionals to formal policy-making process through which macrosocial change is effected and through which aggregate social welfare services are proposed, authorized, financed, and programmed. Theories of complex organizations applied to social welfare service delivery settings.

517 Diversity, Social and Economic Justice, and Oppression (2) In context of the cultural, ecological, developmental, and transactional theories, social work values and ethics, and a human rights perspective, critically assesses theory and research about sources, forms, and outcomes of oppression for at-risk client systems. Integrates local to international information about our global, diverse, multicultural society with evidence-based knowledge and skills that address oppression, are culturally affirming, and promote social and economic justice and human dignity.

518 Social Work and Oppression (3) Sources, dynamics, and impact of oppression in U.S. society as manifested in both social/ecological/ economic systems and personal experience. Connections among various forms of oppression: racism, sexism, classism, and heterosexism, and forces that perpetuate such conditions.

519 Foundation Research (3) Social work practice-focused quantitative and qualitative research knowledge and skills. Includes critical evaluation of theoretical literature and basic research methodology including construct operationalization; study design; selection, development, implementation, and evaluation of measures and instruments; and data management and analysis using statistical software.

520 Foundations of Evidence-Based Practice (1) Examines how to (1) convert information needs related to practice decisions into well-structured answerable questions; (2) efficiently locate the best evidence with which to answer such questions; (3) critically appraise such evidence; (4) apply results to practice and policy decisions; and (5) evaluate the effectiveness and efficiency of the application of such results to practice and policy decisions.
Recommened Background: Advanced Standing.

521 Clinical Social Work Practice with Individuals (3) Theories, knowledge, and skills for clinical practice with individuals from ecological perspective. Therapeutic process and intervention strategies, incorporating content from psychodynamic and cognitive practice models, and specific client problems.

522 Introduction to Social Work Practice (4) Historic and contemporary contexts of social welfare. The profession’s distinctive mission, history, values and ethical standards, and multiple roles with individuals, families, groups, organizations, and communities are examined using local to international comparisons. Theories are examined in the context of critical thinking and evidence-based practice. Defines generalist practice philosophy, methods, roles. Emphasizes skills (i.e., interpersonal communication, relationship building, power analyses, assertiveness, conflict management) that are essential to problem identification, assessment, and intervention with all client systems (individuals, groups, organizations, communities), and with other professionals and decision-makers. Uses local to international examples to translate theory and evidence-based knowledge into practice that is competent, ethical, cultural-affirming, and emotionally engageing.
Registration Restriction(s): Master of Science in Social Work.

523 Clinical Social Work Practice with Families (3) Concepts related to understanding and analyzing family dynamics and interactional patterns from perspective of major family therapy models. Techniques of intervention in terms of application to families with varied systems and individual problems and to families from varied social and cultural backgrounds.

524 Psychopathology and Social Deviance (3) Assessment of psycho social functioning of individuals. Examination of mental disorders: clinical presentation problems, causes, and processes. Ecological perspective.
Recommended Background: Foundation or consent of instructor.

525 Clinical Social Work Practice with Groups (3) Theoretical and historical approaches to social work with groups and clinical principles supporting specific types of group work used in clinical practice and associated leader interventions.

526 Evaluating Clinical Practice (3) History and philosophies, conceptual approaches, techniques and methods in the practice and use of practice research as applied to implementation and evaluation of direct services to clients.

530 Seminar in Clinical Social Work (2-3) Topics in theory and practice of clinical social work with individuals, couples, families and groups.
Repeatability: May be repeated. Maximum 6 hours.

532 Short-Term Interventions (3) Theory and practice of planned short term, emergency, and crisis interventions.

534 Social Work Interventions with Children and Adolescents (3) Various practice modalities for assessing and intervening with children and adolescents.

535 School Social Work (3) Place of school as community institution and resource. Methods, processes, and techniques employed in school social work.
537 Introduction to Psychopathology and Social Work Practice (2) Examines psychopathology and mental disorders from an ecological perspective. Emphasis on understanding biopsychosocial influences on the incidence, course and treatment of the most commonly presented mental disorders and the differential effect of these factors on diverse populations. Focuses on the acquisition of diagnostic skills as they relate to comprehensive social work assessment and the development of social work interventions. Stresses ethical issues, collaboration with families, knowledge of psychopharmacology and the varied roles social workers play in mental health settings. (DE) Prerequisite(s): 510, 512, 513, 517, 519, 520, 522.

538 Advanced Social Work Practice w/At-Risk Populations (2) In-depth study of evidence-informed and evidenced-based practice models with at-risk populations. Assessment and interventions focus on individuals, groups, families, and communities. (DE) Prerequisite(s): 510, 512, 513, 517, 519, 520, 522. Registration Restriction(s): Master of Science in Social Work.

539 Leadership Skills and Knowledge for Advanced Social Work Practice (2) Organizational management knowledge, leadership skills and supervision required in development and management of structure, resources and cultures of human services delivery systems. Administrative knowledge and skills in budgeting, resource allocation, marketing and expenditure control. Issues regarding organizational management change in organizations, communities and national global contexts. (DE) Prerequisite(s): 510, 512, 513, 517, 519, 520, 522.

540 General Topics in Social Work (3) Current topics in advanced social work.
Repeatability: May be repeated. Maximum 6 hours.

541 Leadership and Management in Human Services (3) Management practices and leadership skills required in development and management of human services delivery systems. Issues regarding human resources management, resource allocation, strategic planning, and organizational dynamics.

542 Foundation Field Practice I (3) Instruction and supervision in generalist social work practice. This course includes a seminar and agency-based internship.
Grading Restriction: Satisfactory/No Credit grading only.
Registration Restriction(s): Master of Science in Social Work.

543 Financial Management and Resource Development (3) Administrative decision making related to financial planning and resource allocation in human service organizations. Knowledge and skills in budgeting, allocating, expenditure control, fundraising, grant writing, marketing, and evaluation.

544 Foundation Field Practice II (2-3) Instruction and supervision in generalist social work practice. This course includes a seminar and agency-based internship.
Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated only if a grade of S has been earned. Maximum 3 hours.
Registration Restriction(s): Master of Science in Social Work.

547 Evaluation Research (3) History and philosophies, conceptual approaches, techniques and methods, and issues in practice and utilization of evaluation research as applied to development and evaluation of social work programs and policies. Issues pertaining to strengths and limitations of various evaluation methods, microcomputer application of data and measurement of program goals and objectives.

550 Seminar in Management and Community Practice (2-3) Topics in theory and practice of management and community practice.
Repeatability: May be repeated. Maximum 6 hours.

Repeatability: May be repeated. Maximum 6 hours.

552 Community Organization (3) Locality development, social planning and social action as practice models for development of resources to meet human needs.

564 Substance Abuse (3) Survey and analysis of social, cultural, medical and psychological factors underlying alcoholism and drug abuse and addiction; recent research and practice innovations.

566 Social Gerontology (3) Physical, psychological and social aspects of aging, and major social policies and programs.

580 Field Practice (3) Instruction and supervision in social work practice.
Grading Restriction: Satisfactory/No Credit grading only.

581 Field Practice (3) Instruction and supervision in social work practice.
Grading Restriction: Satisfactory/No Credit grading only.

582 Field Practice (2-6) Advanced field practice in clinical social work or management and community practice. Full-time students must enroll for six credit hours.
Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated. Maximum 6 hours.

583 Field Practice (2-6) Advanced field practice in clinical social work or management and community practice. Full-time students must enroll for six credit hours.
Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated. Maximum 6 hours.

584 Field Practice (3) Field practice for summer session advanced standing students only.
Grading Restriction: Satisfactory/No Credit grading only.

585 Seminar in Gerontology (1) (See Health 585.)

593 Independent Study (1-6) Individualized study, student selects, designs, and completes examination of special issue or problem.
Repeatability: May be repeated. Maximum 6 hours.

600 Doctoral Research and Dissertation (3-15)
Grading Restriction: P/NP only.
Repeatability: May be repeated.

601 Research for Social Work Practice I (3) Epistemological and methodological considerations for both quantitative and qualitative research for social work practice.

602 Research for Social Work Practice II (3) Epistemological and methodological considerations for both quantitative and qualitative research for social work practice.

605 Analysis of Social Work Data I (3) Techniques for quantitative analysis of social work data: unique data analysis problems encountered in social work research.

606 Analysis of Social Work Data II (3) Techniques for quantitative analysis of social work data: unique data analysis problems encountered in social work research.


640 History of American Social Work (3) Social, cultural, economic and political contexts for development of social work profession, development of education for profession, and modern welfare system.

650 Programs and Legislation for Children and Families (3) Background, purposes, and current issues surrounding major social welfare and health programs serving disadvantaged children and their families: Social Security Act (Title IV, Child Welfare and AFDC; Title V, the Maternal and Child Health Block Grant; Title XIX, Medicaid), Head Start, WIC and other nutrition programs, and Healthy Start. Current issues and controversies; legislative changes.

670 Critical Literature Reviews (3) Techniques and methods for conducting critical reviews of literature: conceptual and methodological critiques of existing research.
Grading Restriction: Satisfactory/No Credit grading only.

693 Directed Study in Social Work Research (3) Advanced individual study, under faculty guidance, of social work practice issues.
Repeatability: May be repeated. Maximum 9 hours.
Recommended Background: First-year required PhD courses or consent of instructor.

Sociology (915)

446 The Modern World System (3) Critical examination of the capitalist world-system as a social system, its coherence, boundaries, regions, member groups, cleavages, and patterns of conflict. Analysis of who gets what, why, and how in global political economy.

451 Criminal Justice (3) A critical assessment of the criminal justice apparatus and its components. Brief examination of the police, with most of the emphasis on the criminal courts and institutions and programs such as the prison, probation, and parole. Analysis of their operation and impacts. (Same as Legal Studies 451.)
Recommended Background: 350.

452 Minorities, Crime and Criminal Justice (3) Examines racial/ethnic disparities in criminal offending and victimization, as well as different experiences with law enforcement, judicial and correctional agencies. Emphasis on social justice.
453 Gender and Crime (3) Probes the gendered nature of offending, victimization and criminal justice. Examines the different experiences of males and females, and theories that attempt to explain these differences.

455 Society and Law (3) How laws and legal processes are affected by social change, the social impact of legal sanctions, and relations between law and social justice. (Same as Legal Studies 455.)

459 White-Collar Crime (3) The distinctive nature and dynamics of white-collar crime, victims and costs of white-collar crime, organizations as white-collar offenders, causal theories, and the dynamics of responses to white-collar crime by private and public parties.


464 Urban Ecology (3) The relation of humans to their urban environment with emphasis on conservation and use of appropriate technology.

465 Social Values and the Environment (3) Human dimensions of ecosystem management and public policy. An applied focus on how social values are activated within specific biophysical and social settings.

(DE) Prerequisite(s): 110 or 120 or consent of instructor.

500 Thesis (1-15)
Grading Restriction: P/NP only.
Repeatability: May be repeated.

502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed.
Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated.
Credit Restriction: May not be used toward degree requirements.

504 Sociological Foundations of Political Economy (3) Survey of contemporary sociological theories of political economy, sources of political and economic power and conflict.

505 Foundations of Criminology (3) Critical overview of contemporary developments in criminology, theories of crime causation and theories of responses to crime.

506 Social Justice and Public Policy (3) Examines the formulation and consequences of public policy, analyzing: the general public policy process model; the model's specific applications to criminal justice policy, environmental policy, and economic and political policies; and techniques of policy evaluation research.

507 Foundations of Social Psychology (3) Current and classical theoretical perspectives in social psychology.

510 Professional Preparation (1) A variety of one-credit seminars that offer training in specific aspects of professional socialization.
Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated. Maximum 6 hours.

521 Sociological Theory I (3) Assessment of what sociological theory is; its major figures and their approaches to understanding society.

531 Research Methods in Sociology (3) Research design, measurement, sampling, quantitative and qualitative data collection techniques, data, reduction, and analysis.

534 Advanced Sociological Analysis (3) Underlying assumptions and logical procedures used by sociologists in formulating explanations; foundations of sociological research strategies and techniques.

541 Collective Behavior, Social Movements, Social Change (3) Basic theory and research on conditions of social unrest in human collectivities and efforts of collectives to change existing society.

543 Sociology of Development (3) Sociological theories and studies of development: modernization, colonialism, dependency; comparative impact of various development paths upon selected aspects of social structure and change.

551 Juvenile Delinquency and the Social Structure (3) This course examines how juvenile delinquency policies are shaped by social structures and changes in social perceptions of childhood, crime, and punishment.

560 Environmental Sociology (3) Systematic treatment of current research in environmental sociology. Social impact analysis and conflicts over environmental issues.

562 Sociology of Environmental Policy (3) Examines the history of environmental use and environmental protection; the policy process; the institutional and cultural barriers to improved environmental policies; and potential policies for sustainability.

585 Seminar in Gerontology (1) (See Health 585.)

591 Foreign Study (1-15)
Repeatability: May be repeated. Maximum 15 hours.

592 Off-Campus Study (1-15)
Repeatability: May be repeated. Maximum 15 hours.

593 Independent Study (1-15)
Repeatability: May be repeated. Maximum 15 hours.

599 Readings (3) Selected topics.
Repeatability: May be repeated. Maximum 6 hours.

600 Doctoral Research and Dissertation (3-15)
Grading Restriction: P/NP only.
Repeatability: May be repeated.

622 Sociological Theory II (3) Distinct schools of sociological theory and contributions of their principal exponents.
(DE) Prerequisite(s): 521 or consent of instructor.

629 Supplementary Readings in Sociological Theory (3) Individual guidance. Preparation for comprehensive examination.
Grading Restriction: Satisfactory/No Credit grading only.
Registration Permission: Consent of instructor.

633 Survey Design and Analysis (3) Systematic exploration of survey problems through student participation in design and analysis of survey.
(Same as Child and Family Studies 633.)
(DE) Prerequisite(s): 531 or consent of instructor.

636 Field Research (3) Research experience in selected field sites using techniques of interviewing, participant observation, and other methods of field research.
(DE) Prerequisite(s): 531 or consent of instructor.

639 Supplementary Readings in Methodology (3) Individual guidance. Preparation for comprehensive examination.
Grading Restriction: Satisfactory/No Credit grading only.
Registration Permission: Consent of department.

644 Political Sociology (3) Critical examination of theories of state and political processes.

645 Advanced Studies in Political Economy (3) Topical seminar.
Repeatability: May be repeated. Maximum 6 hours.
(DE) Prerequisite(s): 504 or consent of instructor.

649 Supplementary Readings (3)
Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated. Maximum 6 hours.
Registration Permission: Consent of instructor.

653 Sociology of Law (3) Intensive examination of selected topics in sociology of law.
(DE) Prerequisite(s): 505 or consent of instructor.

655 Advanced Studies in Criminology (3) Intensive examination of selected topics in criminology.
Repeatability: May be repeated. Maximum 6 hours.
(DE) Prerequisite(s): 505 or consent of instructor.

661 Environmental Sociology (3) Historical and contemporary studies of interaction between humans and their environment.
Registration Permission: Consent of instructor.

665 Advanced Topics in Environmental Sociology (3) Topical seminar covering particular lines of research and theory within area.
Repeatability: May be repeated. Maximum 6 hours.
Registration Permission: Consent of instructor.

675 Advanced Studies in Social Psychology (3) Selected contemporary research issues related to social psychological theories.
Repeatability: May be repeated. Maximum 6 hours.
(DE) Prerequisite(s): 541 or consent of instructor.

695 Advanced Special Topics (3) Topic of special interest or student-initiated courses that will not be regularly offered.
Repeatability: May be repeated. Maximum 6 hours.
Registration Permission: Consent of instructor.

699 Tutorials in Advanced Topics (3) Individual instruction.
Repeatability: May be repeated. Maximum 6 hours.
Registration Permission: Consent of department.
Spanish (924)

421 Phonetics (3)  
(DE) Prerequisite(s): 323 or consent of instructor.

422 Advanced Grammar and Translation (3) Structure of the grammatical system of Spanish. In-depth analysis of selected syntactic phenomena with practical illustration/application and exercise in Spanish-English and English-Spanish translation. Emphasis on finer points of grammatical structures.  
(DE) Prerequisite(s): 323. Comment(s): Not available to native or bilingual students of Spanish without consent of department.

423 Advanced Composition and Conversation (3) Develops writing and speaking skills at the advanced level, covering a wide range of topics and situations and including a variety of in-class and extra-class activities.  
(DE) Prerequisite(s): 323 or consent of department. Comment(s): Not available for credit for students whose level of proficiency in Spanish is superior as defined by the ACTFL.

425 Introduction to Descriptive Linguistics (3) (See French 425.)

426 Methods of Historical Linguistics (3) (See German 426.)

429 Romance Linguistics (3) (See French 429.)

430 Topics in Hispanic Linguistics (3) Introduction to the study of the Spanish language through different areas of linguistics such as phonology, morphology, syntax, semantics, sociolinguistics, dialectology, and second language acquisition. (Same as Linguistics 431.)  
Repeatability: May be repeated with consent of department. Maximum 6 hours.  
(DE) Prerequisite(s): 323.

433 Images of Woman in Hispanic Literature (3) examines major Hispanic texts (and/or women authors) in light of the relation of female individuality to a particular social context, the role of women in society, patriarchal tradition, woman as cultural and aesthetic value (the feminine symbolic), and feminist theoretical issues.  
(DE) Prerequisite(s): 323, 330, and completion of 9 additional hours of upper-division Spanish.  
Repeatability: May be repeated with consent of department. Maximum 6 hours.  
Repeatability: May be repeated with consent of department. Maximum 6 hours.

434 Hispanic Culture through Film (3) Analysis of selected films on subjects concerning life, culture, and artistic traditions in the Hispanic world; exploration of ideological, philosophical, social, and political implications of films and a comparison of them with treatments of related subjects in other types of artistic production. Taught in Spanish. (Same as Cinema Studies 434.)  
Repeatability: May be repeated with consent of department. Maximum 6 hours.  
Repeatability: May be repeated with consent of department. Maximum 6 hours.

461 Special Topics (3) Focus on aspects of Hispanic literature, culture, linguistics, or foreign language pedagogy. Topics vary.  
Repeatability: May be repeated with consent of department. Maximum 6 hours.

465 Latin American Film and Culture (3) Explores Latin American and Latino/a films and videos from 1900s to present as works of art and in light of political, cultural, and social contexts. Taught in English. (Same as Cinema Studies 465; Latin American Studies 465.)  
Contact Hour Distribution: 1 hour lecture, 2 hours screening, and 1 hour discussion.

479 Disenchedt Texts in Hispanic Literature (3) Texts representing trends and periods of renewal in Spain and Latin American countries. Selected topics on traditions in crisis. Content will vary. (Same as Latin American Studies 479.)  
Repeatability: May be repeated with consent of department. Maximum 6 hours.  
(DE) Prerequisite(s): 323, 330, and completion of 9 additional hours of upper-division Spanish.

480 Social Forces in Hispanic Literary Expression (3) Analysis of major Hispanic texts that address factors and events that influenced and/or continue to influence social and cultural evolution of the Hispanic world, including literature itself.  
Repeatability: May be repeated with consent of department. Maximum 6 hours.  
(DE) Prerequisite(s): 323, 330, and completion of 9 additional hours of upper-division Spanish.

482 Trends in Hispanic Thought (3) Intellectual/philosophical currents represented in literary works, selected thinkers, or movements from historical periods of Spain and Latin American countries.  
Repeatability: May be repeated with consent of department. Maximum 6 hours.  
(DE) Prerequisite(s): 323, 330, and completion of 9 additional hours of upper-division Spanish.

484 Race, Ethnicity, and Nation in Hispanic Literature (3) Close reading and analysis of literary texts that deal with issues of race and ethnicity in the Hispanic world, especially with regard to identity and concepts of nationhood. Among possible course topics—mestizaje; conceptual distinctions between race and ethnicity in Latin America; indigenism; afrocentrism; issues of mestizaje and empire; and relationship between Jews, Christians, and Moors in Spain.  
Repeatability: May be repeated with consent of department. Maximum 6 hours.  
(DE) Prerequisite(s): 323, 330, and completion of 9 additional hours of upper-division Spanish.

486 Literary and Artistic Movements in the Hispanic World (3) Examination of relationships (thematic, cultural, socio-political, aesthetic, philosophical, etc.) between specific trends in literature and other artistic media, in light of historical contexts in which those relationships emerged.  
Repeatability: May be repeated with consent of department. Maximum 6 hours.  
(DE) Prerequisite(s): 323, 330, and completion of 9 additional hours of upper-division Spanish.

489 Topics in Hispanic Civilization (3) Analysis of major trends, issues and/or movements in the civilizations of Spain and Spanish America. Political, literary, and cultural perspectives dealing with topics from the Middle Ages to present day may be explored.  
Repeatability: May be repeated with consent of department. Maximum 6 hours.  
Repeatability: May be repeated with consent of department. Maximum 6 hours.

500 Thesis (1-15)  
Grading Restriction: P/NP only.  
Repeatability: May be repeated.

502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed.  
Grading Restriction: Satisfactory/No Credit grading only.  
Repeatability: May be repeated.  
Credit Restriction: May not be used toward degree requirements.

512 Teaching a Foreign Language (3) Practical application of methods for teaching and evaluating basic language skills and cultural aspects through seminars, demonstrations, peer teaching, and observation of foreign language classes. Required of all MA and PhD students holding Graduate Teaching Assistantships, except those whose previous training or experience warrants their being excused by the department.

531 Old Spanish (3) Evolution of Spanish language from its origins through the 15th century.

532 Medieval Spanish Literature (3) Literary works of the 11th through 15th century. Application of literary theories to understanding of literature, nature and evolution of major literary genres during Spanish Middle Ages, and socio-historical contexts of medieval works.  
Repeatability: May be repeated with consent of department. Maximum 6 hours.

533 Golden Age Prose (3) Wide range of prose fiction in Spain during the 16th and 17th centuries: Moorish, picaresque, sentimental, pastoral and exemplary novels, and dialogues.

534 Don Quijote (3) Cervantes’ masterpiece in socio-cultural and literary context of its times: study of thematic, structural, and stylistic issues: crisis of aristocracy, Quixotic madness, discrepant cognitive and ethical perspectives, satiric irony, culture of sentiment, and Cervantes’ legacy to subsequent literary periods. Content varies.  
Repeatability: May be repeated with consent of department. Maximum 6 hours.

535 Golden Age Poetry (3) Garcilaso, Fray Luis de León, San Juan de la Cruz, Lope de Vega, Quevedo, and Góngora.

537 Golden Age Drama (3) Major dramatists of period: Lope de Vega, Tirso de Molina, Ruiz de Alarcón, Guillén de Castro, Calderón de la Barca, Moreto, and Rojas Zorrilla.

Repeatability: May be repeated with consent of department. Maximum 6 hours.

541 19th-Century Spanish Prose (3) Costumbrismo, realism, and naturalism in the novel, short story, and essay as represented in major authors: Larra, Mesonero Romanos, Fernán Caballero, Alarcón, Valera, Palacio Valdés, Pereda, Galdós, Pardo Bazán. Content varies.  
Repeatability: May be repeated with consent of department. Maximum 6 hours.

542 20th-Century Spanish Literature: Generation of '98 through Civil War (3) Principal achievements and representative directions in literature of Spain through Civil War years.

543 20th-Century Spanish Literature: Post-Civil War through Present (3) Principal achievements and representative directions in literature of Spain from Post-Civil War period to present.
550 Techniques of Literary Analysis and Research Methods (3) Theoretical and critical essays on various techniques of literary analysis. Exploration of bibliographical and research materials.

551 Special Topics in Hispanic Literature or Linguistics (3)
Repeatability: May be repeated. Maximum 6 hours.

552 Directed Readings (3)

561 Spanish American Colonial Literature (3) From the pre-Columbian era through the 18th century. Reading and analysis of selected works from the Colonial Spanish American period and their Continental sources. Indigenous texts and authors. Content varies.
Repeatability: May be repeated with consent of department. Maximum 6 hours.

Repeatability: May be repeated with consent of department. Maximum 6 hours.

571 Spanish American Narrative: Criollismo to 1950 (3) Critical study of major trends and movements that shaped Spanish American narrative during the first half of 20th century. Content varies.
Repeatability: May be repeated with consent of department. Maximum 6 hours.

572 Spanish American Narrative: Boom to Present (3) Critical study of major trends and movements that established Spanish American narrative as influential force in world literature during the second half of the 20th century. Content varies.
Repeatability: May be repeated with consent of department. Maximum 6 hours.

573 Regional Approaches to Interpreting Spanish American Literature (3) Interpretation of Spanish-American literature taking into consideration regional differences attributable to such factors as race, geography, immigration, and economic development. Key regions include Mexico, Central America, Caribbean, Andean countries, and the Southern Cone. Course readings vary between specific regional perspective and transregional one. Content varies.
Repeatability: May be repeated with consent of department. Maximum 6 hours.

575 Spanish American Modernismo and Vanguardismo (3) Critical study of principal writers and literary works associated with Spanish American modernismo and vanguardismo published between 1880 and 1950. Concepts and expressions of modernity as reflected in literature of period. Content varies.
Repeatability: May be repeated with consent of department. Maximum 6 hours.

576 Contemporary Spanish American Poetry (3) Critical study of major poets in Spanish America from 1950 to present. Content varies.
Repeatability: May be repeated with consent of department. Maximum 6 hours.

577 Contemporary Spanish American Theater (3) Reading and analysis of Spanish America’s major dramatic works published and performed since 1950. Content varies.
Repeatability: May be repeated with consent of department. Maximum 6 hours.

Repeatability: May be repeated with consent of department. Maximum 6 hours.

579 Spanish American Literary Criticism (3) Major works in which Spanish Americans have developed strategies to define, organize, and catalog literature published throughout continent. Critical approaches that surpass European and other non-Spanish American critical perspectives. Content varies.
Repeatability: May be repeated with consent of department. Maximum 6 hours.

581 Seminar in Spanish Literature or Linguistics (3) Topics vary in field of Peninsular literature.
Repeatability: May be repeated with consent of department. Maximum 9 hours.

621 Seminar in Spanish American Literature or Linguistics (3) Topics vary.
Repeatability: May be repeated with consent of department. Maximum 9 hours.

Special Education (932)

410 Early Childhood Special Education Foundations (3) Introduction to the field of early childhood special education, including the nature of disabling conditions; theoretical perspectives in the field; legislation; policies and procedures used in the field.

419 Psychology and Education of Students with Mild Disabilities (6) Nature and characteristics of persons with mild handicaps and educational strategies appropriate for these persons.
(DE) Prerequisite(s): 402.
(DE) Corequisite(s): 420.
Comment(s): Admission to teacher education required.

420 Field Experience in Special Education Programs (3) Practicum in teaching special education programs. Planning, developing, implementing, and evaluating instruction.
Grading Restriction: Satisfactory/No Credit grading only.
(DE) Prerequisite(s): 402.
(DE) Corequisite(s): 419 and/or 471.
Comment(s): Admission to teacher education required.

431 Field Experience in Comprehensive Programs (3) On-site teaching experience with moderately and severely handicapped children and youth.
Grading Restriction: Satisfactory/No Credit grading only.
(DE) Prerequisite(s): 402.
(DE) Corequisite(s): 432.
Comment(s): Admission to teacher education required.

432 Psychology and Education of Students with Moderate/Severe Disabilities (6) Nature and characteristics of persons with moderate/severe disabilities and the educational strategies appropriate for those persons.
(DE) Prerequisite(s): 402.
(DE) Corequisite(s): 431.
Comment(s): Admission to teacher education required.

456 Speech and Language Basis of Learning Disabilities in the Classroom (3) Normal communication development. Understanding of speech and language impairments in school-age students. Integration of oral/written communication skills into existing curriculum, especially for high incidence special education students.

470 Psychology of the Exceptional Child (3) General characteristics and educational needs of exceptional children. Implications of developmental variations for functioning as adults.
Comment(s): Enrollment limited to non-special education majors.

471 Early Childhood Special Education (6) Assessment, curriculum planning and development and teaching approaches used in early childhood special education.

504 Clinical Experience in Teaching and Supervision of Exceptional Children (3-9) (See Education of the Deaf and Hard of Hearing 504.)

506 Internships in Teaching in Special Education and Rehabilitation (3-15) Placement in professional settings in public schools or agencies under supervision of master practitioners.
Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated. Maximum 15 hours.
Comment(s): Enrollment limited to those in the fifth-year program.

553 Assessment of Exceptional Students (3) Current issues related to assessment; advanced study of evaluation models for special education; dynamic and other innovative assessment approaches; advanced study of application to educational programming; basic statistics and application in assessment.

554 Assessment in Early Childhood Special Education (3) Development of knowledge and skills in appropriate formal and informal assessments of handicapped infants and young children: screening, identification, diagnosis, placement and programming assessment issues.

555 Characteristics of Affective/Motivational Functioning in Children with Disabilities (3) Definition, methods, identification and symptoms of children with affective/motivational development in disabled youngsters. Comparison to normal development and that of children labeled disturbed or behavior disordered.

556 Instructional Systems for Affective/Motivational Education for Children with Disabilities (3) Educational strategies and models of instruction; simulation, demonstration, and media. Teaching techniques, materials, and teacher/pupil/family interactions. Therapeutic forms of education through art, music, role play, puppetry, bibliotherapy, and group interactions.
(DE) Prerequisite or (DE) Corequisite: 555 or consent of instructor.
490 Psychology of Coaching (3) Major topics and theories dealing with the social-psychological factors affecting the performance of athletes and teams, with practical suggestions for enhancing the effectiveness of teachers and coaches.

500 Thesis (1-15) Grading Restriction: P/NP only. Repeatability: May be repeated. Maximum 15 hours.

501 Special Project (3) Research study suitable for publication, or practicum requiring special written work. Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated. Maximum 15 hours.

502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed. Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated. Credit: May not be used toward degree requirements.

511 Administration/Supervision in Sport (3) Development of knowledge and analytic skills desirable for managers/administrators in sport business/organization: organizational, administrative, and supervisory strategies related to sport in profit and non-profit settings. Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated. Credit: May not be used toward degree requirements.

512 Application of Legal Concepts to Sport Settings (3) Application of contract law, breach of contract, and monetary damages within sport settings: risk assessment and development of effective risk management strategies; development of contracts in sports; and analysis of cases involving discrimination based upon gender, race, and age as well as protection of rights at amateur and professional levels of sport. Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated.

530 Sport and Media Issues (3) Gender and race issues within context of media and sport. Development of sport media and media influence on sport. Grading Restriction(s): Master of Science – sport management major.

532 Research Techniques in Sport (3) Evaluate, compare, and contrast research techniques in sport with consideration for and experiences in appropriate review, design, analysis procedures, and proposal development. Grading Restriction(s): Master of Science – sport management major.

535 Ethics in Sport Management (3) Development of analytical skills and knowledge desirable of middle and upper level managers in sport business/organizations. Social issues and ethics in sport administration. Registration Restriction(s): Master of Science – sport management major.

540 Sport Economics and Finance (3) Principles of economics and finance as applied to sport organizations. Market structures of sport finance and political economics that form those structures.

544 Theories of Leadership and Leader Behavior in Sport (3) Integration of various theoretical approaches to leadership styles in sport administration within cultural contexts, research, and field experiences. Grading Restriction(s): Master of Science – sport management major.

553 Case Studies in Sport Management (3) Current issues and problems in sport administration at all levels of amateur and professional sport. Repeatability: May be repeated if topic differs. Maximum 9 hours.

554 Readings in Sport Management (3) Survey of pertinent literature in refereed and applied journals and texts. Registration Restriction(s): Master of Science – sport management major.

555 Evaluation Techniques for Sport Managers (3) Review and application of techniques of evaluation appropriate for sport programs, facilities, and personnel. Registration Restriction(s): Master of Science – sport management major.

560 Sport Governance (3) Principles of organizational governance theories as applied to sport organizations. Review of history, mission, and structure, administrative and legislative processes of amateur and professional governing bodies in sport. Registration Restriction(s): Master of Science – sport management major.

570 Event Management (3) Review of current research related to theory and practice in event management and involvement in management capacity with one or more special events. Registration Restriction(s): Master of Science – sport management major.

580 Special Topics (1-3) Advanced study in selected disciplinary or professional areas of physical education and/or sport. Repeatability: May be repeated. Maximum 6 hours.

590 Practicum (3) Practical experience in areas of major interest. Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated. Maximum 6 hours.

593 Independent Study (1-3) Repeatability: May be repeated. Maximum 6 hours.

595 Internship (3) Full-time application of previous theoretical and applied knowledge and skills in appropriate sport setting. Grading Restriction: Satisfactory/No Credit grading only. Registration Restriction(s): Master of Science – sport management major.

Sport Studies (959)

400 Applied Research in Sport (3) Research study suitable for publication, practicum requiring special written work.
505 History of Olympics: Ancient and Modern (3) Examination of various aspects of ancient and modern Games. Ancient Olympics 776 BC to 393 AD: Panhellenic Games. Modern Olympics, 1896 to date: political, social class, gender, and economic issues that influence Games.

Comment(s): Requires admission to the sport studies major or consent of instructor.


514 Advanced Philosophy of Sport (3) Major philosophical theories of sport. Various conceptual, moral, aesthetic, and social-political issues.

Comment(s): Requires admission to the sport studies major or consent of instructor.

515 Social Theories of Sport (3) Liberal, democratic and Marxist social theories of sport.

Comment(s): Requires admission to the sport studies major or consent of instructor.

533 Psychology of Sport (3) Social psychological factors influencing human behavior in a sport context; discussion of contemporary theory, research, and methodology.

(DE) Prerequisite(s): General psychology course or consent of instructor.

Recommended Background: Requires admission to the sport studies major or consent of instructor.

534 Motor Behavior and Skill Acquisition (3) Topical explanation and application of principles of human movement behavior to acquisition and performance of skills; discussion of current research and methodology.

Comment(s): Requires admission to the sport studies major or consent of instructor.

535 Health and Exercise Psychology (3) Study and cultural critique of various aspects of health and exercise psychology.

Comment(s): Requires admission to the sport studies major or consent of instructor.

536 Expert Performance in Sports (3) Examines expertise in athletic performance with a primary focus on the development and maintenance of expertise. Special emphasis is placed on theoretical and practical perspectives on the study of sport expertise as they intersect with issues regarding sport psychology, race, aging, gender, or other socio-cultural factors.

Comment(s): Requires admission to the sport studies major or consent of instructor.

538 Professional Practice Issues in Sport Studies (3) Study and cultural critique of various aspects of professional practice in sport studies.

Comment(s): Requires admission to the sport studies major or consent of instructor.

539 Research Development in Sport Psychology: Idea Formation to Data Collection (3) First of a two-semester sequence designed to familiarize students with research process in applied sport psychology. Includes idea formation, critical review of related literature, development of a research question and methodology, and data collection.

Comment(s): Requires admission to the sport studies major or consent of instructor.

540 Research Development in Sport Psychology: Data Analysis to Manuscript Submission (3) Second of a two-semester sequence designed to familiarize students with research process in applied sport psychology. Includes data analysis, manuscript preparation and manuscript submission.

Comment(s): Requires admission to the sport studies major or consent of instructor.

542 Sociological Aspects of Sport (3) Social and cultural factors influencing sport and physical education. Pertinent issues and research applications.

Comment(s): Requires admission to the sport studies major or consent of instructor.

Registration Permission: Consent of instructor.

543 Women, Sport, and Culture (3) Critical examination of experiences of girls/women in American sports from a socio-cultural perspective with particular emphasis on the constructs of gender, race, class, and sexuality. Explores theories from sport, feminist, race, and cultural studies.

(See Women’s Studies 543.)

593 Independent Study (1-3)

Gradning: Satisfactory/No Credit or letter grade.

Repeatability: May be repeated. Maximum 9 hours.

594 Supervised Readings (1-3)

Gradning: Satisfactory/No Credit or letter grade.

Repeatability: May be repeated. Maximum 6 hours.

595 Special Topics (1-3) Advanced study in selected aspects of sport studies.

Gradning: Satisfactory/No Credit or letter grade.

Repeatability: May be repeated. Maximum 9 hours.

Comment(s): Requires admission to the sport studies major or consent of instructor.

600 Doctoral Research and Dissertation (3-15)

Gradning Restriction: P/NP only.

Repeatability: May be repeated.

601 Research Seminar (1) (See Exercise Science 601.)

633 Advanced Sport Psychology (3) Analysis, synthesis, and discussion of contemporary theory and topics; research development and production in sport psychology.

Repeatability: May be repeated. Maximum 9 hours.

Comment(s): Requires admission to the sport studies major or consent of instructor.

681 Practicum (1-3) Intern experience in areas of major interest.

Repeatability: May be repeated. Maximum 6 hours.

Comment(s): Requires admission to the sport studies major or consent of instructor.

693 Independent Study (1-3)

Gradning: Satisfactory/No Credit or letter grade.

Repeatability: May be repeated. Maximum 6 hours.

694 Supervised Reading (1-3)

Gradning: Satisfactory/No Credit or letter grade.

Repeatability: May be repeated. Maximum 6 hours.

695 Special Topics (1-3) Study for doctoral students in selected aspects of sport studies.

Gradning: Satisfactory/No Credit or letter grade.

Repeatability: May be repeated. Maximum 9 hours.

Statistics (962)


(DE) Prerequisite(s): 320.


(DE) Prerequisite(s): 330.

500 Thesis (1-15)

Gradning Restriction: P/NP only.

Repeatability: May be repeated.

Credit Restriction: May not be used toward degree requirements.

502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed.

Gradning Restriction: Satisfactory/No Credit grading only.

Repeatability: May be repeated.

531 Survey of Statistical Methods I (3) Univariate and bivariate data collection and organization, statistical estimation and hypothesis testing; analysis of relationships for categorical and numerical data, including Chi-square tests and simple linear and quadratic regression. Use of computing facilities required.

Credit Restriction(s): Students may not receive credit for both 531 and 537.

Recommended Background: 1 year of college mathematics.

532 Survey of Statistical Methods II (3) Multiple linear regression, including use of dummy variables; single and multiple factor analysis of variance and covariance; issues in experimental design and analysis. Use of computing facilities required.

(DE) Prerequisite(s): 531.

537 Statistics for Research I (3) Principles and application of statistical methodology, integrated with considerable use of major statistical computing system. Probability and probability distributions, forming and testing hypotheses using parametric and nonparametric inference methods. Matrix-based simple linear regression and correlation.

Credit Restriction(s): Students may not receive credit for both 537 and 531.

Recommended Background: 1 year of undergraduate mathematics and 1 undergraduate statistics course.
538 Statistics for Research II (3) General linear model as applied to multiple regression and analysis of variance. Diagnostic and influence techniques. One-way, factorial, blocking, and nested designs, preplanned versus post-hoc contrasts. Random factors and repeated measures. 
(DE) Prerequisite(s): 537 or 532.

560 Introduction to Mathematical Statistics (3) Probability, probability distributions, simulation of random variables, sampling distributions, central limit theorem, testing of hypotheses, confidence intervals, maximum likelihood methods, Bayesian methods.
Credit Restriction: Not for credit for MS with a major in statistics or management science.
(DE) Prerequisite(s): Mathematics 241.
Comment(s): A course equivalent to Mathematics 241 also is acceptable.

561 Introduction to Computing for Data Management and Analysis (1) The University of Tennessee, Knoxville, computing environment for beginning statistics graduate students. Use of operating system commands, system editor, utility programs and SAS statistical package for data entry and editing, file management and statistical analysis. Use of UTCC computing facilities required.
(DE) Prerequisite(s): 531 and 537 or consent of instructor.

563 Statistical Inference I (3) Basic probability and probability models; random variables and distributional models; kernel density estimation; cubic splines; likelihood inference and maximum likelihood estimation and model fitting with information criteria; moment and moment generating functions; functional of random variables; goodness of fit tests and quantile modeling of distributions.
(DE) Prerequisite(s): Mathematics 241.
Registration Permission: Prerequisite(s) or consent of instructor required.

564 Statistical Inference II (3) Sampling distributions; point and interval estimation; fixed width entropy confidence intervals; likelihood theory; Fisher information and its inverse; large sample, deviance, and bootstrap confidence intervals; Bayesian estimation and hypothesis testing; informative approach to hypothesis testing; uniformly most powerful and likelihood ratio tests, theory of linear models, estimation, model building and inference.
(DE) Prerequisite(s): 563.

566 Statistical Techniques in Industrial Processes (3) Applications of control charts and other statistical techniques in industrial setting. Attributes and variables control charts, process capability analysis, aspects of sampling, statistical tolerancing, estimation of variance components, problems of measurement, special industrial applications.
(DE) Prerequisite(s): 571 or equivalent.


571 Statistical Methods (3) Data collection strategies. Descriptive statistics. Probability distributions, simulation of random variables, sampling distributions. Estimation and hypothesis testing, regression, Chi-Square test for categorical data, simple design of experiments, nonparametric methods. Use of statistical software.
Recommended Background: 1 year of calculus and a statistics course.

(DE) Prerequisite(s): 571 and matrix algebra.

(DE) Corequisite: 572.

574 Data Mining Methods and Applications (3) Understanding and application of data mining methods. Data preparation; exploratory data analysis and visualization; cluster analysis; logistic regression; decision trees; neural networks; association rules; model assessment; and other topics. Applications to real world data. Use of standard computer packages.
(DE) Prerequisite(s): 532 or 538 or 571 or consent of instructor.

575 Applied Time Series (3) Fundamental concepts of time series analysis: Box-Jenkins approach, stationary and nonstationary models, forecasting model identification, seasonal models, transfer function models, and spectral theory.
(DE) Prerequisite(s): 538 or 572 or consent of instructor.

Recommended Background: 1 year of graduate-level statistics and regression analysis and analysis of variance or consent of instructor.

(DE) Prerequisite(s): 538 or knowledge of regression and analysis of variance.

583 Special Topics in Applied Statistics (1-3) Repeatability: May be repeated. Maximum 9 hours.

585 Principles of Statistical Process Management (1-3) Statistical and other techniques applied to management of organizational processes. Repeatability: Not repeatable. May be taken once for 1-3 hours.
Registration Permission: Consent of department head.

587 Graduate Seminar (1) Directed readings and active participation in colloquium program of Department of Statistics and of student’s minor program.
Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated. Maximum 2 hours.
Registration Permission: Consent of departmental director of graduate studies.

592 Internship (1-6) Supervised off-campus experience in application of statistical principles and methods in business, industry, or government. Written and oral report required.
Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated. Maximum 6 hours.
Recommended Background: 4 courses in graduate-level statistics or consent of departmental director of graduate studies.

593 Independent Study (2-6) Faculty directed readings and investigation of specified topic in probability or statistics. Written report and oral presentation required.
Grading: Satisfactory/No Credit or letter grade.
Repeatability: May be repeated. Maximum 6 hours.
Registration Permission: Consent of the departmental director of graduate studies.

595 Statistical Consulting Practicum (1-6) Supervised experience helping on-campus researchers plan, manage data, and develop and perform analyses specific to designs and hypotheses. Discussion of activities in regular seminar meetings. Final written reports and/or detailed diaries required.
Repeatability: May be repeated. Maximum 6 hours.
(DE) Prerequisite(s): 572 or 538.

600 Doctoral Research and Dissertation (3-15) Graduation Restriction: P/NP only.
Repeatability: May be repeated.

662 Computational Methods in Statistics (3) Up-to-date computational methods in statistics: open architecture interactive computational languages supplemented by other statistical packages with graphical capabilities. Statistical computing, numerical methods for linear models and generalized linear models, nonlinear statistical methods, matrix computations and special matrices, essentials of Monte Carlo simulation, and re-sampling techniques.
Recommended Background: Knowledge of programming language and 572 or consent of instructor.

(DE) Prerequisite(s): 564 and Mathematics 445.

664 Advanced Statistics Theory II (3) Testing statistical hypotheses, Bayesian methods and estimation, linear model theory and model selection.
(DE) Prerequisite(s): 663.

(DE) Prerequisite(s): 564 and 566.
673 Advanced Topics in Design of Experiments and Linear Models (3) Experimentation for product and process improvement: response surface methodology and robust design methods; mixture experiments; optimal design topics; distribution theory and inference for linear models. (DE) Prerequisite(s): 573 or consent of instructor.


677 Statistical Modeling (3) Modern techniques of statistical modeling: predictive, likelihood, Bayesian, and information-based model selection and evaluation paradigms. Application of techniques in various types of models for both continuous and discrete data modeling problems. Interactive computational tools. (DE) Prerequisite(s): 564 and 572 or 538 or consent of instructor.

679 Multivariate Statistical Modeling (3) Modern information based techniques and model selection in multivariate analysis, informational tests of significance with multivariate data, multivariate analysis of variance, multivariate regression and variable selection, multivariate model clustering. Recommended Background: Matrix algebra and 564 or matrix-based linear models with experience in interactive computing or consent of instructor.

683 Special Topics in Statistics (1-3) Presentation of specialized topics in statistics.

691 Graduate Seminar in Applied Statistics (3) Reading of literature and discussion of open problems of importance to industry: design of experiments, modeling, process control, regression, and reliability. Grading: Satisfactory/No Credit or letter grade. Registration Permission: Consent of instructor.

693 Independent Study (1-6) Directed research on subject of mutual interest to student and faculty member. Repeatability: May be repeated. Maximum 6 hours.

Theatre (976)

420 Special Studies in Acting (3) Exercises in selected concentrated areas such as styles, techniques, approaches, e.g., Shakespeare, movement, humor. Content varies. Repeatability: May be repeated. Maximum 9 hours. (DE) Prerequisite(s): 320. Registration Permission: Consent of instructor.

425 Advanced Musical Theatre (3) Study and practice of musical theatre material, including dance and vocal work. (DE) Prerequisite(s): 325.

430 Principles of Play Directing (3) Problems in composition, picturization, rhythm, and movement. (DE) Prerequisite(s): 220. Comment(s): 430 and 431 must be taken in sequence.

431 Principles of Play Directing (3) Problems in composition, picturization, rhythm, and movement. (DE) Prerequisite(s): 220. Comment(s): 430 and 431 must be taken in sequence.

446 Costume Patterning (3) Draping patterns for period costumes. Includes corsetry and the study of historic patterns 1500-1900. (DE) Prerequisite(s): 345 or consent of instructor.

450 Special Studies in Entertainment Technology (1-3) Content varies. Repeatability: May be repeated. Maximum 9 hours. Registration Permission: Consent of instructor.

452 Entertainment Technology II (3) Automation systems in live entertainment, including advanced rigging and flying for stage and film. (DE) Prerequisite(s): 352 or consent of instructor.

454 Scenery Painting (2) Introduction to materials, techniques, and principles of the craft. Emphasis on gaining skill and understanding through studio experience. Registration Permission: Consent of instructor.

456 Scenic Design II (3) Advanced studies in set design. (DE) Prerequisite(s): 355 or consent of instructor.

462 Lighting Design II (3) Advanced lighting design theory and practice. Lab and project intensive. (DE) Prerequisite(s): 362 or consent of instructor.

464 Computer Aided Drafting for the Theatre (3) Introduction to entertainment drafting. Emphasis on 2-D graphical standards, drafting techniques, and drawing layout and presentation.

470 Playwriting (3) Advanced instruction in writing of plays. Registration Permission: Consent of instructor.

491 Foreign Study (1-15) Repeatability: May be repeated. Maximum 15 hours.

492 Off-Campus Study (1-15) Repeatability: May be repeated. Maximum 15 hours.

493 Independent Study (1-15) Repeatability: May be repeated. Maximum 15 hours.

501 Introduction to Graduate Research in Theatre (3) Research tools and methods for theatre artist and scholar.

502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed. Grading Restriction: Satisfactory/No Credit grading only. Repeatability: May be repeated. Credit Restriction: May not be used toward degree requirements.

503 Elements of Design for the Theatre (3) Analysis of the principles of design through visual, structural, and emotional relationships.

510 Studies in Theatre History (3) Intensive study of selected topics in theatre history. Repeatability: May be repeated. Maximum 9 hours.

512 Dramatic Literature Analysis (3) Dramaturgical strategies of major playwrights, using variety of analytical approaches from Aristotelian to deconstruction.

520 Master Class in Performance: Acting (3) Master class in acting techniques. Repeatability: May be repeated. Maximum 18 hours. Comment(s): Theatre MFA students only.

523 Master Class in Performance: Movement (3) Master class in movement techniques. Repeatability: May be repeated. Maximum 18 hours. Comment(s): Theatre MFA students only.

525 Master Class in Performance: Voice (3) Master class in voice and speech techniques. Repeatability: May be repeated. Maximum 18 hours. Comment(s): Theatre MFA students only.

536 Projects in Play Directing (3) Practical work in play direction involving various lengths and kinds of scripts. Repeatability: May be repeated. Maximum 9 hours.

542 The Social History of Costume (3) Study and analysis of costume as related to society’s manners and mores, architecture and furniture.


545 Millinery for the Stage (2) Pattern making and construction techniques for hats from antiquity to present. Registration Permission: Consent of instructor.

563 Lighting Design I (3) Basic lighting design theory and practice. Lab and project intensive.

564 Computer Aided Drafting for the Theatre (3) Introduction to entertainment drafting. Emphasis on 2-D graphical standards, drafting techniques, and drawing layout and presentation.

567 Advanced Topics in Design of Experiments and Linear Models (3) Experimentation for product and process improvement: response surface methodology and robust design methods; mixture experiments; optimal design topics; distribution theory and inference for linear models. (DE) Prerequisite(s): 573 or consent of instructor.

570 Statistical Modeling (3) Modern techniques of statistical modeling: predictive, likelihood, Bayesian, and information-based model selection and evaluation paradigms. Application of techniques in various types of models for both continuous and discrete data modeling problems. Interactive computational tools. (DE) Prerequisite(s): 564 and 572 or 538 or consent of instructor.

577 Multivariate Statistical Modeling (3) Modern information based techniques and model selection in multivariate analysis, informational tests of significance with multivariate data, multivariate analysis of variance, multivariate regression and variable selection, multivariate model clustering. Recommended Background: Matrix algebra and 564 or matrix-based linear models with experience in interactive computing or consent of instructor.

583 Special Topics in Statistics (1-3) Presentation of specialized topics in statistics. Repeatability: May be repeated. Maximum 6 hours.

681 Graduate Seminar in Applied Statistics (3) Reading of literature and discussion of open problems of importance to industry: design of experiments, modeling, process control, regression, and reliability. Grading: Satisfactory/No Credit or letter grade. Registration Permission: Consent of instructor.

693 Independent Study (1-6) Directed research on subject of mutual interest to student and faculty member. Repeatability: May be repeated. Maximum 6 hours.

COURSES OF INSTRUCTION
556 Drafting (3) Drafting techniques for scenic designer.
Comment(s): Theatre MFA students only.

560 Lab Analysis of Realized Lighting Design (3) Realized lighting design projects from concept meeting through opening night.
Repeatability: May be repeated. Maximum 18 hours.
Registration Permission: Consent of instructor.

564 Advanced Computer Aided Drafting for the Theatre (3) Advanced drafting techniques. Emphasis on 3-D solid modeling, rendering, and publication.
(DE) Prerequisite(s): 464 or consent of instructor.

580 Design Seminar (1-6) Analysis, research, interpretation, and design of plays in a cross-disciplinary environment.
Repeatability: May be repeated. Maximum 18 hours.

584 Photography for the Theatre (3) Photographic techniques for shooting live performance events under challenging lighting environments.
Registration Permission: Consent of instructor.

585 Production Workshops (1-6) Directed experience in production collaborations.
Repeatability: May be repeated. Maximum 12 hours.
Registration Permission: Consent of instructor.

587 Computer Aided Rendering for the Theatre (3) Computer rendering programs and their use by theatrical designers.
Registration Permission: Consent of instructor.

593 Independent Study (1-3) Individual or group projects.
Repeatability: May be repeated. Maximum 24 hours.
Comment(s): Theatre MFA students only.
Registration Permission: Consent of instructor.

599 Project in Lieu of Thesis (1-6)
Repeatability: May be repeated. Maximum 9 hours.
Recommended Background: Minimum of 30 hours toward the MFA.
Registration Permission: Consent of instructor.

Theory and Practice in Teacher Education (978)

500 Thesis (1-15)
Grading Restriction: P/Non-P only.
Repeatability: May be repeated.

502 Registration for Use of Facilities (1-15)
Required for the student not otherwise registered during any semester when student uses university facilities and/or faculty time before degree is completed.
Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated. Credit Restriction: May not be used toward degree requirements.

503 Problems in Lieu of Thesis (2-3)
Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated. Maximum 9 hours.

517 Trends and Issues in Education (3)
Examination of contemporary trends and issues in education.

518 Educational Specialist Research and Thesis (3)
Grading Restriction: P/Non-P only.
Repeatability: May be repeated. Maximum 15 hours.

519 Curriculum for School Leaders (3) This course is designed to equip aspiring school leaders with practical and theoretical knowledge of various curriculum models that might be used to foster instructional leadership and enhance school improvement initiatives. Seminars, lectures, and inquiry-based approaches will be used.

526 Drama and Story Telling in Teaching (3) Use of techniques of drama and storytelling to improve impact of teaching and to teach more effectively.
Recommended Background: Classroom experience or admission to teacher education.

535 Inquiry Teaching and Learning (3) Use of children’s and adolescent literature. Exploration of ways to create setting that invite learners to engage in inquiry learning and teaching.

540 Topics in Improvement of Instruction (3) Special conferences, workshops, and in-service programs.
Grading: Satisfactory/No Credit or letter grade.
Repeatability: May be repeated. Maximum 6 hours.

542 Integrated Middle Grades Methods (6)
Activities in this class are intended to promote the professional growth of pre-service and in-service middle grades teachers through study, design, and implementation of curriculum, instruction, and assessment strategies. In particular, methods of integrating language arts, mathematics, science, and social science content for grades 4-8 will be explored. The use of technology in supporting learning of middle grades content will also be an emphasis throughout.

543 Middle Grades: Concepts and Practices (3) Designed as the introductory course for students pursuing middle-level teacher licensure. Attention is focused on the decline of the junior high and rise of the middle school (typically grades 6-8), the componentary structures that characterize exemplary middle schools, and the philosophy that forms the foundation for this movement. Looks at the theories, research, and exemplary practice concerning the components of middle schools. Helps to prepare middle school professionals who understand the rationale for and the role of teachers in interdisciplinary teams, teacher-based advisory, flexible scheduling and grouping, and working with colleagues, families, resource persons, and community groups.

549 Secondary School Curriculum (3)
Focus of this course is curriculum and instructional design for secondary school. Characteristics of students, curriculum designs, instructional patterns, and organization and structure of secondary schools will be studied.

550 Action Research and Practical Inquiry in Education (3)
Principles of action research and practical inquiry for practitioners in early childhood and school settings and methods for conducting such inquiries in professional roles.
Comment(s): Admission to graduate program required.

555 Curriculum Planning and Development (3)
Focuses on foundations and principles of curriculum planning and development, historical analysis of curriculum theory, principles of planning and development, and classroom applications for improved learning.

558 Instructional Theory and Design (3)
Focuses on the relationship of curriculum to instruction; examination of instructional and related learning theories; instructional models and teaching styles.

593 Independent Study (1-3)
Grading: Satisfactory/No Credit or letter grade.
Repeatability: May be repeated. Maximum 12 hours.

594 Supervised Readings (1-3)
Grading: Satisfactory/No Credit or letter grade.
Repeatability: May be repeated. Maximum 12 hours.

595 Special Topics (1-3)
Grading: Satisfactory/No Credit or letter grade.
Repeatability: May be repeated. Maximum 24 hours.
Credit Restriction: Only 12 hours can be used to meet degree requirements.

596 Clinical Experience in Assessment and Instruction (3)
Academic remediation applied in lab/field setting; tasks related to teaching: assessment, preparation of lessons, and delivery of instruction.
Grading: Satisfactory/No Credit or letter grade.
(DE) Corequisite(s): 553.

600 Doctoral Research and Dissertation (3-15)
Grading Restriction: P/Non-P only.
Repeatability: May be repeated.
Comment(s): Admission to candidacy required.

604 Trans-Departmental Seminar I (1)
Introduction to doctoral programs in education: research requirements, academic integrity, the meaning of scholarship in academe and issues/problems in education.
Grading Restriction: Satisfactory/No Credit grading only.
Credit Restriction: May not be used to meet 600-level requirement.
Comment(s): Admission to a doctoral program or consent of the doctoral program coordinator required.

605 Trans-Departmental Seminar II (1)
Seminar to prepare doctoral students for the final steps in completing a terminal degree including preparing for and completing qualifying exams, preparing a prospectus, and completing a dissertation.
Credit Restriction: May not be used to meet 600-level requirement.
(DE) Prerequisite(s): 604.

610 Internship in College Teaching and Supervision (3-9)
Supervised practice in college teaching and supervision.
Grading Restriction: Satisfactory/No Credit grading only.
Repeatability: May be repeated. Maximum 9 hours.
Comment(s): Admission to doctoral program or consent of instructor required.

617 Advanced Studies in Education – An Interdisciplinary Perspective (3)
Educational trends, issues, and policies related to curriculum and instruction, assessment, the organization and administration of schools, and preparation of educators for both K-12 and higher education settings.
Comment(s): Admission to doctoral program or consent of instructor required.