Fields of Instruction

Accounting and Business Law
(College of Business Administration)

MAJORS DEGREES
Accounting ............................................. M.Acc.
Business Administration ......................... Ph.D.

Keith G. Stanga, Head

Professors:
Anderson, Kenneth E. (Distinguished Prof.), CPA, Ph.D. ........................................ Indiana
Dittrich, Norman E. (Emeritus), CPA, Ph.D. ................................................................. Ohio State
Fisher, Bruce D., LL.M. ........... George Washington
Herring, Hartwell C., III, CPA, Ph.D. .................. Alabama
Kiger, Jack E. (Warrren L. Slagle Prof. of Accnt), CPA, Ph.D. ................................. Oklahoma State
Reeve, James M. (DeLoitte & Touche Prof.), CPA, Ph.D. ........................................... VPI
Stanga, Keith G. (Arthur Andersen Prof.), CPA, Ph.D. ........................................... Louisiana State
Williams, Jan R. (Ernst & Young Prof.), CPA, Ph.D. ........................................ Arkansas

Associate Professors:
Carcello, Joseph V., CPA, Ph.D. Georgia State
Ray, Amy W., Ph.D. ...................................... VPI
Murphy, Daniel, CPA, Ph.D. ....... North Carolina
Posey, Imogene A. (Emeritus), CPA,
M.S. ........................................ Tennessee
Townsend, Richard L., CPA, Ph.D. .......... Texas

Assistant Professors:
Ayers, Susan, CPA, Ph.D. ........... Arizona State
Beih, Bruce K., CPA, Ph.D. ........... Arizona State
Norris, Kathleen B., Ph.D. ........... Oklahoma

THE MASTER OF ACCOUNTANCY PROGRAM

The objective of the M.Acc. program is to provide persons who have a high level of ability and motivation with the depth and understanding of accounting that will enhance their probability of success in a career in professional accounting. Moreover, the student's educational experience should develop perspectives toward the discipline of accounting in a manner that will enable the student to spearhead innovation and change in response to needs in public accounting, industry, and government.

UK's accounting undergraduate and graduate programs are accredited by the American Assembly of Collegiate Schools of Business and are among the initial programs in the nation to receive this accreditation.

Admission Requirements
Application deadlines for international students are: Fall and Summer, January 15. Application deadlines for U.S. citizens and permanent residents are: Fall and Summer, March 1. The program is designed both for students who have completed an accredited baccalaureate degree program with a major in Accounting and others. Those with outstanding undergraduate records in areas other than accounting may earn the M.Acc. degree by completing prerequisites in accounting and by including courses in other business and related disciplines to supplement the student's undergraduate background. Students entering the program should be computer literate and are expected to have completed coursework in calculus, principles of accounting, and introductory economics.

In addition to the general admission requirements for The Graduate School, M.Acc. applicants are required to take the Graduate Management Admission Test (GMAT) and submit information on forms provided by the College of Business Administration. Applicants whose native language is not English must submit results of the Test of English as a Foreign Language (TOEFL).

Course Requirements
A student's program encompasses a minimum of 30 semester hours of graduate coursework. Specifically, the student must complete courses in accounting and other areas as indicated below. Each course is 3 semester hours of graduate credit.

A student with an undergraduate degree in accounting can usually complete the program in about eleven months. A student without an undergraduate accounting degree can usually complete the program in about fifteen months.

For students with an undergraduate accounting degree, the requirements are:

Business Core (6 hours): Business Administration 502-03; Business Law 511.
Accounting Core (6 hours): 506-07.
Accounting Concentration (9 hours): Three concentrations are available:
3. Taxation: 531, 532, 533, 534, 539.

Students must take at least three courses from the same concentration and one of the course numbers must end with 9.

Accounting Electives (6 hours): Elective courses to be taken from graduate accounting courses.

For students without an undergraduate Accounting degree, the requirements are:

Prerequisites: 311, 341, 411, 414, and 431.

Business Core (12 hours): Business Administration 502-03; Business Law 511; and a non-accounting business elective to be approved by advisor.

Accounting Core (6 hours): 506-07.
Accounting Concentration (9 hours): Three concentrations are available:
3. Taxation: 531, 532, 533, 534, 539.

Students must take at least three courses from the same concentration and one of the course numbers must end with 9.

Transfer Credits
A maximum of six semester hours taken at other AACSB accredited institutions that otherwise conform to the transfer policy of The Graduate School may be credited toward M.Acc. degree requirements.
Other Requirements
To qualify for the degree, a student must maintain a B average (3.0) or above in the program. The program must satisfactorily demonstrate his/her ability to recognize, analyze, and solve accounting policy problems and integrate concepts from the various areas of accounting by passing a comprehensive written examination. This examination is included in the prerequisite courses in each concentration as follows: 519, Seminar in Accounting and Auditing Policy; 539, Tax Policy; and 549, Systems Issues and Policies.

BUSINESS ADMINISTRATION CONCENTRATION

For complete listing of Ph.D. program requirements, see Business Administration.

Ph.D. Concentration: Accounting
This degree provides a research-oriented terminal qualification for those seeking entry-level faculty positions in accounting. Students take approximately three years of coursework beyond the bachelor's degree, including a doctoral sequence designed to expose students to various areas of accounting research. Courses in accounting research are selected to complement the student's individual background and to prepare the student in an area of accounting specialization. A student's academic performance is monitored. The final year is normally spent completing the doctoral dissertation. Minimum course requirements are 12 hours including 611, 612, 619, and one other accounting course to be approved by Ph.D. accounting program advisor.

ACADEMIC STANDARDS
A graduate student in the College of Business Administration whose grade-point average falls below 3.0 will be placed on probation. A student on probation will be dropped from the program unless his/her cumulative grade-point average is 3.0 or higher at the end of the probationary period. The probationary period is defined as the next semester's coursework as established by the degree program for full-time students and the next two semesters' coursework as established by the degree program for part-time students.

ACADEMIC COMMON MARKET
An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.Acc. program in Accounting is available to residents of the state of West Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

Accounting

GRADUATE COURSES

415 Governmental and Nonprofit Accounting (3) Advanced study of governmental and nonprofit entities. Governmental accounting principles, revenues and expenditures, budgeting, and financial reporting. Accounting principles and reporting models of nonprofit organizations. Integration of economic and social issues with reporting standards for governmental and nonprofit organizations. Prereq: Financial Reporting by Business and Nonprofit Organizations or consent of instructor.

451 Operational Auditing and Consulting (3) Approaches to evaluate an entity's efficiency and effectiveness in a variety of settings and techniques used in consulting to provide entity with competitive advantage.

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered. During any semester when a student uses University facilities and is not enrolled in a course, consent of instructor may be required. S/NC only. E

506-07 Professional Accounting Practice I, II (3, 3) Various advanced financial reporting and auditing topics to meet complex and changing needs of profession. Prereq: Admission to M.Acc. program.

514 Information Systems Control and Auditing (3) Relationships among design of internal controls, assessment of internal control effectiveness, and audit of internal controls in computerized business environment. Current security and technology issues for both centralized and distributed computing environments. Hands-on use of computer-assisted auditing techniques to perform variety of audit tasks. Prereq: Admission to M.Acc. program.

518 Taxation of Business Entities (3) Review and analysis of tax principles and law pertaining to business entities: corporations and partnerships. Tax planning strategies and techniques. Prereq: Admission to M.Acc. program.


521 Seminar in Advanced Managerial Cost Accounting (3) Analysis of conceptual and current issues; design of controls in cost accounting. Approaches to management accounting, decision and control models, and financial and operational control systems. Prereq: Admission to M.Acc. program or consent of instructor.

522 Corporate Taxation and Reorganizations (3) Organization and structure, distributions, liquidations, reorganizations, and special problems in taxation of corporations and shareholders. Prereq: Admission to M.Acc. program.


532 Corporate Taxation and Reorganizations (3) Organization and structure, distributions, liquidations, reorganizations, and special problems in taxation of corporations and shareholders. Prereq: Admission to M.Acc. program.

533 Taxation of Partnership and S Corporations (3) Formation, operation, termination, and other special problems of partnerships. Election for S Corporations, and comparison of partnerships and S Corporations. Prereq: Admission to M.Acc. program or consent of instructor.

534 Family Tax Planning (3) Review and analysis of laws pertaining to inter vivos and post-mortem property transfers and taxation of estates. Financial planning techniques and strategies used to accomplish family tax objectives. Prereq or coreq: 531.

539 Multijurisdictional Tax Planning and Policy (3) Analysis of international, state, and local tax law as it relates to business transactions. Identification of tax planning opportunities and development of strategies to accomplish tax planning objectives. Policy issues related to multijurisdictional taxation. Prereq: Federal Income Taxation and admission to M.Acc. program.

541 Database Systems (3) Design, implementation, and use of database systems for collection, organization, and distribution of economic information about organizations. Prereq: Accounting Information Systems and admission to a graduate program or consent of instructor.

542 Systems Analysis and Design (3) Analysis and design of information systems for management and distribution of economic information about organizations. Prereq: Accounting Information Systems and admission to a graduate program or consent of instructor.

549 Systems Issues and Policies (3) Seminar in emerging topics in management systems and knowledge-based systems. Prereq: 541 and admission to a graduate program or consent of instructor. Prereq or coreq: 542.

592 Graduate Internship in Accounting (3) Full-time resident professional employment for one academic semester involving qualified job experience, written report of responsibilities, and evaluation of student performance. Prereq: Admission to M.Acc. program or consent of M.Acc. advisor.

593 Individual Research in Accounting (3) Directed research in a topic of mutual interest. Prereq: Admission to M.Acc. program or consent of instructor. May be repeated. Maximum 6 hrs.

600 Doctoral Research and Dissertation (3-15) P/NP only. E

611-12 Doctoral Seminar in Accounting (3,3) Analysis of issues reflected in accounting literature. Prereq: Consent of Ph.D. program advisor.

619 Doctoral Research in Accounting (3) Study of research methodology and application of various research methods in accounting literature. Prereq: Consent of Ph.D. program advisor.

621-22 Accounting Colloquium (1,1) Research and discussion of contemporary issues in practice of accounting. Prereq: Consent of Ph.D. program advisor. May be repeated. S/NC only.

Business Law

GRADUATE COURSES

511 Business Law and Professional Responsibility (3) Legal framework, methods and ethics implications of business transactions. Prerequisites and principles in law of contracts, commercial transactions, real property, trusts, estates and professional responsibility. Prereq: Legal Environment of Business and admission to M.Acc. program or consent of instructor. Not available for students with credit for 401.

Advertising

(College of Communications)

MAJOR DEGREES

MAJOR (College of Communications)

Advertising

Communication... M.S., Ph.D.

Ronald E. Taylor, Head

Professors:

Hoy, Mariea, Ph.D. Illinois

Taylor, Ronald E., Ph.D. Illinois

Associate Professors:

Hay, Eric, Ph.D. Georgia

Hoy, Mariae, Ph.D. Oklahoma State

Assistant Professors:

Morrison, Margaret, Ph.D. Georgia

McMillan, Sally, Ph.D. Oregon

The Department of Advertising offers a concentration area for the master's degree with a major in Communications and participates in the interdisciplinary doctoral program. See Communications for additional information.

GRADUATE COURSES

490 Special Topics (3) Topics vary: advanced media strategy, advanced creative strategies, direct marketing, and advertising and social issues. E

510 Advertising and Society (3) Analysis of advertising as institution in a free-enterprise democratic society and its relation to social, legal, cultural, and economic institutions. F

520 Advertising and Communications Theory (3) Application of contemporary communications theories of attitude change, information-processing, and persuasion as applied to creative strategy decisions. Prereq: Consent of Instructor or admission to program. F

48 Accounting and Business Law
Aerospace Engineering
See Mechanical and Aerospace Engineering

Agricultural and Biosystems Engineering

(College of Agricultural Sciences and Natural Resources)

MAJORS

Biosystems Engineering..................... M.S., Ph.D.
Biosystems Engineering Technology........... M.S.

C. Roland Mote, Head

Professors:
Bledsoe, B. L., PE, Ph.D. ......... Oklahoma State
Henry, Z. A. (Emeritus), PE, Ph.D. .... NC State
Luttrel, D. H. (Emeritus), Ph.D. .... Iowa State
McDow, J. J. (Emeritus), PE, Ph.D. ........... Purdue

Associate Professors:
Buscher, J. J., Ph.D. .......... Tennessee
Freeland, R. L., PE, Ph.D. ....... Tennessee
Grady, G. F., Ph.D. ......... Tennessee
Hart, W. E., Ph.D. .......... Purdue
Gacion, L. O., Ph.D. .......... Penn State
Wilkinson, J. B., Ph.D. .......... Purdue
White, A. R., PE, Ph.D. .......... Tennessee
Yoder, D. C., Ph.D. .......... Purdue
Yoder, R. E., PE, Ph.D. .......... Colorado State

Assistant Professors:
Burns, R. T., PE, Ph.D. ............ Tennessee
Hubert, G. J., PE, Ph.D. .......... Illinois
Raman, D., Ph.D. ............... Cornell

Graduate programs leading to the Master of Science and Doctor of Philosophy with a major in Biosystems Engineering are available to graduates of a recognized curriculum in agriculture or other related fields. Each applicant will be advised about any prerequisite courses before entering a program. A student's program of study must be approved by his/her advisory committee and must comply with the requirements of The Graduate School.

In addition to completing the 30 semester hours, master's students must pass a final oral examination covering the thesis, related areas, and graduate coursework.

Non-Thesis Option: A non-thesis option in Biosystems Engineering Technology is available to qualified students. Applicants who have not previously earned a degree from a professionally accredited program within the U.S. must submit scores from the GRE general examination. Applicants accepted into the program must complete at least 36 semester hours to earn a degree. Of these 36 hours, 20 must be in courses numbered 500 or greater. Other specific requirements for the 33 hours are:

- Biosystems Engineering Technology
  - 504 (1) or 507 (1), 505 (1), and other major subject courses
  - Coursework in computational methods (mathematics, computer science, statistics, or any course containing appropriate computational components that may be approved by the department)

Program electives 6
Thesis 500 6

In addition to completing the 33 semester hours, non-thesis students must pass a comprehensive written final examination covering the graduate program, including the capstone experience. The discretion of the candidate's committee, an oral examination may also be required.

THE DOCTORAL PROGRAM

Departmental Requirements

Students applying for admission into the doctoral program must submit evidence of ability to perform and report independent research to the satisfaction of the faculty of the department. An approved master's thesis will usually be acceptable for this purpose. Scores on the GRE general and engineering subject examinations are also required for applicants who have not received a degree from an ABET-accredited engineering program.

To earn a degree, each doctoral student must complete at least 75 hours of approved graduate credit (beyond the baccalaureate degree) in Biosystems Engineering and supporting areas (engineering, computational methods, agricultural and biological sciences, and other related areas). Of the 75 hours, 48 must be in courses numbered 500 or greater (including 24 hours of course 600) and 6 hours of courses at UTK numbered greater than 600. Other specific requirements for the minimum 75 hours are:

- Major subject courses 18 hours
- Coursework in computational methods (mathematics, computer science, statistics, or any course containing appropriate computational components that may be approved by the department) 9 hours

Program electives 21 hours
Seminar (504, 505 or equivalent courses) 3 hours
000 Dissertation 24 hours
Biosystems Engineering

GRADUATE COURSES

403 Machine and Component Design (3) Nature of design; functional analysis; creativity; design schematic requirements; plane mechanisms; force, stress, deflection, event-time analyses applied to design project components and machines. Prereq: Power Units and Machinery or consent of instructor. 1 hr and 2 labs. F

423 Irrigation and Waste Management System Design (3) Design of irrigation and agricultural waste management systems with consideration given to livestock waste characteristics, climate, water quantity, system characteristics, and impact on crop yield and water quality. Prereq: Soils and Water Conservation and Hydrology. 1 hr and 2 labs. F

430 Mobile Hydraulic Power System Design (3) Functional and operational characteristics of mobile hydraulic system components: pumps, valves, and actuators. Analysis and design of pump and system. Prereq: Fluid Mechanics and Hydraulics. 2 hrs and 1 lab. F

433 Bioprocess System Design and Analysis (3) Design of processing, storage, and handling systems for biological materials: Mass and energy balances, product and waste characteristics, equipment specifications, economic analysis, safety, and human factors. Design concepts. 3 hrs. Prereq: Coreqs: Processing Food and Biological Materials. 1 hr and 2 labs. F

451 Electronic Systems (4) Basic electronics with biological applications: Analog and digital electronics; sensing and controlling physical properties. Prereq: Consent of instructor. 2 hrs and 1 lab. F

462 Agricultural Chemical Application Technology (3) Equipment for application of liquid, solid, and gaseous agricultural chemicals: system components; operational characteristics; calibration; selection and management; safety considerations; materials handling and disposal methods. Prereq: Physics 121 or consent of instructor. 2 hrs and 1 lab. Sp

500 Thesis (1-15) P/NP only. E

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

504 Professional Development Seminar (1) Planning and executing research projects; ethics and professionalism. Prereq: Departmental permission. (Same as Biosystems Engineering Technology 504.) S/NC only. F

505 Professional Communications Seminar (1) Reviews, and discusses the basics of communication and debate. May not be used toward degree requirements. May be repeated. S/NC only. E

506 Physical Phenomena (3) Properties of materials, fundamentals of hydrodynamics, principles of electricity, thermodynamics of composting; biology of composting; thermodynamic of composting; heat transfer; membrane; aerators; substrate characteristics; process kinetics; and odor control. Design project. Prereq: Thermodynamics, heat and mass transfer. 2 hrs and 1 lab. Sp

543 Instrumentation and Measurement (3) Instrumentation techniques: Static and dynamic response of instrumentation; signal conditioning; temperature, moisture, optical radiation, displacement, strain, pressure, velocity, acceleration, and flow measurements; digital data acquisition and control. Prereq: 451 or Electronics and Computer Circuits or equivalent. 2 hrs and 1 lab. (Same as Environmental Engineering 543.) F

550 Selected Topics (1-3) Lecture/group discussion on specialized topics. May be repeated. Maximum 6 hrs. F

552 Biological Treatment Theory (3) (Same as Environmental Engineering 552.)

600 Doctoral Research and Dissertation (3-15) P/NP only. E

605 Professional Development Seminar (1) Planning and executing research projects; ethics and professionalism. Prereq: Departmental permission. (Same as Biosystems Engineering Technology 605.) S/NC only. F

614 CAD Applications to Biosystems Engineering (3) Use of computer software to create drawings of components, machinery systems, flow charts, and process diagrams related to biosystems. Prereq: Admission to degree program or consent of instructor. Prerequisite in use of personal computer. F

622 Processing and Environmental Systems (3) Environmental systems in plant and animal production: application of electric power, mechanical equipment, structures, crop processing, and materials handling. Prereq: 506. 2 hrs and 1 lab. Sp

630 Feedback and Control Systems (3) Differentiation of control systems: solutions, transforms, and system response. 2 hrs and 1 lab. F,A

652 Selected Topics (1-3) Lecture, group discussion on specialized topics. May be repeated. Maximum 6 hrs. E

662 Agricultural Credit (3) Farm and ranch finance and management; credit utilization; marketing systems. Prereq: 506. 2 hrs and 1 lab. Sp

750 Selected Topics (1-3) Lecture, group discussion on specialized topics. May be repeated. Maximum 6 hrs. E

811 Computer-Aided Design (3) Use of computer-aided design software to create drawings of components, machinery systems, flow charts, and process diagrams related to biosystems. Prereq: Admission to degree program or consent of instructor. Prerequisite in use of personal computer. F

822 Processing and Environmental Systems (3) Environmental systems in plant and animal production: application of electric power, mechanical equipment, structures, crop processing, and materials handling. Prereq: 506. 2 hrs and 1 lab. Sp

Agricultural and Extension Education (College of Agricultural Sciences and Natural Resources)

MAJOR DEGREE

Agricultural and Extension Education: M.S.
GRADUATE COURSES

411 Fundamentals of Agricultural Extension (3) History, philosophy, organizational structure, clientele served, major areas of programs, teaching methods, and relationships with other educational agencies. Graduate credit for non-majors only. Sp

500 Thesis (1-15) P/NP only. E

502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when such student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

521 Extension Program Planning (2) Methods of developing county extension programs: sources of essential basic information, determination of problems and needs of people, functions of lay people and various groups of extension workers. Use of committees, step-by-step planning procedures, coordinated county and state plans and characteristics of effective programs. Prereq: 411 or consent of instructor. Sp

522 Extension Teaching Methods (2) Teaching/learning methods and techniques applicable to extension work, interpersonal and relative effectiveness. Description, demonstration, teaching, and use of programs and teaching and to determine progress of clientele. Prereq: 411, 521, or consent of instructor. Sp

524 Research Methodology (3) Social research design, hypothesis testing, experiment construction, scaling, interviewing, data coding, basic descriptive and relational statistics, and presentation of results. Prereq: 436, 523, or consent of instructor.

525 Curriculum Planning in Agricultural Education (3) Models, principles and procedures for developing curricula in agricultural education and scheduling of learning activities for planned instructional programs. Prereq: 435, 436 or consent of instructor.

526 Agricultural Education for First-Year Teachers (2) Devising methodologies needed by first-year teachers for planning, organizing and conducting programs of instruction in agriculture, livestock, and horticulture in local communities. Group meetings in selected centers and visits by instructor. Prereq: 435, 436 or consent of instructor.

527 Adult Education and Strategies for Teaching (3) Psychological, philosophical and sociological theories for adult education in agriculture, methods and strategies for organizing classes and teaching adults. Prereq: 411 or 436 or consent of instructor.

528 Advanced Techniques for Teaching Agricultural Mechanics (3) Teaching techniques, demonstrating needed competencies, organizing and managing agricultural mechanics facilities. Prereq: 435, 436 or consent of instructor.

529 Supervised Occupational Experiences in Agricultural Education (3) Historical and philosophical bases for supervision and evaluation of work programs and training activities for students in agricultural education. Prereq: 435, 436 or consent of instructor.

530 Special Topics in Agricultural and Extension Education (1-3) Current issues. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E

531 Extension History, Philosophy and Objectives (2) Historical and philosophical foundation of extension education in American agriculture, key figures, issues, legislative movement, farm programs and organizations. Prereq: 411 or consent of instructor. Sp

532 Managing Extension Organizations, Programs and Personnel (3) Theory and principles of management for individual and organizational effectiveness. Prereq: 521, 531, or consent of instructor. Sp

533 Special Problems in Agricultural and Extension Education (1-4) Special research and/or special problems approved by instructor. Prereq: Supervised independent study. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E

THE MASTER'S PROGRAM

Thesis Option

A candidate for the master's degree who elects the thesis option must successfully complete:

1. A minimum of 30 hours of graduate credit in courses approved by the student's advisory committee. Six hours of thesis may be counted toward this requirement.

2. A minimum of 20 hours of graduate credit in courses numbered at or above the 500 level.

3. A minimum of 12 hours of graduate credit in courses appropriate to the area of concentration taught in the department and a minimum of 6 hours taught from outside the department.

4. A minimum of 3 hours of graduate credit in coursework in either research methodology or statistics.

5. A final oral examination.

Non-Thesis Option

A candidate for the master's degree who elects the non-thesis option must successfully complete:

1. A minimum of 30 hours of graduate credit in courses approved by the student's advisory committee.

2. A minimum of 24 hours of graduate credit in courses numbered at or above the 500 level.

3. A minimum of 12 hours of graduate credit in courses appropriate to the area of concentration taught in the department and a minimum of 6 hours taught from outside the department.

4. A minimum of 3 hours of graduate credit in coursework in either research methodology or statistics.

5. A creative component designed by the student and approved by the student's advisory committee for 3 hours of graduate credit.

6. A written and oral comprehensive examination.

THE MASTER'S PROGRAM

Thesis Option

A candidate for the master's degree must complete a minimum of 30 hours of graduate credit in courses approved by the student's master's committee. Six hours of thesis may be counted toward this requirement. At least 27 hours of graduate credit must be earned in courses numbered at or above the 500 level. In the agricultural economics concentration, 15
hours of agricultural economics, 6 hours of economic theory and 6 hours of quantitative methods are required. In the rural sociology concentration, 9 hours of rural sociology, 6 hours of sociological theory, 3 hours of research methods and 3 hours of statistics are required. Each student must successfully complete a final oral examination.

Non-Thesis Option
A minimum of 30 hours of graduate coursework is required. At least 27 hours must be in courses numbered at or above the 500 level. The agricultural economics concentration must include a minimum of 24 hours in agricultural economics and 6 hours of economic theory. In the agribusiness concentration, 15 hours in agricultural economics, 3 hours of economic theory and 6 hours of internship are required. Six hours of quantitative methods are required in both concentrations. Each student must successfully complete both written and oral comprehensiveness exams.

Minor
A minor will include 6 hours of coursework in the department, with at least 3 hours in 500- or 600-level courses. The student's committee must include a member of the faculty from the department who will be responsible for designating courses required for the minor.

THE DOCTORAL PROGRAM
A minimum of 78 hours of graduate credit beyond the B.S. degree, including 24 hours of dissertation research, but excluding any master's research credit, is required. A minimum of 27 hours of coursework in agricultural economics, 15 hours of economic theory, and 9 hours of quantitative methods are required. The program must include a minimum of 9 hours in courses numbered at or above the 600 level (excluding dissertation credits). Qualifying exams are required in macroeconomic and microeconomic theory. Comprehensive exams include three written exams and one oral exam. The written exams are in general agricultural economics, quantitative methods, and the area of concentration.

Minor
A minor will consist of a minimum of 9 hours of coursework taken in the department and approved by the minor professor. At least 6 hours of credit in the minor area must be in 500- and 600-level courses.

MINOR IN ENVIRONMENTAL POLICY
The department participates in a program designed to give graduate students an opportunity to develop an interdisciplinary specialization in environmental policy. See Economics for program description.

Agricultural Economics

GRADUATE COURSES
412 Agricultural Finance (3) Micro-finance, financial objectives, acquisition of debt and equity funds, capital investments, capital allocation, credit analysis, borrower and lender loan application analysis, insurance strategies, computer applications, kinds and sources of agricultural credit, and financial intermediation. Prereq: Introductory Economics. Sp

420 International Agriculture Trade and Marketing (3) Real and monetary aspects of international trade and effect on agricultural commodity flows; partial equilibrium analysis of international trade in agricultural products; international aspects of international marketing of agricultural products. Prereq: Intermediate Agricultural Economics or consent of instructor. F

430 Agricultural Policy (3) Values, goals and policy process. Economic rationale and effects of policy. Historical development and current characteristics of commodity, credit, food, and trade policy. Prereq: Intermediate Agricultural Economics or consent of instructor. Sp

442 Agribusiness Management (3) Applications of advanced decision analysis concepts and tools to analyze management decision problems in farm and nonfarm agribusiness settings. Case study work on strategic planning; assessing cost structure using budgeting and break-even analysis; evaluating profit portability; liquidity and solvency using financial statements; analyzing financial statements using capital budgeting. Prereq: Farm Business Management and consent of instructor. F

450 Agricultural Industry Analysis and Forecasting (3) Analytical tools for decision making in agricultural sector; applications of supply and demand; analysis of commodity supply and demand conditions; economic modeling; market forecasting, analysis of temporal and spatial patterns. Prereq: Agricultural Microeconomics and introduction to Statistics or consent of instructor. F

470 Natural Resource Economics (3) Nature of natural resources; economic efficiency as basis for natural resource use; externality in natural resource use; factors influencing environmental quality; alternative public policy tools for influencing natural resource use or improving environmental quality. Prereq: Introductory Economics. Sp

500 Thesis (1-15) P/NP only. E

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used to meet degree requirements. Repeatable. S/N only. E

505 Microeconomic Analysis (3) Theory of utility maximization and demand, production, cost, firm behavior, and supply; price in product and factor markets; efficiency and welfare. Prereq: Calculus and Intermediate Microeconomics or equivalent. F

524 Econometric Methods in Agricultural Economics (3) Application of statistical tools to economic and agricultural models; estimation of supply, demand and production functions; microeconomic forecasting models; interpretation of results. Prereq: Economics 511 and 512 or consent of instructor. F

525 Agribusiness Operations Research Methods (3) Application of operations research methods and concepts to agribusiness, theoretical background and applied considerations of each technique with emphasis on applications. Computer and other uses of applications of each technique for relevant agribusiness problems. Prereq: Basic Calculus and 524. Sp

530 Agricultural Policy Analysis (3) Evaluation of public policy as related to agricultural industry and rural areas. Prereq: 505 and Economics 513 or consent of instructor. F

542 Advanced Agribusiness Production Decisions (3) Theoretical and empirical methods in production analysis; allocation of agricultural resources; behavior of the firm; impact of market structure; decision theory with application to agricultural problems. Prereq: 505 or equivalent. Sp

550 Advanced Agribusiness Marketing (3) Use of economic concepts in agribusiness marketing decisions. Analysis of agricultural marketing decisions; buyer behavior in food and farm markets; competitive environment. Prereq: 505 or equivalent. Sp

570 Advanced Natural Resource Economics (3) Analysis of natural resource allocation issues; applied welfare economics, external effects and evaluation of public policy. Prereq: 470 and Economics 511 or consent of instructor. F

593 Special Topics in Agricultural Economics (1-3) Topics to be assigned. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/N only. E

595 Professional Internship (0) Supervised internship experience with appropriate agribusiness firm. 600 Doctoral Research and Dissertation (3-15) P/NP only. E

620 Advanced Quantitative Methods (3) Discussion and evaluation of advanced statistical and mathematical techniques in current agricultural economics research. Prereq: 552, 524, and Economics 681-82, or consent of instructor. Sp,A

640 Agricultural Supply Analysis (2) Critical evaluation of both theoretical basis and empirical procedures used for estimating agricultural supply relationships using regression techniques, production functions, mathematical programming, firm growth models and simulation software. Prereq: 540 or consent of instructor. F,A

652 Consumer Demand and Food Consumption (2) Simultaneously consumer decision making; food demand. Constraints on demand. Complete demand system models. Prereq: Economics 511 and 512 or consent of instructor. Sp,A

670 Seminar in Natural Resource Economics (2) Issues in natural resource economics. Current literature. Evaluation of theory, methodology and public policy related to allocation of natural resources. Prereq: 570 or consent of instructor. Su,A

Rural Sociology

GRADUATE COURSES
480 Technological and Community Change (3) Analysis of communication processes whereby new technology spreads within a farm population and analysis of social institutions relating technologies in rural communities. Prereq: Rural Sociology or consent of instructor. (Same as Sociology 480). Sp

580 Advanced Rural Sociology (3) Application of sociological concepts and theory to analyze changing structure and function of rural life in U.S. and developing countries. Demographic changes, rural and community indicators, and rural development processes. Prereq: 390 or equivalent. (Same as Sociology 580.1). Sp

593 Special Topics in Rural Sociology (1-3) Current sociological issues involving application of sociological theory. Prereq: 390 or consent of instructor. May be repeated. Maximum 6 hrs. E

Agriculture

(College of Agricultural Sciences and Natural Resources)

GRADUATE COURSES
507 Professional Development Seminar (1) Planning and executing graduate research programs: ethics and professionalism; graduate program procedures and resources. (Same as Animal Science 507, Biosystems Engineering 507, Blyosystems Engineering Technology 507, Food Science and Technology 507, Ornamental Horticulture and Landscape Design 507, and Plant and Soil Sciences 507). S/N only. F

509 Scientific Communication (1) Application of speaking, writing and organizational skills in preparation of research proposals, slide presentations, abstracts, web sites and vitae. (Same as Animal Science 509, Food Science and Technology 509, Ornamental Horticulture and Landscape Design 509, and Plant and Soil Sciences 509.) F

512 Teaching Internship in Agriculture (1) Supervised experience in teaching; preparation and evaluation of agriculture students. May be repeated. Maximum 2 hrs for M.S. students; 4 hrs for Ph.D. students.
The Department of Animal Science offers graduate programs leading to the Master of Science and Doctor of Philosophy with a major in Animal Science. At the M.S. level, areas of concentration are nutrition, breeding, physiology (reproductive, mammalian, and metabolic), and management with an option toward beef cattle, dairy cattle, swine, and poultry. The department also offers an option in animal nutrition, animal breeding, animal physiology, animal anatomy, and animal management. For specific information, contact the department head.

The doctoral program requires a minimum of 48 semester hours of coursework beyond the B.S. and a minimum of 24 hours of doctoral research and dissertation. The 48 hours of coursework must include:

1. A minimum of 16 hours in related fields outside of animal science.
2. At least 24 hours must be at the 500 and 600 level, exclusive of doctoral research and dissertation, of which a minimum of 6 hours must be at the 600 level. Students in the nutrition, breeding, physiology, or anatomy concentration must complete at least 12 hours at the 500 and 600 level in the respective concentration or closely related area. Students in the management concentration must complete Animal Science 581 and 9 hours at the 500 or 600 level in two non-management concentrations for a total of 12 hours (including 581).
3. A minimum of 1 hour of Agriculture 512 in addition to that required at the M.S. level.
4. A minimum of 6 hours in 400-, 500-, or 600-level statistics courses approved for the ICGSP.

The doctoral program requires the writing of a thesis based on original research; the completion of a minimum of 24 hours of graduate coursework, of which at least 14 must be taken in courses numbered at or above the 500 level; and 6 hours of thesis. Included in the course requirement is 1 hour of Agriculture 512 and a minimum of 3 hours in statistics. These statistics courses must be chosen from courses numbered at the 400 level, or 500, 600 level of courses approved for use in the Intercollegiate Graduate Statistical Program (ICGSP). The remainder of the coursework will be selected jointly by the student and the major professor depending on the student's area of concentration and professional objectives.

The advisory committee will consist of the major professor, a faculty member of Animal Science, who will act as chairperson of the committee, and a minimum of two other faculty members, one of whom may be outside of the Animal Science Department. The advisory committee approves the student's coursework and research problem and conducts the final oral examination which consists of a comprehensive oral examination and a defense of the thesis.

The-doctoral-program

The doctoral program requires a minimum of 48 semester hours of coursework beyond the B.S. and a minimum of 24 hours of doctoral research and dissertation. The 48 hours of coursework must include:

1. A minimum of 16 hours in related fields outside of animal science.
2. At least 24 hours must be at the 500 and 600 level, exclusive of doctoral research and dissertation, of which a minimum of 6 hours must be at the 600 level. Students in the nutrition, breeding, physiology, or anatomy concentration must complete at least 12 hours at the 500 and 600 level in the respective concentration or closely related area. Students in the management concentration must complete Animal Science 581 and 9 hours at the 500 or 600 level in two non-management concentrations for a total of 12 hours (including 581).
3. A minimum of 1 hour of Agriculture 512 in addition to that required at the M.S. level.
4. A minimum of 6 hours in 400-, 500-, or 600-level statistics courses approved for the ICGSP.

For admission to the M.S. program, a student must have obtained a 3.0 grade-point average on a 4.0 scale (or a 3.0 each term during the junior and senior years) in a completed undergraduate degree program in one of the animal sciences or in a related area. The student must submit evidence of research experience and a statement of intent. The advisory committee approves the coursework and the dissertation research proposal and determines if there is to be a foreign language requirement. The advisory committee approves the completion of an oral examination and the final dissertation defense examination.

GRADUATE COURSES

481 Beef Cattle Production and Management (3) Integration of principles of nutrition, breeding, physiology, and marketing into complete production and management programs. Structure of industry, enterprise establishment, systems of production, production practices, and environmental programs. Management evaluated in terms of production responses and economic returns. Prereq: Completion of 300-level core courses or equivalent consent of instructor. 2 hrs and 1 lab. Sp.

482 Dairy Cattle Production and Management (3) Integration of principles of nutrition, breeding, physiology, and marketing into complete production and management programs. Structure of industry, enterprise establishment, systems of production, production practices, and environmental programs. Management evaluated in terms of production responses and economic returns. Prereq: Completion of 300-level core courses or equivalent consent of instructor. 2 hrs and 1 lab. F.

483 Pork Production and Management (3) Integration of principles of nutrition, breeding, physiology, and marketing into complete production and management programs. Structure of industry, enterprise establishment, systems of production, production practices, and environmental programs. Management evaluated in terms of production responses and economic returns. Prereq: Completion of 300-level core courses or equivalent consent of instructor. 2 hrs and 1 lab. F.

498 Registration for Use of Facilities (3-15) Required for the student to otherwise register during any semester when the student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated: S/NC only. E.

507 Professional Development Seminar (1) Game as Agriculture 507, Biosystems Engineering 507, Biosystems Engineering Technology 507, Food Sciences and Tech-
509 Scientific Communication (1) (Same as Agriculture 509, Food Science and Technology 509, Ornamental Horticulture and Landscape Design 507, and Plant and Soil Sciences 507.) F

511 Special Problems in Animal Science (1-4) Prereq: Consent of instructor and department head. May be repeated. Maximum 9 hrs. E

520 Animal Physiology (4) Major body systems and interrelationships: nervous, muscle, blood, cardiovascular, kidney, respiratory, gastrointestinal, and endocrine. Concepts of metabolism, temperature regulation, and acid base balance. Prereq: General undergraduate anatomy and physiology, and biochemistry, or consent of instructor. F, A

523 Advanced Mammalian Reproduction (3) Current topics and "new frontiers" in investigative biology. Prereq: 322. Sp

530 Animal Nutrition and Metabolism (4) Comparative digestive physiology, digestion, absorption and metabolism of nutrients in ruminant and nonruminant species. Concepts and methodologies of animal growth and nutrient requirements, monitoring variability and deficiencies of nutrients. Prereq: Animal Nutrition 101, and Ratation Formulation or consent of instructor. F

531 Analytical Techniques in Animal Science (3) Principles, concepts and methods applied to characterization and mechanistic study of cells, organs and biological active molecules. Demonstration of methodologies, nutrient analysis, histology and ultrastructural morphology, immunology, competitive binding assays, protein biochemistry and molecular biology. Prereq: Organic Chemistry and Lab or equivalent. 1 hr and 2 labs. S/N only. Sp

535 Ruminology (2) Anatomy, physiology, and microbiology of rumin ecosystem: microbial fermentation and metabolism of polysaccharides, lipids and nitrogen. Prereq: 530 or consent of instructor. Sp

536 Nutritional Aspects of Companion Animal Health (2) Nutritional concepts applied to veterinary management of normal and abnormal states for pets including dogs, cats, horses and exotic species. (Same as Comparative and Experimental Medicine–Veterinary Medicine 638.) Sp

551 Mammalian Organology (3) Microscopic study of structure of organs and major organ systems. Prereq: Embryology, histology and/or consent of instructor. 2 hrs and 1 lab. (Same as Comparative and Experimental Medicine–Veterinary Medicine 551.) Sp

552 Disorders of the Endocrine System (2) Pathological and physiological aspects of diseases; endocrine glands of various animal species. Prereq: 501 or consent of instructor. (Same as Comparative and Experimental Medicine–Veterinary Medicine 652.) Sp, A

555 Anatomy of Domestic Carnivores (4) Gross dissection by systems and regions of dog, with comparison to cat. Prereq: Consent of instructor. 1 hr and 3 labs. (Same as Comparative and Experimental Medicine–Veterinary Medicine 555.) F

554 Comparative Histology (3) Morphology, physiology and development of blood and blood forming organs: similarities and differences of major domestic and laboratory species. Prereq: Undergraduate histology or consent of instructor. 2 hrs and 1 lab. (Same as Comparative and Experimental Medicine–Veterinary Medicine 554.) Sp, A

561 Advanced Livestock Management (3) Objective functions to evaluate alternative livestock production management policies. Systems approach to analysis and integration of reproductive management programs, genetic improvement policies, alternative feeding systems, and herd health programs. Consideration of time, risk, and uncertainty in livestock production. Tools, linear programming, as aids in decision-making and resource allocation.

Research Assistant Professors:
Elam, J. Michael, Ph.D. .............................................. Missouri Frankenberg, S. (Curator), Ph.D., Northwestern University

The Department of Anthropology offers both the M.A. and Ph.D. degrees with concentrations in archaeology, biological anthropology, cultural anthropology, and zooarchaeology. Additional information on the Anthropology graduate program may be obtained from the departmental brochure or by contacting the Anthropology Department.

THE MASTER'S PROGRAM

Students wishing to enter the Master of Arts degree program with a major in Anthropology should have an undergraduate GPA of 3.5 in the major, 3.3 overall, and hold a bachelor's degree from an accredited university with a major in Anthropology. Applicants with a major in a related field (biology, sociology, geology, classics or geography) will be considered only if they have a formal minor in anthropology or its equivalent (at least five upper division anthropology courses).

All prospective M.A. students must make formal application to The University of Tennessee, Knoxville Graduate School. Copies of the application form, transcripts, and GRE scores that are sent to the Graduate School should also be sent directly to the Department of Anthropology at the same time. In addition, the department requires a letter of intent from the applicant indicating career goals and reasons for selecting the University of Tennessee, Knoxville, three letters of recommendation, and one sample of the prospective student's written work (a class paper or research report); these materials should be sent directly to the Graduate Secretary, Department of Anthropology, SSH 250, University of Tennessee, Knoxville, TN 37996-0720.

Graduate applications are considered once a year by the Graduate Committee. All application materials must be received in the department by January 15 for admission the following Fall. Because of the structure of first-year studies, M.A. students should plan to begin their studies in the Fall semester.

M.A. REQUIREMENTS

The program leading to the M.A. is a general curriculum that allows for concentration after completion of a core course sequence. Formal requirements include:

1. Selection of an M.A. advisor. This should be done as soon as possible in the student's program but must be done no later than the end of the first semester in residence. The department graduate secretary must be informed in writing of each student's advisor.

2. A minimum of 30 credit hours in graduate courses. Twenty-four hours must be in coursework graded A-F. Coursework must include three core classes taken in the first year.

a. 510 Method and Theory in Cultural Anthropology
b. 560 Theory in Archaeology
c. 590 Method and Theory in Biological Anthropology

Additional coursework should be selected in consultation with the student's advisor and must include one additional course from two anthropology concentrations besides the student's primary concentration. At least 20
hours of coursework must be at the 500 level or higher.
3. During the first year, comprehensive Graduate Evaluation Examinations (GEEs) are required of all M.A. students and are based on the content of the core courses. These examinations are given as the final examination in each core class (during regularly-scheduled final periods) and are graded by all faculty within the appropriate subdiscipline for each course. At the end of the first year, all M.A. students will be evaluated by the entire faculty and will either be retained or dropped from the program based on their first year’s performance and GEE scores.
4. All M.A. students must attend the graduate section of the visiting lecturer program. To insure compliance with this requirement, each student is required to register for one credit hour of Anthropology 501 in the Fall semester of each year and fulfill all requirements for the course defined by the instructor. Materials covered by visiting lecturers may appear on the GEE.
5. A graduate-level introductory statistics course, usually Statistics 537.
6. In the second year of the program, students pursue their concentration area and undertake thesis research. Coursework will be determined through consultation with the student's advisor and committee (composed of the advisor and at least one other member of the Anthropology faculty along with other mutually-agreed upon members).
7. Successful completion of the thesis and final oral examination. Normally, students will complete and defend their theses during the Spring semester of their second year.
8. Two copies of the thesis are required by the Graduate School. In addition, bound copies of the thesis are to be provided to the department and to all members of the student’s M.A. committee.

THE DOCTORAL PROGRAM

In addition to the Graduate School requirements, requirements for the Ph.D. degree with a major in Anthropology, in the appropriate sequence of completion, are as follows:

Admission: Admission to the Ph.D. program is contingent upon completion of ALL requirements prior to that level. Master’s thesis candidates at UTK who are conditionally accepted into the Ph.D. program can enroll as doctoral students the semester following conferral of the M.A. degree. Students holding Master’s degrees from other institutions must apply by January 15 for admission the following Fall and must begin their studies in the Fall semester.

Admission to the Ph.D. program is based upon the applicant’s academic record and credentials, but also on fit between an individual’s interests and faculty areas of research. Applicants will not be admitted to the Ph.D. program unless appropriate faculty members are available to chair and serve on the doctoral committee. Doctoral program applicants should communicate directly with the potential chairperson and two additional members of the anthropology faculty who will be asked to sit on the committee.

Applicants to the Ph.D. degree program should meet the same academic standards as M.A. program applicants and furnish the same materials (see The Master’s Program). Admissions to the program requires either:
1. Acceptance of a Master’s degree in anthropology
2. Acceptance of a Master’s degree in another discipline, with the provision that the student will follow the first-year program with entering M.A. students, i.e., complete the core courses (510, 560, 590) and pass the Graduate Evaluation Examinations.

Doctoral Committee: A doctoral committee is appointed following admission to the program. In consultation with this committee, the student defines the future program of studies. When the student and committee have agreed upon the specific fields of specialized competence over which the student will be examined, a brief delineation of the fields by the student, approved by the members of the committee, is presented to the department head and the student’s major professor. As early as possible, no later than a full semester after admission to the program, the student shall formally present a written dissertation proposal to the department head and advisor.

Residence and Coursework: Every potential Ph.D. candidate must complete two consecutive semesters of full-time residence prior to taking the doctoral comprehensive examination. The student must complete the minimum coursework requirements of The Graduate School, including at least nine hours of 500- or 600-level courses outside of anthropology, chosen in consultation with the doctoral committee, particularly the outside member who represents the cognate area. Outside coursework may be taken in a single discipline or distributed across two or more disciplines as appropriate to the individual's program of study.

Statistics: Demonstration of competence in statistics by completing Statistics 537 and 538 with a grade of B or better is required.

Language: Students must demonstrate knowledge of one foreign language. This language should normally be French, German, Russian or Spanish, but another language may be substituted at the committee's discretion. This requirement may be met by either:
1. Successful performance on a language examination administered by the appropriate language department. A student electing this alternative should consult with the advisor; or
2. Completion of the second semester of specialized reading courses for graduate students with a grade of B or better.

Doctoral Comprehensive Examination: Students must successfully complete a written and oral comprehensive exam.

2. Comprehensive Written Examination: When the Ph.D. aspirant has completed all of the foregoing requirements and is judged by the committee to be prepared for the final(s) of concentration, the student will be required to take a comprehensive written examination. The exam will consist of three sections and be given by the student’s committee. All three sections must be taken within seven consecutive days.

2. Comprehensive Oral Examination: This examination follows shortly after successful completion of the comprehensive written exam. The major professor acts as chairperson of the committee.

Admission to Candidacy: Upon successful completion of the comprehensive exam and with the formal approval of The Graduate School, the student is admitted to candidacy for the Ph.D. degree. The formal dissertation prospectus must be filed no later than one full semester after advancement to candidacy.

Defense of Dissertation Examination: When the dissertation has been tentatively accepted by the committee, a final oral examination will be held. The committee conducts the examination, which is ordinarily held as a colloquium in which the candidate will expound on the nature and significance of his/her contribution to anthropological knowledge as set forth in the dissertation.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.A. program in Anthropology is available to residents of the states of Louisiana (concentration in zoarchaeology only), Virginia (concentration in zooarchaeology or cultural anthropology), Delaware, or West Virginia. The Ph.D. program is available to residents of Alabama, Louisiana, Mississippi, South Carolina, or West Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE COURSES

410 Principles of Cultural Anthropology (3) Exploration and illustration of major concepts, theories, and methods in cultural anthropology, with application to analysis of specific ethnographic cases. Prerequisite: 130.

411 Linguistic Anthropology (3) Basic linguistic concepts applied to research in cultural anthropology, with application to analysis of relationships between language and culture. Prerequisite: 130 or Linguistics 200. (Same as Linguistics 411.)

412 Folklore in Anthropology (3) Introduction to anthropological study of folklore and folkloric materials from various tribal, peasant, and complex societies. Prerequisite: 130 or consent of instructor.

413 Dynamics of Culture (3) Major changes in culture, ranging from evolution and diffusion to religious revitalization and political revolt, and changes in diverse cultural settings through use of archaeological, ethnographic, and comparative cases. Prerequisite: 130.

414 Political Anthropology (3) Organization and dynamics of power and politics in both stateless and state-level societies. Role of symbols, rituals, and ideologies in producing and reproducing power relations, relationships between actors (individuals) and structures. Encapsulation of traditional political forms and systems in modern states. Prerequisite: Cultural anthropology or consent of instructor.

431 Ethnographic Research (3) Conceptual and practical exploration of methods and techniques cultural anthro
513 Rural Studies in Anthropology (3) Theory, method, and ethnographic research on selected problems and aspects of traditional agrarian groups in U.S. and peasant societies. Prereq: Cultural area course or equivalent. May be repeated. Maximum 9 hrs.

514 Anthropology of Development (3) Application of anthropological theory, methods, and findings to community and national development programs. Analysis of anthropologists' roles, values, and ethical issues in selected case studies. Survey of anthropologists' work in non-academic settings.

515 Medical Anthropology (3) Cultural impact on disease patterning, theories of disease causation, and models of therapy. Theoretical and applied aspects of the anthropological study of health and disease. Prereq: Consent of instructor.

517 Forms of Social Inequality (3) Anthropological perspectives on societies stratified along lines of rank, caste, race, ethnicity, and class. Inequalities engendered by sex role structure. Consideration of social distinctions before and after rise and consolidation of modern world system. Intersections of race and ethnicity with class and gender.

520 Seminar in Zoology (3) Approaches to analysis and interpretation of archaeological faunal remains. Intensive reading, evaluation and discussion of major faunal studies, guides to identification, methods of presenting faunal data. May be repeated. Maximum 6 hrs.

521 Laboratory Studies in Zoology (4) Examination and comparison of skeletons of major vertebrate groups, shells of terrestrial and aquatic molluscs, in relation to animal remains from archaeological contexts. Basic osteology and shell characters of species encountered in aboriginal sites: use of comparative collections. May be repeated. Maximum 8 hrs.

522 Seminar in Archaeology (3) Theoretical and practical issues in contemporary archaeology: ethnarchaeology, paleoethnobotany, technology, ceramic analysis, agricultural origins, and regional archaeological cultures. May be repeated. Maximum 9 hrs.

530 Fieldwork in Archaeology (3-0) Practicum in surveying, excavating, processing, and analysis of archaeological data. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

560 Theory in Archaeology (3) Detailed consideration of theory in contemporary archaeology: models of scientific explanation, research design, archaeological formation processes, and methods of analysis and interpretation.

561 Archaeological Resource Management (3) Federal legislation and regulations affecting identification, protection, and management of archaeological resources. Professional ethics and responsibilities and relationships of federal and state agencies, public interest groups, and professional archaeologists in conducting federally sponsored archaeology. May be repeated. Maximum 6 hrs.

563 Lithic Artifactual Analysis (3) Methods for analyzing prehistoric stone tools in practical laboratory/lecture format. Stone tool production, use, stylistic variability, and discard processes.

564 Archaeology of Southeastern United States (3) Archaeological research on prehistoric American Indian cultures in Southeastern United States; Tennessee prehistory.

560 Advanced Human Variation (3) Genetic and morphological variation among extant human groups; relationships of variation to geography, ecology and subsistence.


582 Paleoanthropology (4) Fossil record from origin of hominids to appearance of anatomically modern humans. Functional morphology and phylogenetic relationships of fossil humans. Prereq: 480.

583 Skeletal Biology (3) Practical and theoretical approaches to analysis of prehistoric human skeletal remains. Demography, vital statistics, pathology, nutrition, and measures of biological relationships as related to population as adaptive unit. Prereq: 480.

585 Anthropometry (3) Techniques of measuring and describing skeletal material and human subjects: practical applications to growth, nutrition and human engineering. Prereq: Consent of instructor.

589 Anthropological Genetics (3) Application of population quantitative genetic theory to study of human and nonhuman primate populations. Prereq: Consent of instructor.

590 Method and Theory in Biological Anthropology (3) Current methods of analysis in biological anthropology and current history of theoretical perspectives. Paleoanthropology, human osteology, and human variation and population structure. Prereq: Consent of instructor.

591 Foreign Study (1-15) See College of Arts and Sciences.

592 Off-Campus Study (1-15) See College of Arts and Sciences.

593 Independent Study (1-15) See College of Arts and Sciences.

600 Doctoral Research and Dissertation (3-15) P/NP only. E

601 Advanced Graduate Research (1-15) Independent investigation of special problems in anthropology by advanced graduate students. May be repeated. Maximum 12 hrs. Only 3 hrs may count toward 600-level requirement.

611 Theory in Cultural Anthropology (3) Critical evaluation of current issues in theory and data interpretation, primarily for doctoral students in cultural anthropology.

650 Advanced Seminar in Archaeology (3) Selected topics in prehistoric and historic archaeology. May be repeated. Maximum 6 hrs.

690 Selected Topics in Physical Anthropology (3) For doctoral students in biological anthropology. May be repeated. Maximum 6 hrs.

691 Selected Topics in Paleonanthropology (3) May be repeated. Maximum 6 hrs.

695 Gross Human Anatomy (3) Skeleton, muscles, and cardiovascular system. Dissection of cadavers. Prereq: 480 or Human Biology. 3 hrs and 5 labs.

Architecture

(Major of Architecture and Design)

MAJOR

DEGREE

Architecture ................................. M.Arch.

Marlene K. Davis, Dean
William J. Lauer, Associate Dean
Jon P. Coodington, Graduate Program Head

Professors:
Anderson, G. I., M.Arch. ............................... Illinois
Conley, G. (Emeritus), B.Arch. .................. Harvard
Davis, Marlene, M.Arch. ............................... Harvard
Grieger, F., M.Arch. ............................... Pennsylvania
Kaplan, M., M.Arch. ............................... Harvard
Kelso, R. M., M.S. ............................... Tennessee
Kensvag, J., A., D.Sc. ............................... Southern Cal
Kinzy, S. A., Ph.D. ............................... SUNY (Buffalo)

Lauer, W. J. (Liaison), M.S.Arch.Engr. ............... Iowa State
Lester, A. J. (Emeritus), M.Arch. .................. Virginia
Lizon, P., Ph.D. ............................... Pennsylvania
Moffett, M. S., Ph.D. ............................... MIT
Rabun, J. S., M.A. ............................... Texas
Robinson, M. A., M.Arch. ............................. Pennsylvania
Rudd, J. W., M.A. ............................... Northwestern
Shell, W. S., M.S.Arch ............................... Columbia
Watson, J. S., M.Arch. ............................... Pennsylvania
Wodhouse, L. M. (On leave), Ph.D. ............................ St. Andrews
Admission Requirements
In addition to meeting The Graduate School's minimum requirements, the following specific admission requirements to the Master of Architecture program must be met.

For Track 1 applicants, a bachelor's degree with a 3.0 GPA from a regionally accredited college or university is required. International applicants must have an equivalent 4-year degree and a 3.0 GPA. Candidates with a GPA less than 3.0 may be considered for conditional admission when evidence of exceptional promise is identified. Undergraduate work must include at least twelve semester hours of humanities, a basic understanding of physical principles, systems and analytical procedures, and an understanding of mathematical principles and analytical procedures, as well as a general understanding of the use of computers. The School requires a separate application for Architecture including an essay and three letters of recommendation. A personal on-site interview is desirable but not mandatory. For those applicants from accredited 4+2 architecture programs, a portfolio is required in addition to the above requirements.

For Track 2 applicants, a Bachelor of Architecture degree from an NAAB accredited program, or foreign equivalent. Candidates with a GPA less than 3.0 may be considered for conditional admission when evidence of exceptional promise is identified. Submission of a portfolio with a separate application to Architecture is required. The Graduate School Admissions Committee will request additional information for any student not otherwise registered during any semester when the student is not on campus. The student must be on campus before degree completion is granted.

Degree Requirements
Track 1 requires a minimum of 48 semester hours of undergraduate preparation and 60 semester hours of graduate coursework.

401 Introduction to Preservation (3) History, theory, and legal aspects of architectural preservation and restoration.
404 Preservation Technology (3) Techniques of preservation: methods of analysis, history of materials and technology used in old buildings. Prereq: 403.
511 Environmental Influences (3) Environmental factors which influence regional character of architecture. Natural forces associated with these factors, cultural interpretation and response regarding importance and impact.
512 Non-Western and Indigenous Architecture (3) Building responsive to climate, material availability, and economic level, as designed by indigenous builders. Prehistoric times to present throughout the world. Prereq: Consent of instructor.
410 History and Theory of Urban Form (3) Historical and contemporary urban form and design.
517 The International Style (3) Survey of architecture of early modern movement, primarily in Europe and America. Prereq: Consent of instructor.
514 Seminar in Recent Architectural Theory (3) Study of the development of recent architectural theory and design. Prereq: Consent of instructor.
513 Tennessee Architecture (3) History of settlement patterns and building in Tennessee. Reading assignments, lectures, and field trips. Historical research using primary materials.
500 Thesis (1-15) P/NP only.
521 Principles of Architectural Form (3) Historical and contemporary architectural theory through investigation of form and related examples. Theories of understanding and theories of application related to generation of architectural form and space in response to both cultural and environmental focus.

525 Special Topics in Architecture (1-9) Student- initiated course. May be repeated. Maximum 9 hrs. SANC or letter grade.

526 Directed Readings in Architecture (1-9) Readings on topics of interest: primary texts, history, theory, urban issues, technology and professional practice. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

528 Topics in Architectural History and Theory (3) Historical topics, ideas and theories in architecture. Prereq: Consent of instructor.

532 Computer Applications for Architecture (3) Advanced use of computers in architecture. Prereq: Consent of instructor.

541 Representation III—Model Making (1) Model making as representation: concept models, process models and presentation models. Reinforcement of previous representational skills and knowledge.

542 Representation IV—Alternatives (1) Investigations of contemporary, alternative representation techniques as found in architecture and other disciplines. Reinforcement of previous representational skills and knowledge. Portfolio organization, presentation techniques.

551 Research Methods (3) Quantitative and qualitative methods of research in architectural inquiry. Systematic study and application of a selected theory of research, including theoretical and practical investigations in the field of architectural research. Review and identification of techniques and methodologies and applications for architectural research and scholarship.

553 Advanced Topics in Architectural Technology (3) In-depth investigations and analysis: architectural technology, lighting, structural, mechanical and other architectural technologies. Prereq: Consent of instructor.

562 Professional Practice (3) Management and organizational theories and practices for delivering professional design services: assessment of building industry and its influence on practice; analysis of basic management functions within professional firms; legal and ethical concerns facing practitioners today; and introduction to special obligations and privileges of design professional.


591 Foreign Study (1-9)

592 Off-Campus Study (1-9)

593 Independent Study (1-9)

Art
(College of Arts and Sciences)

MAJOR

DEGREE

M.F.A.

Norman Magden, Head

Professors:
Bain, Sandra J., M.F.A. Wisconsin
Brake, P. M., M.F.A. Yale
Cleaver, Dale E. (Emeritus), Ph.D. Chicago
Dahmert, R. H. (Emeritus), M.F.A. Wisconsin
Darow, J. F., Ed.D. Illinois State
Faletti, Joseph S. (Emeritus), M.S. Ohio State
Goldstein, M. B., M.F.A. Nebraska
Henderson, William C., M.F.A. Wisconsin
Lee, B., M.F.A. Yale
Leland, W. E., M.F.A. Tennessee
Livingston, P. R., M.F.A. Wisconsin
Lyons, B. (Liaison), M.F.A. Arizona State
Magden, Norman, Ph.D. Case Western Reserve
Martinson, Fred, Ph.D. Chicago
Metros, Susan E., M.F.A. Michigan State
Moffatt, F., Ph.D. Chicago
Peacock, D., M.F.A. Iowa
Riesing, T. J., M.F.A. Nebraska
Stewart, F.C., M.F.A. Berkeley
Yates, S., M.F.A. North Carolina (Greensboro)

Associate Professors:
Habel, Dorothy, Ph.D. Michigan
Hilles, Timothy, Ph.D. Penn State
LeFevre, Richard (Emeritus), M.F.A. Rochester, NY
Neff, A., Ph.D. Pennsylvania
Staples, Carolyn, M.F.A. Michigan State
Wilson, D., M.F.A. California (San Diego)

Assistant Professors:
Broden, Sally B., M.F.A. NY State College of Ceramics (Alfred)
Everson, Kevin, M.F.A. Ohio State
Smith, Peter, M.F.A. RISD

The Master of Fine Arts is the terminal degree in studio art. It is offered in the concentration areas of ceramics, graphic design, drawing, media arts, painting, printmaking, sculpture, and watercolor. Inter-area studies are available with consent of the faculty.

THE MASTER’S PROGRAM

To become a candidate, the applicant must be admitted by The Graduate School and approved by the Department of Art. In addition to the admission requirements of The Graduate School, the Department of Art specifically requires the following:

1. A detailed letter of intent including statement requesting assistantship, if desired.
2. Three letters of recommendation from former professors or professionals in the field.
3. An undergraduate major in art or evidence of equivalent proficiency.
4. A portfolio to be evaluated by the faculty.
5. M.F.A. Requirements
   1. A minimum of 60 hours is required.
   2. A minimum of 9 hours of graduate level academic (non-studio) courses of which at least 5 hours are to be in art history.
   3. Eleven hours of electives which may consist of any combination of courses offered by the University and graduate credit.
   4. Art 589, Project in Lieu of Thesis (20 hours). A third year of semi-independent study. Student must have completed all other coursework prior to registration.
   5. The candidate’s committee will consist of a minimum of 3 members and a maximum of 6 members and will be appointed prior to registration for 589. The committee must consist of one faculty member from the candidate’s concentration area (designated as chairperson) and a faculty member from outside the concentration area. The inclusion of an Art History faculty member on each committee is encouraged.

A Exhibition and oral examination: With the completion of all requirements for the M.F.A., the student must produce an exhibition and, in the presence of that work, must satisfactorily complete an oral examination.

Academic Standards
1. First-year evaluation: At the end of the first 2 semesters in residence, the student must present a portfolio for evaluation by the faculty and receive permission to continue in the program.
2. Second-year evaluation: With completion of all coursework, the student must present work for evaluation by the faculty and receive permission to register for Projects in Lieu of Thesis.
3. If, in a review by the student’s major area faculty, the student’s progress is deemed insufficient, the faculty may recommend a work period without advancement toward the degree, probation with specific goals set for a specific time, or dismissal.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.F.A. program in Art is available to residents of the states of Alabama (concentration in watercolor only), Arkansas or Kentucky (concentration in graphic design only). Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE MINOR IN THE HISTORY OF ART

A graduate minor in Art History may be arranged with consent of the student’s committee, the instructors involved, and The Graduate School. Prerequisite is an undergraduate art history minor, or its equivalent, and reading knowledge of French, German, or Italian, unless waived by the Art History faculty.
**Art History**

**GRADUATE COURSES**

403 History of Photography (3) Survey of history of photography from introduction of daguerreotype and calotype to more recent trends. Aesthetics and use of photography as medium for artistic expression.

411 Art of Indian Asia (3) History of Indian art: Central Asia and Southeast Asia. Writing-emphasis course.

415 Chinese Art (3) Survey from pre-Shang Dynasty to contemporary movements in China, Taiwan, and Hong Kong. New discoveries. Writing-emphasis course.

419 Japanese Art (3) Survey from ancient Jomon art to clay to hibon painting style of today. Variety of media. Writing-emphasis course.

425 Early Christian and Byzantine Art to 1350 (3) Art in Italy and the Eastern Empire from the beginnings of Christian art to 1350. Mosaic and painting, sculpture and architecture. Writing-emphasis course. (Same as Judaica Studies 425.)

431 Medieval Art of the West, 600-1400 (3) Western European art of the "Dark Ages," Romanesque, and Gothic periods. Writing-emphasis course. (Same as Judaica Studies 431.)

411 Northern European Painting, 1500-1600 (3) From court art of late Middle Ages to Northern Renaissance. Jan van Eyck, Roger van der Weyden, Durer: early printmakers. Writing-emphasis course.

424 Art of Northern Europe, 1600-1750 (3) Concentrated study of Seigneur, Rubens, Rembrandt, Gericault in Tour; Vermeer, Poussin, and Hals. Writing-emphasis course.

451 Art of Italy, 1520-1450 (3) Development of exploration of naturalism. Revival of antiquity and development of theories of perspective in Early Renaissance, Duccio, Giotto, Masaccio, Donatello, Botticelli. Writing-emphasis course.

452 Art of Italy, 1450-1575 (3) Concentrated study of Leonardo, Michelangelo, Titian, Raphael, Pontormo, and Gioronzo. Writing-emphasis course.

453 Art of Southern Europe, 1575-1700 (3) Concentrated study of Caravaggio, Bernini, and Italian Baroque developments in all media. Spanish Baroque painting and sculpture: Velazquez. Writing-emphasis course.

471 History of North American Art (3) Landmarks in painting, architecture, sculpture, and design from prehistory to 1900.

472 History of 20th-Century American Art (3) Development in architecture, painting, and design from 1900.

473 19th-Century American Painting (3) From West and Copley to emergence of "The Eight."

474 Theory of 20th-Century Art in Europe and America (3) Theoretical basis for modern and contemporary writing by artists and theorists. Western Art I and II, or consent of instructor.


479 Special Topics in Art History (3) Student- or instructor-initiated course offered at convenience of department. May be repeated. Maximum 12 hrs.

483 History of American Sculpture (3) American sculpture from prehistory to 1980's.
Art Media Arts

GRADUATE COURSES


432 History of Film and Modern Art (3) Study of development and interaction between cinematic arts and visual arts within context of modern art history. Available for Art History credit. (Same as Cinema Studies 432.)

435 Cinematography as Art (3) Continued development of concepts and techniques for creation of film as art form: individual projects. Prereq: Introduction to Cinematography as Art and Media Arts Portfolio Review or consent of instructor. May be repeated. Maximum 9 hrs.

436 Video Art (3) Continued development of concepts and techniques for creation of video works as art form: individual projects. Prereq: Introduction to Cinematography as Art and Media Arts Portfolio Review or consent of instructor. May be repeated. Maximum 9 hrs.

438 Special Topics in Art History (3) Student- or instructor-initiated course offered at convenience of department. Prereq: M.F.A. candidate or consent of instructor. May be repeated with consent of department. Maximum 6 hrs.

441 Digital Photography II (4) Continuation of explanation and implications of use of computer in photography. Prereq: Digital Photography I and consent of instructor.

442 Large Format Photography II (4) Studio course that continues exploration of use of large format camera in photography. Prereq: Large Format Photography I and consent of instructor.

531 Photography II (2-6) May be repeated. Maximum 10 hrs.

532 Photography II (2-6) May be repeated. Maximum 10 hrs.

535 Media Arts I (2-6) May be repeated. Maximum 10 hrs.

536 Media Arts II (2-6) May be repeated. Maximum 10 hrs.

577 Studies in Media as Art (3) Selected topics in theory and history of media as art form. May be repeated. Maximum 9 hrs.

493 Independent Study (1-15) See College of Arts and Sciences. Prereq: Consent of instructor.

595 Visiting Artist Seminar (2) Contemporary art issues by different visiting artists. May not be used toward art history requirement. May be repeated. Maximum 12 hrs.

599 Projects in Lieu of Thesis (10) Prereq: All graduate course work and successful second year evaluation by graduate faculty. May be repeated. Maximum 20 hrs. S/NC only.

573 Studies in Baroque Art (3) 17th-century art and architecture: major artists and works from southern or northern Europe. Prereq: M.F.A. candidate or consent of instructor. May be repeated with consent of department. Maximum 6 hrs.

Art Painting

GRADUATE COURSES

413 Painting IV (6) Advanced painting, individual concepts and personal expression with varied media. Prereq: Painting III. May be repeated. Maximum 12 hrs.


419 Special Topics in Drawing and Painting (3) Student- or instructor-initiated course offered at convenience of department. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

513 Graduate Painting I (2-6) May be repeated. Maximum 10 hrs.

514 Graduate Painting II (2-6) May be repeated. Maximum 10 hrs.

515 Graduate Watercolor I (2-6) May be repeated. Maximum 10 hrs.

516 Graduate Watercolor II (2-6) May be repeated. Maximum 10 hrs.

593 Independent Study (1-15) See College of Arts and Sciences. Prereq: Consent of instructor.

595 Visiting Artist Seminar (2) Contemporary art issues by different visiting artists. May not be used toward art history requirement. May be repeated. Maximum 12 hrs.

599 Projects in Lieu of Thesis (10) Prereq: All graduate course work and successful second year evaluation by graduate faculty. May be repeated. Maximum 20 hrs. S/NC only.

441 Advanced Sculpture (3-6) Individual development of sculptural problems and techniques. Prereq: 6 hrs of 300 level sculpture. May be repeated. Maximum 12 hrs.

449 Special Topics in Sculpture (3) Student- or instructor-initiated course offered at convenience of department. Prereq: Successful completion of any portfolio review. May be repeated. Maximum 12 hrs.

514 Graduate Sculpture I (2-6) May be repeated. Maximum 10 hrs.

542 Graduate Sculpture II (2-6) May be repeated. Maximum 10 hrs.

593 Independent Study (1-15) See College of Arts and Sciences. Prereq: Consent of instructor.

595 Visiting Artist Seminar (2) Contemporary art issues by different visiting artists. May not be used toward art history requirement. May be repeated. Maximum 8 hrs.

599 Projects in Lieu of Thesis (10) Prereq: All graduate course work and successful second year evaluation by graduate faculty. May be repeated. Maximum 20 hrs. S/NC only.

Art Printmaking

GRADUATE COURSES

462 Intaglio III (3-6) Exploration of individual projects through advanced color printing methods and combinations with other print media. Prereq: Intermediate Intaglio or consent of instructor. May be repeated. Maximum 12 hrs.

463 Lithography III (3-6) Exploration of individual projects through advanced lithographic methods in combination with other print media. Prereq: Intermediate Lithography or consent of instructor. May be repeated. Maximum 12 hrs.

464 Screen Printing III (3-6) Individual development of screen printing problems and techniques: development of image and personal concept. Prereq: Intermediate Screen Printing or consent of instructor. May be repeated. Maximum 12 hrs.

469 Special Topics in Printmaking (3) Student- or instructor-initiated courses offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 12 hrs.

561 Printmaking I (2-6) Directed exploration of any or all matrix-based imaging: intaglio, relief, lithography, screen printing, photo print methods and monoprint. May be repeated. Maximum 10 hrs.

562 Printmaking II (2-6) Directed exploration of any or all matrix-based imaging: intaglio, relief, lithography, screen printing, photo print methods and monoprint. Prereq: 561.

573 Printmaking III (2-6) Directed exploration of any or all matrix-based imaging: intaglio, relief, lithography, screen printing, photo print methods and monoprint. Prereq: 561, 562.

574 Printmaking IV (2-6) Directed exploration of any or all matrix-based imaging: intaglio, relief, lithography, screen printing, photo print methods and monoprint. Prereq: 561, 562, 563.

593 Independent Study (1-15) See College of Arts and Sciences. Prereq: Consent of instructor.

595 Visiting Artist Seminar (2) Contemporary art issues by different visiting artists. May not be used toward art history requirement. May be repeated. Maximum 8 hrs.

599 Projects in Lieu of Thesis (10) Prereq: All graduate course work and successful second year evaluation by graduate faculty. May be repeated. Maximum 20 hrs. S/NC only.

Arrowmont

GRADUATE COURSES

Courses listed below offered periodically only at the Pi Beta Phi Arrowmont School of Crafts, Gatlinburg, Tennessee. Courses may be repeated. Upon admission to the M.F.A. program at UT Knoxville, a student may apply certain graduate courses taken at Arrowmont toward the degree, subject to the approval of the student’s graduate committee.

400 Special Topics (2-4) Student- or instructor-initiated courses offered at convenience of department. May be repeated.

410 Drawing (2-4) Intermediate to advanced. May be repeated.

420 Ceramics (2-4) Intermediate to advanced. May be repeated.

430 Photography (2-4) Intermediate to advanced. May be repeated.

440 Painting/Watercolor (2-4) Intermediate to advanced. May be repeated.

450 Metal Design (2-4) Intermediate to advanced. May be repeated.

460 Fiber (2-4) Intermediate to advanced. May be repeated.

470 Fabric (2-4) Intermediate to advanced. May be repeated.
Students may elect either the thesis or the non-thesis option. Students in both programs are required to take 511. The master's program with thesis will include a minimum of 30 semester hours of approved graduate credit in speech/language pathology or a minimum of 33 semester hours of approved graduate credit in audiology, including 6 hours of 500 credit in the preparation of an acceptable thesis representing original independent work, and a final oral examination. At least two-thirds of these total hours must be at the 500 or 600 level, including no more than 6 hours of thesis and no more than 6 hours of practicum. Students in the non-thesis option program must present a total of 36 semester hours in the speech/language pathology program or 39 semester hours in the audiology program of approved graduate credit and pass a final written examination.

THE DOCTORAL PROGRAM

The Ph.D. program in Speech and Hearing Science seeks to develop individuals for professional careers in a variety of positions including research and college teaching in the concentration areas of speech and language pathology, audiology, speech-language science or hearing science. The degree program is research oriented with primary emphasis on processes involved in normal, deviant, or disordered speech, language, and hearing. Students will be expected to demonstrate their knowledge in areas related to the concentrated field of study. These areas include:

1. Basic speech, hearing, or language processes;
2. Basic speech, hearing, or language disorders or differences;
3. Related disciplines providing insight into human communication processes;
4. Technical skills in instrumentation and experimental design which enable the student to investigate problems pertaining to speech and hearing processes.

The program will normally consist of three or more calendar years of graduate study beyond the master's degree with the first year being devoted primarily to formal coursework and the last year to full-time research culminating in the doctoral dissertation. The total program is a minimum of 60 semester hours, including a minimum of:

1. 24 semester hours in dissertation 600.
2. 6 semester hours in a research tool.
3. 6 semester hours in a cognate area outside the department.
4. 24 semester hours in 600-level coursework within the department of which:
   a. a minimum of 6 semester hours in the topic of major interest;
   b. a minimum of 6 semester hours in topic(s) of related interest;
   c. 3 semester hours in 611; and
   d. 3 semester hours supervised teaching experience.
5. A comprehensive examination to demonstrate knowledge in the concentration area and an examination of research competence.
6. A final oral examination.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.A. program in Audiology is available to residents of the state of South Carolina. The Ph.D. program in Speech and Hearing Science is available to residents of the state of Arkansas. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE COURSES

431 Stuttering (3) Nature, appraisal and treatment. Prereq: 304 or consent of instructor.
432 Observation of Clinical Practice (1) Prereq: Speech and Language Development, Articulation Disorders, or consent of instructor.
434 Clinical Practice in Speech-Language Pathology II (1-4) Prereq: 433 and consent of instructor. Enrollment for fewer than 2 hrs must have prior departmental approval.
455 Problems in Speech Pathology (1-3) Prereq: Consent of instructor.
473 Audiology II (3) Basic principles of clinical audimetry: pure tone, speech, mask, and overview of special audiological tests. Prereq: 371.
494 Aural Habilitation/Rehabilitation of the Hearing Impaired (3) Psychosocial aspects, amplification components, management of hearing loss, educational, counseling, and therapy. Prereq: 306, 304, and consent of instructor.

GRADUATE COURSES

500 Thesis (1-15) P/NP only. E
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N only. E
504 Appraisal of Speech and Language Disorders (3) Diagnostic procedures for children and adults with speech and language problems including observation and practice with diagnostic tests. Prereq: Consent of instructor.
507 Anatomy and Physiology of Hearing (3) Structure and function of the peripheral and central auditory systems, and their roles in mediating auditory processes. Prereq: 473 or equivalent or consent of instructor.
511 Introduction to Research in Speech and Hearing (3) Analysis of research techniques, fundamentals of statistics, application of statistics, and completion of a proposal and experimental pilot research project.
512 Clinical Practice in Audiology (1-4) Prereq: 473 and 494. May be repeated. Maximum 9 hrs.
513 Clinical Practice in Audiology: Off-Campus Sites (1-4) Prereq: Consent of instructor.
514 Practicum in Verbo-Tonal Habilitation (1-4) Prereq: 494, 595, or consent of instructor. May be repeated. Maximum 8 hrs.
515 Practicum in Aural Rehabilitation (1-4) Prereq: 473 and 494. May be repeated. Maximum 8 hrs.
517 Instrumentation in Audiology and Speech Pathology (3) Principles of instrumentation in audiology and speech pathology: laboratory assignments for familiarization of students with instruments for measuring speech and hearing processes.
520 Aphasia (3) Historical review of aphasia literature, theories of brain functioning, aphasic classification and terminology. Prereq: consent of instructor. May be repeated. Maximum 4 hrs.

521 Seminar in Articulation and Phonological Processing Disorders (3) Students research in diagnosis and management of articulation and phonological processing disorders. Prereq: Articulation Disorders or equivalent or consent of instructor.

523 Seminar in Voice Disorders (3) Current research in diagnosis and management of voice disorders. Multicultural, gender and age-related issues. Prereq: 441 or consent of instructor.

524 Traumatic Brain Injury (3) Advanced neurogenetics: cognitive-linguistic emphasis. Medical and speech-language pathology rehabilitation issues associated with traumatic brain injury (TBI) related to adult TBI population. Prereq: 506 or 520, or consent of instructor.

526 Dysphagia (3) Clinical diagnosis, evaluation, and treatment of adult swallowing disorders and critical interpretation of research literature on dysphagia. Prereq: 506 or consent of instructor.

531 Seminar on Stuttering (3) Current significant research in stuttering. Prereq: 431 or consent of instructor.

532-33-34 Advanced Clinical Practice in Speech-Language Pathology (1, 1-4, 1-4) Prereq: 434 or equivalent and consent of instructor. May be repeated. Maximum 6 hrs.

535-36 Advanced Clinical Practice in Speech-Language Pathology: Off-Campus Sites (1-4, 1-4) Prereq: 100 hrs clinical experience, consent of instructor. May be repeated. Maximum 6 hrs. Enrollment for less than 2 semesters must have prior departmental approval.

538 Advanced Clinical Practice in Speech-Language Pathology: Public Schools (1-4) May be repeated. Maximum 6 hrs. Enrollment for less than 2 semesters must have prior departmental approval.


541 Pediatric Oromotor Disorders (3) Prereq: Evaluation, diagnosis, and treatment of pediatric oromotor disabilities that affect normal speech production and prosody skills. Prereq: 506 or consent of instructor.

542 Hearing Disorders (3) Effects of hearing, development, aging, diseases, and physical agents on hearing. Prereq: 473 or consent of instructor.


545 Hearing Science (3) Study of psychoacoustic phenomena and how they relate to perception and diagnostic audiology. Prereq: 473, 507, and 546 or equivalent or consent of instructor.

550 Seminar in Audiology (1-3) Significant research in various areas of audiology. Prereq: Consent of instructor. May be repeated. Maximum 10 hrs.

552 Seminar in Speech Pathology (2-3) Current significant research in speech pathology. Topics vary. Prereq: 9 hrs speech pathology. May be repeated with consent of instructor. Maximum 9 hrs.

555 Special Problems in Speech-Language Pathology (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

556 Independent Study in Speech-Language Pathology (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

562 Pradieh Field Language Disorders (3) Assessment and pathophysiology of specifically-language-impaired children (ages 3-5). Techniques for special populations. Prereq: 461 or equivalent or consent of instructor.

563 Practical Applications of Language Habilitation Techniques (3) Identification and treatment of communication disorders in infants: family-centered services and family systems. Prereq: 461 or equivalent or consent of instructor.

565 School-Age Language Disorders (3) Review of current literature on assessment and intervention techniques for school-age language learners. Prereq: 461 or consent of instructor.

574 Pediatric Audiology (3) Theoretical and practical considerations in evaluation and treatment of hearing loss in infants and children. Audiological intervention in case management of hearing impaired child: amplification, educational, alternative, and state and federal guidelines.

576 Electroacoustic Assessment of Auditory Function (3) Auditory-evoked potentials and their anatomical origin. Use of various evoked potentials in evaluation of auditory function and determination of aetiology of hearing loss. Prereq: 473, 507, and 546, or equivalent or consent of instructor.

577 Vestibular Disorders (3) Anatomy, physiology, and pathophysiology of vestibular system and other systems that contribute to balance. Prereq: electronystagmography. Prereq: 507, 542, 546, and 576 or equivalent or consent of instructor.


582 Speech and Language Services in School (3) Organization and implementation of speech and language programs in schools. Prereq: Consent of instructor.

590 Advanced Seminar in Speech and Language (2) Topics vary. Prereq: Consent of instructor. May be repeated. Maximum 8 hrs.


610 Seminar in Hearing Science (2) Advanced study of perception of non-speech acoustic signal, detectability, pitch, loudness, dimensional threshold, adaptation, and fatigue. Prereq: 602 or consent of instructor. May be repeated. Maximum 6 hrs.

611 Experimental Design in Speech and Hearing (3) Analysis of experimental design in theories and related journals. Generation of experimental designs. Prereq: Consent of instructor.

625 Advanced Seminar in Neurologically-based Communication Disorders (3) Topics vary. Prereq: 520, 524, and 524, or consent of instructor. May be repeated. Maximum 6 hrs.

655 Practicum in College Teaching (1-3) Supervised experience in college teaching. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. S/NC only.

656 Directed Research (1-4) Participation in ongoing or non-dissertation research. Prereq: Consent of instructor. May be repeated. Maximum 8 hrs.

659 Directed Study in Audiology (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

660 Directed Study in Hearing Science (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

661 Advanced Seminar: Language Disorders in Children (3) Topics vary. Prereq: 565 or consent of instructor. May be repeated. Maximum 6 hrs.

662 Advanced Seminar in Language and Speech (2) Topics vary. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

690 Directed Study in Hearing Science (1-3) Topics vary. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

AVIATION SYSTEMS

Majors

Aviation Systems........................................... M.S.

Frank G. Collins, Co-Chair
Ralph D. Kimberlin, Co-Chair

Professors:
Collins, F. G., Ph.D. ........................................ California
Kimberlin, R. D. (Liaison), Ph.D. ......................... RWTH (Germany)
Mason, A. A. (Emeritus), Ph.D. .......... Tennessee
The University of Tennessee Space Institute offers a program leading to the Master of Science degree with a major in Aviation Systems. The Aviation Systems program is designed for those who possess a Bachelor's degree in engineering or science and wish to study under a "system philosophy" toward careers in research and development or administration in areas pertinent to aviation. Current emphases include flight testing, aircraft design, aviation meteorology, air traffic control, and airport management.

To qualify for admission to this program, the applicant must possess a Bachelor's degree in engineering or science from an accredited institution, show evidence of ability to pursue and benefit from the program, and fulfill The University of Tennessee Graduate School admission procedures and grade-point standards. It is expected that the student will have a basic knowledge of computer utilization and statistics, an understanding of aerodynamic fundamentals, aircraft propulsion, and performance, and some understanding of economics.

Both thesis and non-thesis programs are available. The thesis option involves a minimum of 30 semester hours credit while the non-thesis option involves a minimum of 33 semester hours credit.

**THESIS OPTION**

The thesis program involves satisfactory completion of the following requirements:

**Research and Development Specialization**

1. Twelve hours of 500-level courses in the major field of aviation systems.
2. Six hours in industrial engineering (engineering management).
3. Three hours of electives from the major field, mathematics or engineering.
4. Six hours of Aviation Systems 500 demonstrating the ability to conduct and report on an independent investigation.

**Administration Specialization**

1. Twelve hours of 500-level courses in the major field of aviation systems.
2. Three hours in industrial engineering (engineering management).
3. Three hours in economics or finance.
4. Twelve hours of electives in the major field, mathematics or engineering.
5. Three hours of an assigned project under Aviation Systems 550.
6. A comprehensive final written examination on all coursework submitted for the degree and defense of the project course paper.

**ACADEMIC COMMON MARKET**

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S. program in Aviation Systems is available to residents of the states of Arkansas, Florida, Mississippi, Virginia, or West Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

**GRADUATE COURSES**

<table>
<thead>
<tr>
<th>500 Thesis (1-15)</th>
<th>P/NP only: E</th>
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<tbody>
<tr>
<td>501 Aviation Systems: An Overview (3)</td>
<td>(3-15)</td>
</tr>
<tr>
<td>502 Registration for Use of Facilities (3-15)</td>
<td>Required for student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/W only: E.</td>
</tr>
<tr>
<td>505 Governmental Policies for Aviation (3)</td>
<td>Theoretical and legal basis for economic and governmental regulation of aviation. Plan and development of aviation regulatory agencies. Prereq: 501.</td>
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</tbody>
</table>

**Biochemistry and Cellular and Molecular Biology**

(Non-thesis program)

**DEGREES**

Biochemistry and Cellular and Molecular Biology

<table>
<thead>
<tr>
<th>MAJOR</th>
<th>DEGREES</th>
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<tr>
<td>John W. Kooz, Head</td>
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**Professors:**

Bagby, R. M., Ph.D. ................. Illinois
Carlson, J. G. (Emeritus) (Distinguished Prof.), Ph.D. .......... Pennsylvania
Chen, T.-T., Ph.D. ................. Michigan State
Church, J. E., Ph.D. .......... Sheffield
Handel, Mary Ann (Distinguished Prof.), Ph.D. ................. California
Hochman, Ben (Emeritus), Ph.D. ................. California
Jeon, K. W., Ph.D. ................. London
Joshu, J. G. (Emeritus), Ph.D. .......... Poona
Kenedy, J. R., Ph.D. ................. Iowa
Liles, J. N. (Emeritus), Ph.D. .......... Ohio State
MacCabe, J. A., Ph.D. ................. California (Davis)
McKee, B. D., Ph.D. ................. Michigan State
Monty, John J., Ph.D. ................. Rochester
Roth, L. Evans (Emeritus), Ph.D. ................. Chicago
Sal, T. P. (Emeritus), Ph.D. ................. California
Shivers, C. A., Ph.D. ................. Michigan State
Welch, H. G. (Emeritus), Ph.D. ................. Florida
Wick, W. D., Ph.D. ................. Harvard

**Associate Professors:**

Ganguly, R., Ph.D. ................. Nebraska
Hall, J. C., Ph.D. ................. Illinois
Howell, Elizabeth E., Ph.D. ................. Lehigh
Koontz, John W. (Liaison), Ph.D. ................. Kentucky
Peterson, Cynthia B., Ph.D. ................. LSU
Roberts, Daniel M., Ph.D. ................. California (Davis)
Serpens, Engin H., Ph.D. ................. Hawaii

**Biochemistry and Cellular and Molecular Biology**

(Chief Undergraduate Adviser)

**John W. Kooz, Head**

**Professors:**

Bagby, R. M., Ph.D. ................. Illinois
Carlson, J. G. (Emeritus) (Distinguished Prof.), Ph.D. .......... Pennsylvania
Chen, T.-T., Ph.D. ................. Michigan State
Church, J. E., Ph.D. .......... Sheffield
Handel, Mary Ann (Distinguished Prof.), Ph.D. ................. California
Hochman, Ben (Emeritus), Ph.D. ................. California
Jeon, K. W., Ph.D. ................. London
Joshu, J. G. (Emeritus), Ph.D. .......... Poona
Kenedy, J. R., Ph.D. ................. Iowa
Liles, J. N. (Emeritus), Ph.D. .......... Ohio State
MacCabe, J. A., Ph.D. ................. California (Davis)
McKee, B. D., Ph.D. ................. Michigan State
Monty, John J., Ph.D. ................. Rochester
Roth, L. Evans (Emeritus), Ph.D. ................. Chicago
Sal, T. P. (Emeritus), Ph.D. ................. California
Shivers, C. A., Ph.D. ................. Michigan State
Welch, H. G. (Emeritus), Ph.D. ................. Florida
Wick, W. D., Ph.D. ................. Harvard

**Associate Professors:**

Ganguly, R., Ph.D. ................. Nebraska
Hall, J. C., Ph.D. ................. Illinois
Howell, Elizabeth E., Ph.D. ................. Lehigh
Koontz, John W. (Liaison), Ph.D. ................. Kentucky
Peterson, Cynthia B., Ph.D. ................. LSU
Roberts, Daniel M., Ph.D. ................. California (Davis)
Serpens, Engin H., Ph.D. ................. Hawaii
Requirements for Admission

Applicants for graduate study are expected to have a background equivalent to that required of undergraduate majors in this department. This includes a knowledge of the basic principles of biochemistry, cell biology, genetics and physiology. Requirements for admission are:

1. One year of general biology or the equivalent;
2. A minimum of 8 semester hours of approved biology courses beyond the introductory level and including the subject areas of genetics, cell biology and physiology;
3. Two years of chemistry including one year of general chemistry and one year of introductory Organic Chemistry with laboratory;
4. At least one semester of biochemistry;
5. One year of calculus;
6. One year of physics;
7. Graduate Record Examination scores;
8. A minimum grade-point average of 3.0 out of 4.0.

Otherwise superior students, deficient in one or more of the above requirements, may be admitted at the discretion of the department's Graduate Committee.

The Master's Program

1. Biochemistry and Cellular and Molecular Biology 511-12, 515-16, and 517.
2. Completion of course requirements as determined by the candidate's faculty committee.
3. Achievement of a 3.0 or better GPA in all courses taken for graduate credit.
4. Participation in 601 and 603 during the entire period of residence. Participation in at least one journal club chosen from among 605-608 for six semesters.
5. Comprehensive examination, taken before the end of the third year of study. A dissertation reporting the results of original and significant research carried out during the term of candidacy.
6. A final oral examination which will be concerned primarily with the student's dissertation.

Petitioning for Master's Degree

Students who have passed the comprehensive examination in the PhD program and have completed at least 30 hours of approved coursework for graduate credit, at least two thirds of which must be at or above the 500 level, may petition the department for award of a master's degree. The additional requirements for such a degree are:

1. The preparation of a research manuscript suitable for submission for publication in a major scientific journal and oral defense of that manuscript before an examining committee of three faculty members appointed by the head of the department, at least two of whom shall be members of the department, or
2. Publication of at least one full-length paper in a major scientific journal as senior author.

Academic Common Market

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S. program in Biochemistry and Cellular and Molecular Biology is available to residents of Delaware, New Jersey, and Kentucky. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

Graduate Courses

403 Advanced Genetics Laboratory (2) Experiments illustrating methods in modern genetics; techniques in classical, cytoplasmic, and developmental genetics. Model organisms, Diploids and mice. Prereq: General Genetics and Organic Chemistry.
410 Cellular and Comparative Biochemistry (4) Electrolyte behavior, chemistry and structure of proteins, enzyme behavior and biological function; catabolism and energy capture; synthetic metabolism; nucleic acid function, protein synthesis, and biochemical genetics; regulation of biological processes. Prereq: Organic Chemistry and General Biology. 3 hrs. and 1 discussion. F, Sp.
421 Cell and Tissue Structure and Function (4) Study of animal cells and tissues at light and electron micro scope levels. Prereq: Cell Biology. 2 hrs. and 2 labs.
449 Laboratory in Physiology (2) Prereq or coreq: 440 or 445.
455 Human Genetics (3) Genetic and molecular principles and problems of human inheritance. Prereq: General Genetics.
471-71 Biochemical Chemistry (3.3) Physicochemical principles with applications to biological systems. 471-71 Thermodynamics; chemical equilibrium; solution chemistry; transport; electrophoresis; protein chemistry; kinetics; enzyme catalytic mechanisms. 481-1 Elementary quantum chemistry, interactions of light with biological molecules; optical and magnetic spectroscopy; light scattering; case studies of selected macromolecules. Prereq: Calculus, Organic Chemistry, General Biology or consent of instructor.
480 Physiology of Exercise (3) (Same as Exercise Science 480.)

500 Thesis (1-15) P/NP only. E

502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when using University facilities and/or for the time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

511 Advanced Protein Chemistry and Cellular Biology (3) Cellular structure and function at molecular and supramolecular levels in regulatory proteins and membranes; function; membrane structure and function; bioenergetics; and viruses. Prereq: Prior knowledge of cell biology and biochemistry and/or consent of instructor.
512 Advanced Molecular Biology (3) Regulation of nucleic acid expression and protein activity. Nucleic acid structure and function; replication and repair of nucleic acids; gene expression; protein synthesis; post-translational protein modification; mitosis and meiosis; cell cycles and cell growth. Prereq: 511 or consent of instructor. (Same as Biochemistry 512.) Sp

513 Advanced Protein Chemistry and Cell Biology II (3) Advanced topics of cellular function and regulation of cell division and growth, membrane structure and function of supramolecular structures: cytoskeletal and cell junctions and adhesions. Prereq: 511. Sp

515 Experimental Techniques 1 (4) Modern experimental methodology and instrumentation lab. cell growth; spectrophotometry; micro assay; pH meter; amino acid and protein analysis; gas chromatography and identification and quantitation; computer analysis of nucleic acid and protein sequences. Prereq: Consent of instructor. F

516 Experimental Techniques 11 (3) Laboratory rotations. Students work in laboratory of faculty member on designated project. Prereq: Consent of instructor. F

517 Physical Biochemistry (3) Physics and chemistry of biological systems and molecules. Thermodynamics; diffusion and transport; physical chemistry of macromolecules; enzymes, kinetics, binding reactions; spectroscopy; electrophysiology. Prereq: 511 or consent of instructor.

520 Special Topics (1-2) Selected directed readings or special course in topics of current interest, as announced. Prereq: Consent of instructor. May be repeated.

525 Graduate Research Participation (3-12) Tutorial laboratory experience. May be repeated. Maximum 12 hrs. S/NC only.

550 Advanced Concepts in Neurobiology/Physiology (3) Concepts related to neurobiology/physiology with information taken from current literature. Predominantly lecture format with student participation. Specific subject area to be announced. Prereq: Consent of instructor. May be repeated.

552 Physiology of Hormones (3) Cellular and organismal action of hormones in vertebrate and invertebrate animals. Prereq: 490 or consent of instructor. Recommended prereq: 410. 2 hrs. and 1 lab.

560 Advanced Concepts in Structural Biology/Biochemistry (3) Concepts related to structural biology/biochemistry with information taken from current literature. Predominantly lecture format with student participation. Specific subject area to be announced. Prereq: Consent of instructor. May be repeated.

561 Environmental Toxicology (3) (Same as Ecology and Evolutionary Biology 561.)


564 Introduction to Electron Microscopy - Scanning Electron Microscopy (4) Practical introduction to techniques...
of electron microscopy and to scanning electron microscopy. Use of microscope, introduction to darkroom techniques and digital image processing, preparation of samples for observation, and special project. Prereq: Consent of instructor. 2 hrs and 1 lab. Sp.

570 Advanced Concepts in Cellular/Molecular Biology (3) Concepts related to cellular/molecular biology with information taken from current literature. Predominantly lecture format with student participation. Specific subject area to be announced. Prereq: Consent of Instructor. May be repeated.

580 Advanced Concepts in Genetics/Developmental Biology (3) Concepts related to genetic developmental biology with information taken from current literature, predominantly lecture format with student participation. Specific subject area to be announced. Prereq: Consent of Instructor. May be repeated.

591 Foreign Study (1-15) See College of Arts and Sciences

592 Off-Campus Study (1-15) See College of Arts and Sciences

593 Independent Study (1-15) See College of Arts and Sciences

600 Doctoral Research and Dissertation (3-15) P/NP only. E

601 Departmental Seminar (1) Invited speakers. Topics posted in advance. Required every semester in residence. S/NC only. F, Sp

603 Graduate Research Colloquium (1) Seminars and lectures dealing with current advances in fields of biochemical and biophysical methods, mechanisms of enzyme catalysis, gene expression, membrane structure and function, metabolic regulation, physical biochemistry, molecular genetics, cell biology, neurobiology, and related topics. Required every semester in residence. S/NC only. F, Sp

604 Current Topics in Environmental Toxicology (1) (Same as Ecology and Evolutionary Biology 604) S/NC only. F, Sp

605 Journal Club in Neurophysiology (1) Readings and discussion based on current literature. May be repeated. Maximum 12 hrs. S/NC only. F, Sp

606 Journal Club in Structural Biology/Biochemistry (1) Readings and discussion based on current literature. May be repeated. Maximum 12 hrs. S/NC only.

607 Journal Club in Cellular/Molecular Biology (1) Readings and discussion based on current literature. May be repeated. Maximum 12 hrs. S/NC only.


610 Current Topics in Biochemistry, Cellular, and Molecular Biology (1) (Same as Biology 610) Critical reviews of research problems and methods in biochemistry, cell biology and/or molecular biology. Oral presentations, written reports, computer simulations by faculty and students. Prereq: Consent of instructor. May be repeated. Maximum 4 hrs.

615 Special Topics in Biochemistry, Cellular, and Molecular Biology (3) Biochemical and biophysical methods, mechanisms of enzyme catalysis, gene expression, membrane structure and function, metabolic regulation, physical biochemistry, molecular genetics, cell ultrastructure and physiology, neurobiology, and related topics. Prereq: 511-12 or consent of instructor. May be repeated. Maximum 9 hrs.

Biomedical Sciences

(College of Arts and Sciences)

MAJOR

Biomedical Sciences...............................Ph.D.

Jeffrey Becker, Acting Director

Professor:

Olins, Donald E., Ph.D. .................... Rockefeller
Popp, Raymond A., Ph.D. .................. Michigan

Research Professor:

Olins, Ada L., Ph.D. ..................... New York

Assistant Research Professor:

Hauser, Loren, Ph.D. ...................... California (Irvine)

Shared faculty are drawn from the Oak Ridge National Laboratory.

The University of Tennessee-Oak Ridge Graduate School of Biomedical Sciences, located within the Oak Ridge National Laboratory, offers a program leading to the Doctor of Philosophy. The National Laboratory is a well-known center of basic research. The school utilizes the staff and facilities of this laboratory and thus brings directly into full-time graduate study in the life sciences the talents and experiences of that staff, as well as the most advanced research methods and technology.

The program of study, which incorporates a high faculty-to-student ratio, is based on intensive graduate courses supplemented by tutorial instruction, participation in a wide variety of seminars, and a heavy emphasis on communication skills, research training, and independent study. The program encourages students to pursue graduate studies to the limits of their abilities.

Each student’s curriculum is planned to meet individual needs, with the aim of giving: (1) strength in the basic sciences; (2) perception of the biomedical sciences as a whole; and (3) experience and training in a chosen specialty.

The concentration areas available for Ph.D. dissertation work are biochemistry, biophysics, genetics, cellular, developmental and mammalian genetics, and radiation biology. Included are such subjects as immunology, protein and enzyme chemistry, nucleic acid chemistry, radiation and environmental biology, developmental biology, experimental pathology, microbial and mammalian genetics, mutagenesis, structural biology, and genomic analysis.

ADMISSION REQUIREMENTS

A Bachelor’s degree or its equivalent is required. Students with M.S., D.V.M., or M.D. degrees are also encouraged to apply. Completed applications, Graduate Record Examination scores and letters of reference should be sent to the address below. The student will need preparation in biology, calculus, physics, and organic chemistry. It is recommended that deficiencies in preparation, as identified in the admission process, be eliminated prior to entrance.

Requests for application forms, information on admission, financial support, and housing should be sent to Director, University of Tennessee-Oak Ridge Graduate School of Biomedical Sciences, ORNL, 1060 Commerce Park, Oak Ridge, Tennessee 37831.

THE DOCTORAL PROGRAM

1. Satisfactory (B grade or better) completion of the following core courses or their equivalent: Biochemistry (511); Biophysical Biochemistry (514); Genetics (515); Computing for the Life Sciences (525); and Survey of Statistical Methods (530).

2. Three semesters of Biomedical Sciences Laboratory (531-33-35).

3. Participation in at least one of the seminars during each term of residence after the first year is strongly recommended.

4. Satisfactory completion of formal advanced courses in the areas of the student’s interests. The number and nature of the advanced courses may vary depending upon the student’s background and area of specialization.

5. Passing both written and oral comprehensive examinations.

6. A dissertation reporting the results of original and significant scientific research. A minimum of 24 semester hours of course 600 is required.

7. A final oral examination on the dissertation.

8. A formal seminar presentation of the dissertation research.

GRADUATE COURSES

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

511 Biochemistry (3) Chemistry of carbohydrates, lipids, proteins, and coenzymes; enzymes and metabolism; bioenergetics; biosynthesis of amino acids and nucleic acids; and macromolecules.

514 Biophysical Biochemistry (3) Chemistry and bioenergetics of purines, pyrimidines, and nucleic acids; biosynthesis of DNA, RNA, and proteins. Energy levels and excited states of molecules; optical instrumentation; applications to protein conformation. Properties of proteins and macromolecules in solution; molecular processes and polymerization; and intramolecular forces and bases.

525 Computing for the Life Sciences (3) Interactive computing. Minicomputers and microcomputing. Basic, Fortran, and/or Pascal languages; application of statistics, graphics, text manipulation, and computer communication.

530 Survey of Statistical Methods I (3) (Same as Statistics 531)

531-32-33 Biomedical Sciences Laboratory (3,3,3) Approaches and technologies in various areas of modern biological sciences. Students spend a semester in each of three laboratories conducting research in different areas of biomedical science. Required of all first-year students.

543-46-49 Graduate Research Participation (3,6,9) Special advanced research project not related to dissertation research. Topics chosen with consent of instructor. May be repeated.

551-52-53 Special Topics in Biomedical Sciences (3,3,3) Either tutorials or formal lectures. Potential topics: X-ray crystallography and diffraction microscopy; electron microscopy; electron microscopy and fine structure; and special topics. Either as tutorial or literature survey requiring substantial student preparation. May be repeated.

660 Mammalian Genetics (3) Known genetic variants affecting each organ system of experimental mammals, especially laboratory mice. Inheritance of phenotypical and biochemical traits in rodents and other laboratory animals. Prereq: 515.
Botany

(College of Arts and Sciences)

MAJOR DEGREES

Botany........................................... M.S., Ph.D.

Edward E. Schilling, Head

Professors:

Caponetti, J. D., Ph.D. ............... Harvard
Clebsch, E. E. C. (Emeritus), Ph.D .. Duke
DeSeim, H. R. (Emeritus), Ph.D ... Ohio State
Evans, A. M. (Emeritus), Ph.D ........ Michigan
Heilman, J. A. (Emeritus), Ph.D ....... Ohio State
Herndon, W. R. (Emeritus), Ph.D ........ Vanderbilt
Hickok, L. G., Ph.D. ................ Massachusetts
Holton, R. W. (Emeritus), Ph.D .... Michigan
Hughes, H. C., Ph.D. .................. Utah
Mullin, B. C., Ph.D. ................. North Carolina State
Petersen, R. H. (Distinguished Professor), Ph.D ........ Columbia
Schilling, E. E. (Emeritus), Ph.D ........ Indiana
Schwarz, O. J., Ph.D. ............ North Carolina State
Von Arnim, A. G., Ph.D ............. East Anglia (UK)

Associate Professors:

Amundsen, C. C., Ph.D. ........... Colorado
Pigliucci, M., Ph.D. ................ Connecticut
Smith, D. K., Ph.D. ................... Tennessee
Wofford, B. E. (Curator), Ph.D. .......... Tennessee

Assistant Professors:

Cruzan, M. B. C., Ph.D ... SUNY (Stony Brook)
von Amin, A. G., Ph.D. ........... East Anglia (UK)

Lecturer:

McFarland, K. D., Ph.D. ........... Tennessee

The Department of Botany offers the Master of Science and Doctor of Philosophy degrees with concentrations in anatomy, botany, cytology, cytogenetics, ecology, genetics, lichenology, morphogenesis, mycology, plant biology, physiology, plant ecology, and taxonomy.

Educational service is required of each graduate degree candidate and such service will include teaching and/or ancillary services performed in the department related to the instruction of courses.

For further information, contact the Department Head or the Graduate Coordinator.

ADMISSION REQUIREMENTS

The Botany Department requires scores from the general portion of the Graduate Record Examination, at least three letters of recommendation or standard recommendation forms from academic or professional persons, a short statement describing reasons for interest in graduate education in botany, and the following academic requirements:

1. Bachelor's degree: a B.A. or B.S. from an accredited college or university and a cumulative grade-point average of 2.5 or better (on a 4.0 scale), with evidence of ability to do work of graduate quality.

2. General botany or general biology: 8 semester hours.

3. Advanced botany or closely allied biological sciences: 12 semester hours.

4. Physical sciences: general inorganic chemistry: 8 semester hours; organic chemistry: 8 semester hours. Physics highly recommended.

5. College mathematics: 6 semester hours including 1 term of calculus.

Admission requirements: 

Evidence of a broad undergraduate background, an ability to do work of graduate quality, and an interest in the study of plant science are considered to be much more important than the particular courses taken as an undergraduate. Accordingly, students lacking specific prerequisite courses but otherwise qualified may be admitted to graduate study in botany. In such cases, the deficiencies should be removed as soon as possible, typically during the first year of the student's graduate program. The determination of deficiencies and the manner in which they will be removed will be decided upon by the student's thesis committee during the first meeting with the student.

THE MASTER'S PROGRAM

The program for the Master of Science is patterned to fit the needs of students who desire a less extensive course of study than the Ph.D. program. However, the applicant must be equally well prepared and display an aptitude and ability for advanced study. The M.S. includes thesis and non-thesis options.

Thesis Option

The thesis program is the usual route taken by botany students for the M.S. It is important that the entering student promptly identify a major professor and a suitable research project. The requirements for the thesis option consist of the following:

1. Satisfactory preparation of a written formulation and an oral defense to the student's committee of a research proposal suitable for a thesis. This must be completed before enrollment in Botany 500.

2. Successful completion of 30 hours of graduate credit, at least two-thirds of which must be at the 500 level or higher.

3. Satisfactory completion of two hours at the 600 level.


5. Presentation of a 30 minute departmental seminar.

6. Educational service in the form of teaching and/or ancillary services; consult major professor and department head.

Non-Thesis Option

1. Satisfactory completion of 34 semester hours of approved graduate courses of which 30 semester hours must be in botany including Botany 503. At least two-thirds of the hours must be at the 500 level or higher.

2. Satisfactory completion of two hours at the 600 level.

3. Educational service in the form of teaching and/or ancillary services; consult major professor and department head.

4. Satisfactory performance on a final written examination on all work offered for the degree. The student's committee may also require that an oral examination follow the written examination.

THE DOCTORAL PROGRAM

The Doctor of Philosophy program is patterned to provide training that involves extensive independent research within the student's area of concentration. Although there is no formal program of coursework, the student's committee may require specific courses for the completion of the degree. Most students spend from three to five years working on their Ph.D.

Requirements for successful completion of the Ph.D. are as follows:

1. Satisfactory presentation of a research problem by means of a written proposal and an oral defense to the student's committee. This must be completed before enrollment in Botany 500.

2. Satisfactory performance on a written comprehensive examination.

3. Presentation of one or more cognate areas outside of the department totaling 6 hours of graduate credit with at least a B average.

4. Satisfactory performance on an examination in one modern foreign language (see Graduate Coordinator) or an A or B in French 302 or German 332.

5. Satisfactory completion of 6 hours at the 600 level (excluding dissertation).


7. Presentation of a departmental seminar

MINOR IN ENVIRONMENTAL POLICY

The department participates in a program designed to give graduate students an opportunity to develop an interdisciplinary specialization in environmental policy. See Economics for program description.

GRADUATE COURSES

401 Field Studies in Botany (1-3) Field experience and taxonomy of special plant groups. Topics vary: bryology, ichthyology, pollination, mycology, systematic botany, and photography. May be repeated under different topic. Max. 9 hrs.

403 Plant Evolution (3) Evolutionary biology from plant perspective. Speciation, hybridization, polyploidy, evolution of mating systems, phenotypic plasticity; comparison of characteristics of animal and plant systems. Lectures; paper discussions on primary literature; current research in evolutionary ecology and genetics. Prereq. General Botany or Biodiversity; Organization and Function of the Cell. (Same as Ecology and Evolutionary Biology 403.)

404 Plant Molecular Biology (4) Current research in plant molecular biology techniques and procedures. Genome structure, gene expression and regulation, transformation, transposable elements, plant development. Labs: isolation of DNA and RNA, molecular hybridization, isolation and purification of plasmids, PCR amplification, specific sequences, DNA sequencing and transformation. Prereq. Biodiversity; Organization and Function of the Cell and Genetics with grade of B or better and consent of instructor. 2 hrs and 4 labs.

412 Plant Anatomy (3) Cells, tissues, and organs; development in vegetative and reproductive structures of vascular plants, seed plants. Prereq. General Botany or Biodiversity; Organization and Function of the Cell or equivalent.

431 Plant Ecology (4) Interactions between individuals, species, communities and their environments. Regulation of energy and matter in ecosystems. Weekly field trips or laboratory periods, and at least two weekend field trips. Prereq. Field Botany or equivalent. (Same as Ecology and Evolutionary Biology 431.)
500 Thesis (1-15) P/NP only. E
501 Mycology (4) Intensive survey of fungi, all major classes. Lecture, laboratory and field information. Occasional field trips. Prereq: 310. 3 hrs and 1 lab. Su, A
502 Registration for Use of Facilities (3-15) Required for the student. Office hours, registered during any semester when student uses University facilities. May be repeated before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
503 Non-Thesis Research (2) Library, field, or laboratory research under supervision of staff member. May be repeated. Maximum 4 hrs. E
506 Phycology (4) Comparative study of major algal phyta, both freshwater and marine; morphological, developmental, ecological, taxonomic and phylogenetic aspects. Field and laboratory studies, identification, classification, experimentation. Prereq: 310 or consent of instructor. 3 hrs and 1 lab. F, A
507 Biological Illustration (3) Principles and applications of photography (BW and Color); photomacro- and photomicrography, drawing, graphics and video for research and publication of data in pictorial and graphic form.
510 Introduction to Electron Microscopy - Transmission Electron Microscopy (4) (Same as Biochemistry and Cellular and Molecular Biology 560.)
530 Advanced Taxonomy of Flowering Plants (3) Evolution and classification of families of angiosperms, local flora. Prereq: 330 or equivalent. 2 hrs and 1 lab. F, A
531-32 Special Problems in Botany (1-4, 1-4) May be repeated. Maximum 12 hrs. F, A
533-34 Seminar in Botany (1) Readings and discussions of current literature and topics in botanical research. May be repeated. Maximum 6 hrs. S/NC only.
535 Methods and Instrumentation in Field Investigation (1) Project experience and theoretical background in various research methods, identification, classification, and detection of radioisotopes. Prereq: Chemistry 350, 360; Physics 121, 122. Maximum 5 hrs. S/NC only.
544 Seminar in Botany (1) Readings and discussions of current literature and topics in botanical research. May be repeated. Maximum 6 hrs. S/NC only.
550 International Broadcasting (3) Broadcasting systems, policy formation and management, TV and radio, and international broadcast communication. Prereq: Consent of instructor. F
557 Radio & Television Research (3) Various techniques used by stations and consultants in broadcast research. Applied audience research. Identifying which methods to use, interpreting results, and applying research to management or decision making. Prereq: Communications 512 or 612, or consent of instructor. Sp
560 Seminar in Radio and Television (3) Seminar in radio and television. Topics vary. May be repeated. Maximum 6 hrs. (Same as Communications 561.) F
565 Environmental Assessment and Sustainable Development in Third World Countries (3) (Same as Ecology and Evolutionary Biology 535.)
600 Doctoral Research and Dissertation (3-15) P/NP only. E
606-07 Advanced Topics in Botanical Sciences (1-3, 3) Experimental botanical science: nomenclature, morphology and systematics of vascular plants, cryptogamic plants, cryptogamic botany, cytology and cell genetics, plant physiology, palynology, and ecology. May be repeated. Maximum 12 hrs.
635 Environmental Assessment and Sustainable Development in Third World Countries (3) (Same as Ecology and Evolutionary Biology 535.)
660 Seminar in the History of Botany (2) History of botanical exploration and advances from prehistory to modern periods. May be repeated. Maximum 4 hrs.
THE MBA PROGRAM

The MBA program is designed for students with undergraduate degrees in the social and natural sciences, the humanities, and professional fields such as engineering, business, agriculture, and architecture. The MBA program is a two-year program with students beginning in the fall of each year and graduating in the spring of the following year. The objective of the program is to develop leaders able to enhance the success of their organizations.

The program consists of a common first-year core and a wide selection of second-year concentration/elective courses. The first-year core develops a general management foundation upon which specialization is developed in the second year electives. The objective of the program is to develop leaders able to enhance the success of their organizations.

The program consists of two 15-credit-hour MBA core courses in the first year and 24 credit hours of concentration/elective courses in the second.

Admission Requirements

Applications are accepted for fall semester only. The application deadline for fall semester is March 1. Applications by U.S. citizens and permanent residents received after March 1 will be considered as space allows.

To be considered for admission, the applicant's file must be complete. A completed file includes the Graduate School Application, transcripts of prior college work, the MBA program application, two completed applicant recommendation forms, and the Graduate Management Admission Test (GMAT) score report. The first items should reach The Graduate School one month before the MBA application deadline to allow for processing.

Additional information is required by The Graduate School for international students.

For admission to the MBA program, consideration is given to (1) applicant's academic record with particular attention to the last two years of undergraduate work and previous graduate studies, (2) scores on the GMAT and the Test of English as a Foreign Language (TOEFL) for those whose native language is not English, (3) work experience and other activities that demonstrate potential for leadership, and (4) recommendations from professors and work supervisors.

The admission decision is based on all factors which make up the total application; therefore, there is no automatic cut-off for either grade point averages or GMAT scores. However, admission preference will be given to applicants with full-time work experience after obtaining the undergraduate degree.

Prerequisites

College-level mathematics through at least one course in college-level calculus, taken within the past 5 years, with a grade of B or better, is the only prerequisite requirement for entry into the program. Students whose undergraduate training does not include calculus should arrange to take it at UT Knoxville or at another accredited institution prior to the fall semester of entry into the program. Those electing the management science or statistics concentration must have completed two years of college-level calculus.

MBA Core

The MBA core consists of two 15-hour courses, one taken each semester. The courses are taught by the MBA core faculty in an integrated fashion through a year-long simulation requiring students to learn the functional fundamentals (accounting, finance, management, marketing) and apply them to solving a business problem. The topics introduced in this course follow three major themes: the functional fundamentals (learned within a cross-functional framework); the role of the firm in society (with attention to stakeholder value, economics, and the ethical/legal environment of the firm); and personal and team development. Students will be exposed to the assessment and delivery of customer value, statistical process control, continuous systems improvement, and the role of quality in competitive organizations.

Students in the first-year core undertake active learning within a team-based environment. Many core requirements are experiential exercises in which self-discovery within a team setting is an important element of the learning process. Individualized support is provided for developing both written and oral communication skills.

Concentration and Electives

A concentration area may be indicated on the MBA Program Application or this declaration may be deferred until after matriculation. In any event, selection must be made after completion of the first year. Requirements for changes in concentration area must be submitted for approval to the Office of Graduate Business Programs.

Among the 24 credit hours in the concentration/electives block, at least 9 but not more than 12 must be in one of the following concentration areas. For specific courses required in concentration areas, see the appropriate field of instruction.

For complete listing of MBA program requirements, see above.

Students pursuing a concentration in global business are strongly encouraged to pursue it as a second concentration in addition to one of the traditional departmental concentrations. Students pursuing this concentration are also strongly encouraged to pursue an international or internationally related internship for the summer between their first and second years in the MBA program. Students are expected to participate in a foreign exchange or field experience if at all possible, especially for those with foreign experience. Language training is advised but not required, and beginning language courses are not typically available for graduate credit.

Other Requirements

The Application for Admission to Candidacy must be approved by the MBA faculty members and the department head in the student's area of concentration and the Associate Dean in the College of Business Administration. The application for admission to candidacy must be submitted to the Graduate Office at least one full semester prior to the date the degree is conferred. Admission to candidacy in the fall semester permits graduation in the following spring semester.

To qualify for the degree, the student must achieve a B average (3.0) or above in MBA core courses required in his/her program, a B average or higher in courses comprising the concentration area, and a B average or higher in the overall program. Each student must write a satisfactory analysis of a comprehensive case administered at the end of the first year.

BUSINESS ADMINISTRATION CONCENTRATIONS

For complete listing of MBA program requirements, see above.

MBA Concentration Required: Global Business, New Venture Analysis and Entrepreneurship.

In recognition of the growing globalization of business activity and the importance of the international environment to successful management of every firm, the MBA program offers a concentration in global business. The concentration comprises at least two courses taken from Economics 424, Logistics 507, Management 571, and departmental special topics courses with international content; and at least one but not more than two additional courses from the electives list, or from a list of electives available for graduate credit.

Students pursuing a concentration in global business are strongly encouraged to pursue it as a second concentration in addition to one of the traditional departmental concentrations. Students pursuing this concentration are also strongly encouraged to pursue an international or internationally related internship for the summer between their first and second years in the MBA program. Students are expected to participate in a foreign exchange or field experience if at all possible, especially for those with foreign experience. Language training is advised but not required, and beginning language courses are not typically available for graduate credit.

Because of the fully integrated nature of the first-year curriculum, no credit hours are transferred into this core curriculum. The maximum number of hours that may be transferred to elective and concentration areas is 6 semester hours. Transfer credit will be considered upon formal request to the Director of Graduate Business Programs.

To qualify for the degree, the student must achieve an overall B average of 3.0 or above in MBA core courses required in his/her program, a B average or higher in courses comprising the concentration area, and a B average or higher in the overall program. Each student must write a satisfactory analysis of a comprehensive case administered at the end of the first year.
development. The new venture analysis/entrepreneurship concentration courses may be combined with two elective courses in another area (management or marketing) to achieve a dual concentration.

Minimum course requirements are Finance 551, Management 551, and Marketing 550. These course descriptions are listed under their fields of instruction.

PRE-MBA PROGRAM

The College offers a joint BA/MBA program with the College of Arts and Sciences. Students in this program take their first three years of coursework in Arts and Sciences, and their last two years in the College of Business Administration. Within their first three years, students fulfill all general education requirements for the BA degree, both upper and lower division along with a minor offered by one of the Arts and Sciences departments. They may use one Economics course only to fulfill distribution requirements, and they are required to take a year of calculus as the only prerequisite to the MBA.

Admission requirements are higher than those normally expected of MBA applicants. Desired qualifications include a minimum 3.4 GPA and a GMAT score of 600 or higher. Students interested in the program are counseled initially in the Arts and Sciences Advising Center regarding admission standards and Arts and Sciences requirements. At the end of the second year, they have a conference with the Director of Graduate Business Programs and are advised of their prospects for formal admission. Students who are likely candidates are advised to take the Graduate Management Admission Test in October of the third year, and to submit an application to the MBA program. The admission decision is made by January of the third year.

Upon admission, students begin MBA coursework in the fourth year and are awarded a BA degree at the end of that year. Upon successful completion of the fifth year (minimum of 30 semester hours of graduate credit), the student receives the MBA degree.

DUAL J.D.-MBA PROGRAM

The College of Business Administration and the College of Law offer a coordinated dual program leading to the conferred of the Master of Business Administration degree (concentration in manufacturing management) and the Master of Science degree (with a major in Industrial Engineering, concentration in manufacturing systems engineering). The dual program is designed to accommodate the interests of students who desire a career leading to a leadership position in a manufacturing organization.

Admission Requirements

Applicants for the J.D.-MBA program must make separate application to, and be competitively and independently accepted by, The Graduate School and College of Business Administration for the MBA degree, and by the Dual Program Committee.

Students who have been accepted by both colleges may apply for approval to pursue the dual program anytime prior to, or after, matriculation in either or both colleges. Such approval will be granted, provided that dual program studies be started prior to entry into the last 28 semester hours of J.D. coursework and prior to entry into the second year of the MBA program. Students interested in entering the dual degree program should submit a letter of application to the Dual Program Committee. Upon receipt of the application, the Dual Program Committee will determine eligibility and assign students to advisors who will be responsible for course approval and supervision of their student's progress through the dual program.

Curriculum

A dual program candidate must satisfy the graduation requirements of each college. Students withdrawing from the dual program before completion of both degrees will not receive credit toward graduation from either college for courses in the other college, except as such courses qualify for credit without regard to the dual program.

The College of Law will award up to 9 semester hours of credit toward the J.D. for acceptable performance in approved graduate-level courses offered by the College of Business Administration. The College of Business Administration will award up to 9 semester hours of credit toward the MBA for acceptable performance in approved courses offered in the College of Law. The approval of courses is the responsibility of the Dual Program Committee and the student's assigned advisor.

Students may begin their studies in either the J.D. or MBA program, but must not enroll in MBA coursework while completing the first year of the law curriculum and may not enroll in J.D. coursework while completing the first year of the business curriculum. During the first year in the J.D. program, students register through the College of Law. For any term in which students take MBA courses, even though they are also taking law courses, they must register through The Graduate School. The Graduate School registration form must be approved by the Director of Graduate Business Programs.

Awarding of Grades

Grades for graduate business courses accepted by the College of Law and grades for law courses accepted by the College of Business Administration will be converted to either Satisfactory or No Credit and will not be included in the computation of the student's grade average or class standing in the college in which such grades are so converted. The College of Law will award a grade of Satisfactory for a graduate business course in which the student has earned a B grade or higher and a No Credit for any lower grade. The College of Business Administration will award a grade of Satisfactory for a law course in which the student has earned a 2.3 grade or higher and a No Credit for any lower grade. Grades earned in courses of either college may be used on a regular graded basis for any appropriate purpose in the college offering the course. The official academic record of the student maintained by the Registrar of the University shall show the actual grade assigned by the instructor without conversion.

Approved Dual Credit

MBA courses to be counted toward the J.D. program must include 9 semester hours approved by the College of Law. Law courses to be counted toward the MBA must be selected from those approved by the Director of Graduate Business Programs.

DUAL M.S.-MBA PROGRAM

The College of Business Administration and the College of Engineering offer a coordinated program leading to the conferred of the Master of Business Administration degree (concentration in manufacturing management) and the Master of Science degree (with a major in Industrial Engineering, concentration in manufacturing systems engineering). The dual program is designed to accommodate the interests of students who desire a career leading to a leadership position in a manufacturing organization.

Admission Requirements

Applicants are accepted for fall semester only. Applicants for the M.S.-MBA program must make separate application to, and be competitively and independently accepted by, The Graduate School for the Master of Business Administration degree program and the Master of Science degree program with a major in Industrial Engineering, and by the Dual Program Committee.

Students will initially apply for the MBA program, indicating on that application the intent to pursue the dual M.S.-MBA program in manufacturing (refer to the MBA program for separate instructions). During the second semester of the first year, students will revise through The Graduate School to the M.S. program with a major in Industrial Engineering beginning Fall semester of the second academic year. Students accepted for both degrees programs will be assigned by the Dual Program Committee advisor who will be responsible for course approval and supervision of the student's progress through the dual program.

Applications by U.S. citizens and permanent residents received after the MBA application deadline (March 1) will be considered on a space allows. Additional information is required, and different application dates are established by The Graduate School for international students.
Curriculum
The curriculum in the first academic year of the dual M.S.-MBA program is the two-semester core of the MBA program (two 15-hour courses, one in each semester). A 1-hour seminar each semester in manufacturing will also be taken concurrently during the first two semesters (not for graduate credit). A 3-hour design or industrial project course will be accomplished in the summer term of the first year. This will be a part of a summer internship in industry, and the project will be academically supervised by a faculty member associated with the dual program.

During the second year, 27 hours of coursework will be completed in the manufacturing systems engineering concentration in Industrial Engineering plus an additional 9 hours of graduate courses in the College of Business Administration acceptable in meeting the requirements of the MBA program. Fifteen hours will be taken during each of the first two semesters of the second academic year. A culminating 6-hour integrated case-study, requiring use of most previous material, and a final examination as required by the Dual Program Committee, will be taken during the first session of summer term of the second year.

The dual degree candidate must satisfy the curriculum and graduation requirements of both the College of Business Administration, the College of Engineering, and the College of Architecture and Art.

Approved Dual Credit
A maximum of 15 semester hours of approved graduate-level courses completed in the College of Business Administration may be counted toward the M.S. degree program with a major in Industrial Engineering. A maximum of 15 semester hours of approved graduate-level courses completed in the Department of Industrial Engineering may be counted toward the MBA degree program. The approval of courses is the responsibility of the Dual Program Committee and the student's assigned advisor.

PROFESSIONAL MBA PROGRAM
The professional MBA is offered for fully employed individuals. The weekend track of the MBA results in the same Master of Business Administration degree as the full-time MBA and executive MBA.

Admission Requirements
Applications are accepted for fall semester only. The application deadline is April 15. For admission to the program, consideration is given to (1) applicant's work experience, (2) graduate grades, (3) work experience and other activities that demonstrate potential for leadership and (4) recommendations from supervisors. The admission decision is based on all factors which make up the total applicant; therefore, there is no automatic cut-off for either grade-point averages or GMAT scores.

Transfer Credits
Because of the fully integrated nature of the professional MBA core curriculum, no credit hours may be transferred as substitutes for core curriculum.

Other Requirements
Other requirements are the same as those for the full-time MBA program.

ADMINISTRATION REQUIREMENTS
All applicants begin and complete the program in one twelve-month period. Sessions begin in January of each year. Final deadline for applications is October 10 of the preceding calendar year. For applicants who wish to make plans early in the preceding year, there is an advance reservation deadline of August 1. International students and students whose native language is not English must meet special requirements for admission to The Graduate School of UT Knoxville and are advised to make inquiries well in advance of the program application deadline.

To be considered for admission, the applicant must have a bachelor's degree and 10 or more years of work experience. Applicants must submit a complete application file including the Graduate School Application, official transcripts of prior college work, the executive MBA program application with evaluations from his/her company, and the Graduate Management Admissions Test (GMAT) scores. Reports of transcripts from other institutions only take fourteen to six weeks to arrive, so applicants should request these far in advance of the deadline.

For admission to this program, primary consideration is given to the applicant's work experience and the recommendation from the sponsoring organization and the GMAT. There is no cut-off for either grade-point averages or GMAT scores, however, admission to the program is competitive, and applicants will be evaluated on their ability to operate on a par with other high achieving participants.

Curriculum
The curriculum is taught by a core faculty of 10 professors assisted by other faculty on an ancillary basis. The core faculty develop the entire curriculum and teach it in an integrated, interdisciplinary manner.

The MBA program is completed in three terms and requires registration for 15 hours in each term. The first term is comprised of Executive Core I and Management Project I; it includes two residence sessions. The second term is comprised of Executive Core II and Management Project II; it includes two residence sessions. The third term is comprised of Executive Core III and Management Project III. It includes two residence sessions.

The core courses are a full-term curriculum with reading and study, case work and problem solving, as well as analyses and applications within the sponsoring organization during the off-campus periods. The topics introduced within these courses follow five major themes: the functional fundamentals (learned within a cross-functional framework); continuous improvement from a systems-thinking perspective; the role of the firm in the global environment; organizational culture and change management; and personal and team development.

The management project is carried out as an independent project with faculty advisor. It involves the diagnosis and analysis of some significant aspect in the sponsoring organization and is based on applying major themes in the core courses. The written project and presentation to senior management and faculty serves as the comprehensive examination.

The off-campus work requires substantial and regular contact with faculty.

Transfer Credits
Because of the integrated nature of the curriculum, no credit hours for courses already taken may be substituted for those in the executive program of the MBA.

Executive MBA in Taiwan
The executive MBA taught in Taipei, Taiwan is designed for professionals residing in Taiwan and other nearby countries. Its target audience and objectives are the same as those on the Knoxville campus, except that the sequence of material has been changed to accommodate the schedules of faculty teams traveling to Taiwan. The executive MBA in Taiwan results in the same Master of Business Administration degree as the full-time MBA and executive MBA on the Knoxville campus.
The Taiwan executive MBA is three semesters of 15 credit hours each, including the same core and project courses described for the Knoxville program. Between each semester, there is a term when students are not enrolled. The program begins in the Summer term, continues in Spring semester of the following calendar year and is completed in the Fall semester of that same year. All participants begin and complete the program together.

Each semester is comprised of two periods of concentrated class work with a continuous program of reading, study, and on-the-job applications between class periods. The class will meet occasionally during the semesters in which they are not enrolled for purposes of discussing the readings and assignments and for assisting one another. The first five periods will be taught in Taiwan. The sixth class period is a three-week residency on the Knoxville campus.

Admissions Requirements for the Executive MBA in Taiwan
To be considered for admission, the applicant must have the equivalent of a U.S. bachelor's degree and 10 or more years of work experience. Applicants must submit a complete application file including the Graduate School application, official transcripts of prior college work, and the executive MBA program application with a recommendation from their company. Admission to the program is competitive. Primary consideration is given to the applicant's work history and the recommendation from the applicant's manager, and applicants will be evaluated on their ability to operate on a par with other high achieving participants.

Each international participant who has not taken the Test of English as a Foreign Language (TOEFL) within the previous two years must take and pass it with a score of 650 or higher. This test may be taken after enrolling in the program but must be successfully completed prior to the international study period in the U.S.

Executive MBA for Physicians
The physician track of the executive MBA is custom designed for physicians. Its objectives are the same as the generalized executive track of the MBA on the Knoxville campus. The curriculum content is that of the Knoxville executive MBA, except that it is focused on executive education within the health care industry. The physician track of the executive MBA program results in the same Master of Business Administration degree as the full-time MBA and executive MBA programs on the Knoxville campus.

The physician program is three semesters of 15 credit hours each, including the same core and project courses described for the Knoxville program. The program begins in the Spring semester, continues into the Summer term, and is completed in the Fall semester of that same year. All participants begin and complete the program together.

Each term begins with one intensive residential period of concentrated class work with subsequent interactive sessions between faculty and students using distance learning technologies. In addition, a fourth and final residence period at the end of the Fall term will conclude the educational experience.

Admission Requirements for the Executive MBA for Physicians
To be considered for admission, the applicant must have an M.D. degree and 5 or more years of work experience. Applicants must submit a complete application file including the Graduate School Application, official transcripts of prior college work, and the executive MBA program application. Admission to the program is competitive. Applicants will be evaluated on their ability to operate on a par with other high achieving participants and on their future management potential.

THE DOCTORAL PROGRAM
The primary objective of the Ph.D. in Business Administration is to prepare a select number of qualified students for careers in university-level teaching and research and for responsible positions in business and government.

Admission Requirements
Students seeking a Ph.D. degree must be recommended for acceptance by the College of Business Administration to The Graduate School. Actual admission is based on the applicant's overall standing compared with other applicants and with the number of vacancies in each department. The Graduate School requires the Graduate School Application, transcripts from all previous college work, and additional information from international students. The college requires the Ph.D. application, scores from the GMAT, and four written recommendations. All materials should be received by the College of Business Administration not later than March 1. Late applications are considered only if space is available.

Under exceptional circumstances, a student may be considered for acceptance into the Ph.D. program without having a master's degree. An applicant in this situation should have an outstanding undergraduate background and should represent a deep and sincere commitment to the pursuit of a career in research and instruction.

Program of Study
The Ph.D. normally requires at least three years of intensive study and research beyond the master's degree. Typically, the first two years of a student's program consist of coursework, writing, and research. The third year usually focuses on completion of the dissertation research and writing. It is emphasized that the Ph.D. program is structured for full-time students only. Upon acceptance of a student by a particular departmental faculty, the student is expected to remain in residence until the dissertation has been completed and all requirements are met for completion of the Ph.D.

Since the program focuses on the development of competent scholars, heavy emphasis is placed on both teaching and research skills. As part of the doctoral program, each student is required to serve as a teaching assistant in an undergraduate business class or as a research assistant to a senior faculty member. Typically, the College of Business Administration offers financial support for doctoral students during their tenure in the program.

The Ph.D. program is highly flexible, offering a wide array of concentrations and cognates. Moreover, heavy emphasis is placed on individualized instruction and close student-faculty interaction. Instruction takes the form of regular classes, doctoral seminars, and independent study and research. Students are also encouraged to attend lectures and discussions by visiting scholars throughout the year.

There are six concentrations offered in the Ph.D. program:

Accounting
Finance
Logistics and Transportation Management (Operations Management and Strategic Management)
Marketing
Statistics

More detailed information concerning these specific areas is available by writing directly to each department chairperson and by referring to the appropriate fields of instruction.

Degree Requirements
Doctoral students must file a program of study that has been approved by their doctoral committee within one year of completing their final first year of doctoral studies. This committee is nominated by the department chairperson in a student's intended area of concentration, subject to the Graduate Council's policies and procedures. Following are specific degree requirements:

1. Students must complete at least three years of full-time coursework beyond the baccalaureate degree, with two years of residence on the Knoxville campus.
2. Students are required to have a sound and broad base on which to build their Ph.D. coursework. The departmental doctoral advisor will work with the student to determine what, if any, courses need to be completed. All such work is subject to approval by the temporary doctoral advisory committee and the Director of Graduate Business Programs.

Specific concentrations may have prerequisites.

3. Research Tools: A minimum of 9 semester hours of graduate research methods must be completed. At least 6 semester hours in statistics courses beyond Statistics 531 are required. The remaining 3 semester hours may be completed in additional statistics courses (not to include Statistics 531) or in other areas such as research methodology, management science, computer science, econometrics, and psychometrics.

4. Concentrations: The concentration is the focal point of the Ph.D. program. Students are expected to master the literature and research techniques in the concentration area and to do quality research as evidenced by the preparation of an acceptable dissertation. A minimum of 12 semester hours of coursework is required, including at least 9 hours of doctoral seminars. Graduate work taken in the concentration at other institutions is considered by the temporary doctoral advisory committee in approving the specific coursework required.

Available concentrations are: accounting, finance, logistics/transportation, management (operations management and strategic management), marketing, and statistics. See the appropriate fields of instruction for specific course requirements.

5. A minimum of 9 semester hours of graduate coursework is required in an area
outside, but complementary to, the concentration. The student may choose the cognate from one of the following: one of the six concentrations or business areas listed above, economics, or a related area in another school or college of the University.

**Comprehensive Examinations**

Comprehensive written examinations over the concentration area are required of each person seeking candidacy for the Ph.D. degree. This examination is administered in two sessions of approximately four hours each. Students qualify in the cognate area by completing a one-semester, four-hour examination in an equivalent course jointly approved by the student's major professor and the student's advisor in the cognate area. Comprehensive examinations are generally offered during the fall and spring terms. Comprehensive examinations must be taken within five years of matriculation.

When either the concentration or cognate area examination is passed, the remaining examination must be passed within the next 13 months.

**Doctoral Committee**

A doctoral student is advised to give serious attention early in the program to the composition of his/her doctoral committee. In accordance with Graduate School policy, the student and the major professor identify a doctoral committee composed of at least four faculty members, three of whom, including the chair, must be approved by the Graduate Council to direct doctoral research. When the doctoral committee has been formed, the temporary doctoral advisory committee ceases to exist.

**Admission to Candidacy**

Students may apply for admission to candidacy for the Ph.D. after maintaining at least a "B" average in coursework, successful completion of comprehensive examinations, and acceptance of a research proposal for the dissertation by the student's doctoral committee.

Admission to candidacy must be approved at least one full semester prior to the date the degree is conferred. (Admission in the fall permits graduation in the following spring semester.)

Application for admission to candidacy must include a listing of all courses taken in each of the fields required for the degree (business functional areas, basic disciplines, concentration and cognate area). Graduate courses accepted from other institutions must be included. Under "Other Requirements," the date of acceptance of the research proposal by the doctoral committee should be indicated. The application must be approved by the student's doctoral committee and the Associate Dean before submission to The Graduate School.

**Dissertation**

Minimum of 24 semester hours: The student must complete a dissertation embodying the results of original research demonstrating the ability to do scholarly writing. The dissertation is supervised by the candidate's doctoral committee, which must certify its completion and acceptability after oral defense of the candidate's research effort.

The dissertation normally must be completed within three years of the student's advancement to candidacy.

**GRADUATE COURSES**

502-03 Business Core for Master of Accountancy I, II (3,3) Development of role and responsibility of accountant as business advisor, management and delivery of customer value, continuous system improvement, management, process control, human resource management, role of quality in competitive organizations, performance measurement, financial accounting, and audit of corporate strategy. PreReq: Admission to M.Acc. program.

504 Core I (15) Development of roles and responsibilities of business manage. Functional fundamentals (accounting, finance, marketing, operations, human resource management) through role of management by which knowledge is applied to solution of real-world enterprise. Continuous systems improvement and delivery of customer value: role of the manager with attention to stakeholder value, economics, and the ethical and legal environment of the firm. Personal leadership skills: teamwork, written and communication, and assessment of student's leadership abilities. PreReq: Admission to MBA program or consent of Director of Graduate Business Programs.

505 Corrill (15) Continuation of 504. Functional fundamentals through year-long case. Case study work on organizational, role in global competition, managing technology, ethics and social responsibility, and strategic planning. Case study integrated business simulation. PreReq: 504 or consent of Director of Graduate Business Programs.

506 Information Infrastructure Strategy and Design (3) Information strategy involving structured and unstructured systems, using internet and internet networks. Design of structured system using upper CASE tools and unstructured system using open software which is internet accessible with access control.

510 Customer Responsive Management (3) Management methods that provide flexibility required to diverse customer needs and to adapt to competitive, technological, and political change. Management of corporate executives, interactive marketing, capacity management economics, and relationship management for industries: health care, consulting, governmental services, professional services, repair services, truck load transportation, emergency response organizations, customer service centers and other responsive organizations.

551 Executive Core I (3) Integrated course with substantial reading, study and analyses during off-site periods. Integration of major business functions through strategic and business process perspectives. Application of functional knowledge to tactical and strategic issues. Development of purpose of firm as delivering value to customers and other stakeholders. Ethical issues. Financial and accounting principles. Case study integrated business simulation. PreReq: Admission to executive program of MBA.


561 Management Project I (3) Company project. Preliminary investigation of development of strategic issue. Prerequisite: major project or significant organizational change to enhance organizational effectiveness in sponsoring organization. Work within firm under guidance of faculty to develop proposal which defines issue and scope of project. Proposal is defended by student and faculty. PreReq: Admission to executive program of MBA and cooperation of sponsoring organization.


593 Directed Independent Study (3) Cross-disciplinary topic of mutual interest to student and faculty. Available only by arrangement with sponsoring faculty member. May require approval of Director of Graduate Business Programs. May be repeated. Maximum 6 hrs. S/NC or letter grade.

599 Executive-In-Residence (3) Interaction with corporate executives from wide spectrum of business disciplines and discussion of domestic and international strategic planning as applied in major corporations. PreReq: MBA core and consent of instructor.

**Chemical Engineering**

(College of Engineering)

**MAJOR DEGREES**

Chemical Engineering M.S., Ph.D.

John R. Collier, Head

Professors:

- Bienkowski, Paul R., Ph.D., Purdue
- Collier, John R. (Liaison), Ph.D., Case Western Reserve
- Counce, Robert M., Ph.D., Tennessee
- Culberson, Oran L., Ph.D., Texas
- Cummings, Peter T., Ph.D., Northwestern
- Frazier, George C., Ph.D., Northwestern
- Holmer, John M., Ph.D., Tennessee
- Hsu, Hsien-Wen, Ph.D., Wisconsin
- Moore, Charles F., Ph.D., Louisiana State
- Perona, Joseph J., Ph.D., Philadelphia
- Prados, John W., Ph.D., Northwestern
- Sheth, Atul C., Ph.D., Texas
- Thomas, Carl O., Ph.D., Pennsylvania

Associates Professors:

- Bruns, Duane D., Ph.D., Houston
- Wang, Tse-Wei, Ph.D., MIT
- Weber, Frederick E., Ph.D., Minnesota

Assistant Professors:

- Frymier, Paul D., Ph.D., Virginia
- Koffler, David J., Ph.D., Minnesota

Graduate programs lead to the degrees of Master of Science and Doctor of Philosophy in Chemical Engineering with concentrations in chemical engineering, chemical bioengineering, advanced control systems, and polymer science and engineering.
THE MASTER’S PROGRAM

Thesis Option: The standard master’s program includes a thesis and leads to the Master of Science. Minimum departmental requirements are as follows:

1. A total of at least 21 hours in graduate coursework in chemical engineering and related areas excluding thesis. The minimum requirements are 18 hours in chemical engineering; 3 hours in other engineering, scientific, or business areas (as approved by the departmental faculty); and 9 hours chosen from either of these two categories.
3. Active participation in graduate seminars in the department. Resident students must register for CHE 501 every semester it is offered.
4. A final oral examination covering the thesis, related fields and graduate coursework.

Non-Thesis Option: Under certain conditions, a candidate may apply for a non-thesis program. To be eligible, a candidate must show evidence of significant professional experience after the baccalaureate degree; at least five years of industrial experience or research publications would be examples of such evidence. The departmental faculty will consider each application individually. Upon acceptance, the requirements for completion of the non-thesis option are as follows:

1. A total of at least 33 hours in graduate courses in chemical engineering and related areas. The minimum requirements are 18 hours in chemical engineering; 6 hours in other engineering, scientific, or business areas (as approved by the departmental faculty); and 9 hours chosen from either of these two categories.
2. Completion of a critical review of the literature and other sources in an area related to chemical engineering (CHE 580).
3. A written comprehensive examination over the major field and an oral examination covering the review paper and related areas.

THE DOCTORAL PROGRAM

Students applying for entrance into the doctoral program must submit evidence of ability to perform and report independent research to the satisfaction of the department. The master’s thesis may be offered as such evidence.

Department requirements consist of the satisfactory completion of:

1. Graduate courses in chemical engineering, amounting to approximately 24 semester hours, at least 9 of which must be in 600 series courses.
2. Support courses in related scientific and engineering fields amounting to approximately 24 semester hours, subject to approval by the student’s faculty committee. These related fields will normally include chemistry, mathematics, physics, and engineering.
3. The candidate in chemical engineering, consisting of a written part and an oral part. The written part covers thermodynamics, reactor analysis, and transport phenomena and separations.
4. Active participation in graduate seminars conducted by the department. Resident students must register for CHE 501 every semester offered.

GRADUATE COURSES

403 Introduction to Optimization (3) Principles and applications of optimization techniques to chemical engineering problems; unconstrained and equality constrained optimizers, linear programming, dynamic programming, and geometry of optimization. Prereq: Mathematics 241.
467 Honors: Engineering Internship in Process Control (4) Selected students work in small groups on industrial problems in process dynamics and control. Directed by faculty and engineers from host company. Prereq: Process Dynamics and Control and consent of instructor.
477 Honors: Applied Process Automation Laboratory (3) Interfacing flexible batch continuous processes to automation systems. Top down analysis with bottom up implementation, hierarchical structures and integrated computerized concept used to design automation solutions: human-machine-interfaces. Workstations with modern industrial equipment and computer architecture and visualization environment. Prereq: Process Dynamics and Control and consent of instructor.
485 Hydrocarbon Processing (3) Chemical and physical properties of selected petroleum oils and those processes utilized in conversion of raw materials into various fuels and selected chemical feedstocks. Prereq: CHEM 503.
500 Thesis (1-15) P/NP only. E
501 Graduate Seminar (1) Prereq: Admission to graduate program. May be repeated. S/NC only. F, Sp
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when the student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated, S/NC only. E
505 Engineering Analysis (3) Formulation and solution of problems in chemical engineering and materials areas, ordinary and partial differential equations; types of ODE, PDE and solution techniques; numerical methods; computational mapping; variational methods; introduction to numerical methods. (Same as Materials Science and Engineering 505.)
507 Application of Linear Algebra in Engineering Systems (3) Fundamental concepts of linear algebra to problems in engineering systems: steady state and dynamic systems. Geometric and physical interpretations of relevant concepts: least square problems, LU, QR, and SVD decompositions of system matrix, eigenvalue problems and similarity transformations in solving difference and differential equations; numerical stability aspects of various algorithms; application of linear algebra concepts in control and optimization studies; Introduction to linear programming. Computer projects. Prereq: Graduate standing or consent of instructor. (Same as Electrical Engineering 507 and Mechanical Engineering 507.)
531 Advanced Chemical Engineering Thermodynamics (3) Phase equilibrium in ideal and nonideal solution; composition relationships, free energy, solution behavior and application to macromolecules; introduction to microscopic approach to thermodynamics. F
541 Fluid Mechanics and Polymer Processing (3) (Same as Materials Science and Engineering 541.)
542 Diffusive and Stagnwise Mass Transfer Operations (3) Analysis of mass transfer phenomena, coupled mass transfer and reaction, mass transfer operations in packed towers and agitated vessels, membrane separations. Equilibrium stage designs to mass transfer operation, emphasizing nonisothermal and multicomponent systems.
547 Introduction to Transport Phenomena (3) Unified treatment of mass, momentum, and heat transfer. Differential and macroscopic balances in deriving governing equations. Analogies between processes. Use of dimensionless approach in scaling systems up or down. Applications involving transfer, and simultaneous chemical reactions. F
551 Chemical Reactor Analysis (3) Rate models for heterogeneous reactions, properties of porous catalysts, reactor performance, fluid-fluid and fluid-solid reactors.
575 Applied Microbiology and Biotechnology (3) Introduction to the fundamentals of both concepts in microbiology, biochemical, and biotechnological. Commercial processes. Comprehension of biological systems. Prereq: CHEM 575 and Biological Engineering 575.
581 Industrial Pollution Prevention (3) Principles and practical aspects of industrial waste minimization. Regulatory environment, waste minimization strategies, economic and process safety, case study: analysis of alternative waste minimization technologies. Prereq: Graduate standing in engineering or consent of instructor. (Same as Environmental Engineering 581 and Engineering Sciences and Mathematics 588.)
585 Process System Reliability and Safety (3) (Same as Nuclear Engineering 585).
590 Special Topics in Chemical Engineering (3) May be repeated. Maximum 6 hrs.
600 Doctoral Research and Dissertation (3-15) P/NP only. E
631 Advanced Topics in Statistical Thermodynamics and Molecular Dynamics (3) Statistical thermodynamics, molecular dynamics, computer simulations, Monte Carlo and molecular dynamic calculations. Experiment with computer fluids, macromolecules and biological systems. Prereq: 532.
641 Advanced Diffusional Operations (3) Fixed and fluidized bed operations, recent developments in separation processes. Prereq: 642.
642 Advanced Topics in Polymer Processing (3) (Same as Materials Science and Engineering 642.)
647 Advanced Transport Phenomena (3) Theory of mass, momentum, and energy transport in reactive and nonreactive systems. Formulation of transport models useful for application to analysis and design of separation processes, and chemical and biochemical reactions. Prereq: 505, 547.
656 Advanced Topics in Process Dynamics and Control (3) May be repeated. Maximum 6 hrs.
675 Microbial Systems Analysis (3) Identification and analysis of complex microbial systems using perturbationresponse methods. Structuring of important mechanistic processes, interactions, and regulation at several system levels (reactor or macro, ecological, cellular/physiological and molecular). Experimental methods for data gathering, signal resolution and processing, statistical signal analysis, model development (deterministic, sto-
one-half year of inorganic chemistry is also recommended. Students lacking any of these prerequisites may be admitted with appropriate deficiencies that must be removed without graduate credit. Applicants are required to take the general Graduate Record Examination.

Students minoring in Chemistry are required to present as a prerequisite two years of chemistry including quantitative analysis.

THE MASTER'S PROGRAM

The department offers concentrations in six areas for the M.S. in analytical chemistry, environmental chemistry, inorganic chemistry, organic chemistry, polymer chemistry, and physical chemistry.

The requirements for the M.S. in Chemistry consist of the satisfactory completion of:

1. Research and a thesis to give 6 to 12 hours of graduate credit in Chemistry 560.
2. Participation in seminar (Chemistry 501) during the entire period of graduate study, including the presentation of at least one seminar. (No more than 2 hours may be applied to the course requirements.)
3. Prescribed remedial courses based on performance on entrance examinations.
4. Sufficient graduate coursework in chemistry (at the 400 level or above) and/or a related field to make an overall total of 30 hours, including one of the following sequences: 530-31-32, 550-51-52, 570-72-73, 590-94-95, or three courses from 510-11-12-20. At least 14 hours of this coursework must be at the 500 level or above.
5. A final oral examination.

THE DOCTORAL PROGRAM

The department offers concentrations in eight areas for the Ph.D.: analytical chemistry, chemical physics (in cooperation with the Department of Physics), environmental chemistry, inorganic chemistry, organic chemistry, polymer chemistry, and theoretical chemistry.

The requirements for the Ph.D. in Chemistry (except for the chemical physics concentration) consist of the satisfactory completion of:

1. Research and a dissertation to give at least 24 hours of graduate credit in Chemistry 660. Registration must be continuous from the beginning of research.
2. Participation in seminar (Chemistry 501) during the entire period of graduate study, including the presentation of at least one seminar.
3. Prescribed remedial courses based on performance on entrance examinations.
4. Completion of the comprehensive examination series and defense of an original research proposal to give 2 hours of credit in Chemistry 661.
5. Eighteen additional hours in courses at the 500 level or above including one course above 601 and one of the following sequences: 510-11-12, 530-31-32, 550-51-52, 53-54, 570-71-72-73; and 550-94-95.
6. A final oral examination.

The Ph.D. program with concentration in chemical physics is conducted jointly with the Department of Physics. Graduate students are required to present at least 2 semesters of graduate study in chemistry, 2 semesters in physics, and 2 semesters of instruction in technical writing. The requirements consist of the satisfactory completion of:

1. Research and a dissertation to give at least 30 hours of graduate credit in Chemistry 660. Registration must be continuous from the beginning of research.
2. Participation in seminar (Chemistry 501) during the entire period of graduate study, including the presentation of at least one seminar.
3. A final oral examination.

GRADUATE COURSES

430 Advanced Inorganic Chemistry (3) Atomic and molecular structure, bonding theories, description of chemical elements, kinetics and mechanism of inorganic reactions, applications of modern techniques for characterization, coordination and organometallic chemistry. Prereq: Inorganic Chemistry.

471-81 Biophysical Chemistry (3.3) (Same as Biochemistry and Cellular and Molecular Biology 471-81)

473-83 Physical Chemistry (3.3) Students may not receive credit for both 471 and 473 nor for both 481 and 483. 473—Properties of gases; first, second, and third laws of thermodynamics; chemical equilibria; ideal solutions; solution properties; introduction to statistical thermodynamics. 483—Kinetics of chemical reaction; introduction to quantum mechanics and applications to electronic structure of atomic and molecular molecules. Spectroscopy. Prereq: General Chemistry. Elements of Quantum Mechanics and Statistical Mechanics. California.


484 Advanced Physical Chemistry (3) Chemical dynamics, statistical thermodynamics, quantum mechanics of atomic and molecular systems, crystal structure and solid state. Prereq: 481 or 483. Sp

500 Thesis (1-15) P/NP only: E

501 Chemistry Seminar (1) Lectures and discussion on current research. May be repeated. Continuous registration required for resident graduate students. S/NC only. F, Sp

502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when the student uses University facilities and for any course that does not appear on the student's degree requirements. May not be used toward degree requirements. May be repeated. S/NC only. E, F

505 Special Problems (1-15) Special problems of advanced study, research, or project work. May be repeated. Continuous registration required for resident graduate students. S/NC only. E, F

510 Analytical Spectroscopy (3) Principles and practice of optical and mass spectrometry, in quantitative chemical analysis. Prereq: 1 yr of physical chemistry. Sp

511 Analytical Separations (3) Principles and practice of chemical separations based on extraction, chromatographic, and electrophoretic phenomena. Prereq: 1 yr of physical chemistry. F

512 Electroanalytical Chemistry (3) Fundamentals of electrochemical processes; principles and practice of electroanalytical techniques in quantitative chemical analysis and applied to study of chemical systems. Prereq: 1 yr of physical chemistry.

520 Chemical Instrumentation (3) Principles of analog and digital systems in chemical instrumentation; practice in design and construction of chemical instruments. Prereq: Consent of instructor.

530 Chemical Bonding (3) Wave mechanical atom, group theory, quantum approach to molecular orbital theory, molecular orbitals, ionic, and metallic bonding, ligand field theory, solid state. Prereq: 1 yr of physical chemistry. F

531 Characteristics of Inorganic Compounds (3) Descriptive chemistry of elements, structure, reactions, and mechanisms, equilibria, and spectra of coordination compounds, organometallic, and inorganic compounds. Sp

532 Spectroscopic Methods of Organic Chemistry (3) Principles and practice of organic separations based on extraction, chromatographic, and electrophoretic phenomena. Prereq: 1 yr of physical chemistry.
a remedial mechanism for doctoral students who have earned a master’s degree but have not met the other prerequisite requirements.

THE MASTER’S PROGRAM

The Master of Science degree with a major in Child and Family Studies provides a broad foundation in the understanding of how children develop and how families function in today’s society. Two concentrations are available in child and family studies or in early childhood education.

Child and family studies requires a minimum of 36 credits of coursework and 18 credits in core coursework and 18 credits in specialization. Core requirements are: 510, 511, 540, 550, 562, and 566. Students then choose either the thesis option (research) or the non-thesis option (practice; internship and comprehensive exam required). Students who plan to pursue a doctoral degree are best served by selecting the thesis option. The following are required in the thesis option: 570, Statistics 531 or 537, and 6 credits of Thesis 500. Students who plan to work with children and families in the community should be served by selecting the non-thesis option. Specializations within the practice option include: child and family life practice, family mediation, gerontology, child and family policy, families of children with disabilities, and child and family program administration. Each of these specializations includes 6 credits of specified relevant coursework and a supervised internship (564 and 565). Specific coursework within each specialization is on file within the Department of Child and Family Studies. Interested students should contact the Graduate Coordinator in Child and Family Studies.

The early childhood education concentration is designed for students seeking initial teacher licensure in early childhood education (Pre-K through Grade 3). This program is based on an undergraduate degree in child development or equivalent coursework. A non-thesis option only is available. All students in the early childhood education licensure program must enroll in Human Ecology 574, 575, 591, and Holistic Teaching/Learning 505 (or equivalent Child and Family Studies coursework). Students select 3 credits from 510, 511 or 512; three courses from 511, 520, 521, 522, 525, 530, 540, 590; 3 hours of 560-level statistical methods or interpretation of statistics or research methods (requirement may be met with 569) and written comprehensive examination (36 credits). Students seeking the M.S. with a major in Child and Family Studies must file a plan of study with the department head after 15 hours of graduate credit.

THE PH.D. CONCENTRATION

The department participates in the doctoral program with a major in Human Ecology, concentration in child and family studies. Two themes are highlighted: the integration of human development and family studies within the context of human ecology and related areas, and concentration in a selected area of study. A doctoral program that is concurrently specialized and integrative in nature reflects the complexity of the disciplinary subject matter, provides a broader context to formulate theoretical questions, and broadens the empirical literature for addressing those questions.
early childhood education: description, analysis and evaluation of curriculum models, teaching methods, administrative style, and supervision of personnel. Experimental design and evaluation of early childhood programs for young children: special needs, infancy-age 8. Prereq or coreq: 510 or 512.

521 Organizational Management in Early Childhood Education (3) Designing, implementing, and evaluating physical and human resource environment. Development of skills in environmental organization, interpersonal leadership, budgeting and supervision of staff. Prereq: 510 or 512 or equivalent or consent of instructor.

522 Naturalistic Interventions for Parents and Teachers of Young Children (3) Common problems faced by parents and teachers; methods to modify problem behavior. Prereq: 510 or equivalent or consent of instructor.

525 Seminar on Play (3) Comparison and contrast of theoretical framework and research methodologies on play. Developmental perspective on play.

530 Families of Handicapped Children (3) Developmental nature of families' experiences in caring for handicapped children, especially during infancy and early childhood. Prereq: 510 and 511 or consent of instructor.

535 Child and Family Policy (3) Key policy issues related to children and families: family and poverty and welfare reform, parental kidnapping, abuse and neglect, child care, advocacy, mediations, and families. Basic elements of family policy impact analysis.

540 Parent-Child Relations (3) Influence of parents on children, influence of children on parents, reciprocal interaction between parents and children, applications of systems models, impact of child abuse and divorce on children. Prereq: 550 and 510 or equivalent or consent of instructor.

550 Research and Theory in Marriage and Family (3) Use of family conceptual frameworks and application of theoretical models to understanding research literature on marital relations.

552 Diversity in Children and Families (3) Diversity in family configurations in contemporary U.S. society. Variations of family patterns by race, ethnicity, religion, and social class; social dynamics of family formation, composition, and patterning. Prereq: 550, 510, 511, 570, or 3 hrs graduate statistics, or consent of instructor.

555 Children, Divorce and Remarriage (3) Children's and adolescents' adjustment to transitions involved in parental divorce, single-parenthood, and remarriage. F.A.

558 Human Sexuality (3) Theory, research, and family life education: practices related to study of individuals, relationships, and families. Individual, relational, cognitive, emotional, biological, and developmental issues of human sexuality.

562 Families and Children Coping with Stress (3) Processes children and families during times of stress. Theoretical contributions to study of impact of developmental stresses and catastrophes on children and families. Prereq: 550 and 510 or equivalent.

563 Family Life Education Programs (3) Planning, implementing and evaluating programs in marital, parent-child, and family relationships, and parenthood education. Prereq: Consent of instructor. (Same as Human Ecology 563.)

564 Practicum in Human Development or Family Studies (3) School or community programs. Education for human development and family living. Prereq: Consent of instructor. S/N/C only. E

555 Practicum in Human Development or Family Studies II (3) School and community programs concerned with education for human development and family living. Committee approved and supervised. Written project. Prereq: 554 and consent of instructor. S/N/C only. E

566 Approaches to Family Intervention and Counseling (3) Various theoretical approaches for family intervention and counseling. Structure, experiential, and social learning schools of practice. Effective intervention from perspective of their impact on family functioning and development. Prereq: Same as Counseling Education and Counseling Psychology 566.

567 Family Violence (3) Theory and research on initiation, maintenance, and cessation of violent behaviors in intimate family contexts, and assessment of responses to violent family behaviors, perpetrators, victims, and family systems. Prereq: 550, F.A.
Civil and Environmental Engineering

(College of Engineering)

MAJORS DEGREES
Civil Engineering M.S., Ph.D.
Environmental Engineering (Ph.D. through Civil Engineering)

Gregory D. Reed, Head

Professors:
Bennett, R. M., PE, Ph.D. Illinois
Burdeau, E. G. (Fred N. Peabody Prof.), PE, Ph.D. Illinois
Chatterjee, A., Ph.D., NC State
Davis, W. T., Ph.D., Tennessee
Deathridge, J. D., Ph.D., Tennessee
Drumm, E. C., Ph.D., Arizona
Goodpasture, D. W., Ph.D., Illinois
Grecco, W. L. (Emeritus), Ph.D., Michigan State
Heathington, K. W. (Emeritus), Ph.D.
Northwestern
Humphreys, J. B. (Emeritus), Ph.D., Texas A&M
Johnson, H. L. (Emeritus), M.S., Tennessee
Miller, W. A. (Granger Prof.), PE, Ph.D., Georgia Tech
Reed, G. D. (Liaison), PE, Ph.D., Arkansas
Robinson, R. B. (Fisher Prof.), PE, Ph.D., Iowa State
Smoot, J. L., PE, Ph.D., VPI
Tschantz, B. A. (Condra Prof.), PE, So.D.
New Mexico State
Walker, C. R. (Emeritus), M.S., MIT
Wegmann, F. J., Ph.D., Northwestern

Associate Professors:
Chow, K. G., Ph.D., Northwestern
Cox, C. D., Ph.D., Penn State
Han, L. D., Ph.D., California
Mauldon, M. Ph., Ph.D., California
Miller, T. L., PE, Ph.D., Tennessee
Richards, S. H., PE, Ph.D., Tennessee
Robinson, K. G., Ph.D., VPI

Assistant Professor:
Jackson, N. M., PE, Ph.D., Oregon State

The Department of Civil and Environmental Engineering offers degrees leading to the Master of Science, and Doctor of Philosophy with a major in Civil Engineering concentrating in construction engineering, environmental engineering, geotechnical/materials engineering, public works engineering, structural engineering, and transportation engineering; to the Master of Science in Environmental Engineering with concentrations in water quality, water resources, air quality, mixed waste management, waste management, and environmental risk assessment.

THE MASTER'S PROGRAM

The Master of Science programs in Civil Engineering and Environmental Engineering are offered to graduates of recognized undergraduate curricula.

Departmental requirements provide that for a major in Civil Engineering, the Bachelor's degree must be in civil engineering, or certain undergraduate prerequisite courses must be taken before admission to candidacy for the Master of Science in Civil Engineering.

Civil Engineering

The Department of Civil and Environmental Engineering offers two options for the Master of Science with a major in Civil Engineering.

Theoretical Option: A maximum of 33 semester hours, including 12 hours of thesis, is required.

Non-Thesis Option: A minimum of 33 semester hours, including a 3-hour special problems is required. The special problem will culminate in a written report which must be approved by the student's major professor.

Environmental Engineering

For a Master of Science with a major in Environmental Engineering, normally a Bachelor's degree in a field of engineering is required. For a student who does not have an engineering background, the following minimum prerequisite courses will be required: Engineering Fundamentals 101, 102; Nuclear Engineering 203 or Mechanical Engineering 331; Basic Engineering 121, 131; Engineering Science and Mechanics 271, 272; Civil Engineering 275, 276, 370; Mathematics 141, 142, 231, 241; Chemistry 120, 130, 220.

The student's major professor will adjust the research objectives. A minor may be selected but is not necessarily required.

MINOR IN ENVIRONMENTAL POLICY

The department participates in a program designed to give graduate students an opportunity to develop an interdisciplinary specialization in environmental policy. See Economics for program description.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S. program in Environmental Engineering (concentration in air quality or waste management) is available to residents of the state of Alabama. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

Civil Engineering

GRADUATE COURSES

421 Portland Cement Concrete Mix Design and Analysis (3) Aggregate properties and tests; tests of portland cement and concrete; mix design methods, admixtures, and nondestructive testing. Prereq: 221, 2 hrs and 1 lab.

451 Highway Engineering (3) Design, construction, operation, and maintenance of highway facilities; application of various engineering principles and techniques to process of planning, locating, and design of highway facilities; both geometric and pavement design. Prereq: 210, 251, 352.

452 Traffic Engineering (3) Characteristics of driver, vehicle, and roadway and their Interaction; traffic studies; basic considerations of traffic circulation and control, lighting, capacity analysis, roadway safety analysis and design. Prereq: 210, 251, 352.

472 Reinforced Concrete Design (3) Design of plates, girders, and composite beams; consideration of members subjected to combined stresses, design of typical framed building, connections. Prereq: 471.

474 Reinforced Concrete Design (3) Design of continuous beams, floor slabs, and columns with combined axial loads.
522 Floodplain and Urban Flood Management (3) Review of national, regional, and local flood plain management policies and practices. Topics include floodplain and non-structural/nontaxable responses; policies, programs, and organization of local flood plain management; flood management and hydraulics, HEC-1; HEC-2; floodway encroachment, flood hazard zone and damage potential determination, and other studies. Pre requisite: Civil Engineering 390 or consent of instructor.

524 Sediment Transport (3) Sediment properties and measurements; principles of dynamics of suspended and bed sediment transport in erodible channels; erosion, transport, and deposition of sediment by flowing water; erodible channel design; channel regime theory; common computer models. Pre requisite: Civil 380.

525 Soil Erosion and Sediment Yield (3) Theory of soil erosion and sediment yield processes from disturbed land; methods and computer models for estimating sediment yield. Erosion and sediment control theory and management practices. Local and state regulations. Pre requisite: Civil Engineering 390. (Same as Agricultural Engineering 525.)

530 Urban Hydrology and Stormwater Engineering (3) Planning, design, modeling, management, and maintenance of urban stormwater systems. Theory and application of hydraulic and hydrologic principles to design of stormwater management systems; design of inter structures, conveyance systems, and their interaction with the environment and urban development. Pre requisite: Civil Engineering 380, 385, 390. (Same as Civil Engineering 485 for geology majors. (Same as Geological Science 535.)


540 Remote Sensing for Transportation and Facilities Siting (3) Principles of remote sensing; sources of data and data acquisition; computer interpretation, analog and digital techniques for analysis of aerial and satellite photos, radar and thermal imagery with application to transportation and facilities planning, construction and operations. Pre requisite: Consent of Instructor.

543 Instrumentation and Measurement (3) (Same as Agricultural Engineering 543.)

545 Monitoring Hydrologic Phenomena (3) (Same as Agricultural Engineering 545.)

551 Physicochemical Unit Processes (3) Theory and design application in water and wastewater treatment. Pre requisite: Civil Engineering 380, and Civil Engineering 390.

552 Biological Treatment Theory (3) Theory and design application of biological processes to treatment of water and solid wastes. Pre requisite: Civil Engineering 380. 2 hrs and 1 lab. (Same as Agricultural Engineering 552.)

553 Aquatic Chemistry (3) Theoretical, applied and analytical chemistry related to generation, measurement and treatment of environmental contaminants. Pre requisite: Chemistry 130. 2 hrs and 1 lab.

554 Environmental Engineering Chemistry (3) Application of chemical principles in analyzing physical, chemical, or biological systems in the regulation of contamination in various environmental compartments: atmosphere, hydro- spheres, lithosphere, and biopolysphere. Pre requisite: One year chemistry and consent of Instructor.

555 Solid Waste Management (3) Magnitude and characteristics of solid waste problems; collection systems; design of disposal systems: landfill, incineration, and composting; design of resource recovery systems; current and future solid waste regulations. Pre requisite: Senior standing.

556 Hazardous Waste Management (3) Analysis and design of operations and processes for hazardous waste disposal and processing; regulations analysis; industrial applications. Pre requisite: Graduate standing or consent of Instructor.

557 Hazardous Waste Site Remediation (3) Advanced study of processes for hazardous waste site remediation.
they must complete the Graduate Record Examination, rating forms, and application forms as required by the College of Communications. Minimum requirements for admission to full potential candidate status normally include a 3.0 (4.0 system) grade-point average in undergraduate studies and scores at or above the fiftieth percentile in verbal, quantitative and analytical aptitude on the Graduate Record Examination. All application materials are screened by an admissions committee authorized by the Faculty of the College of Communications.

New students normally are admitted to the programs only at the beginning of fall semester. However, under special circumstances, a student may be admitted at the beginning of spring semester in a temporary non-degree status. Applications for full admission must be received by May 1. Applications for financial aid are due by March 1.

A baccalaureate degree in communications or a related field is recommended. Admission is possible with other baccalaureate degrees. However, all applicants without the appropriate background are required to take up to 16 semester hours of prerequisite and corequisite courses as determined by the department in which the student is enrolled. Students may take a proficiency test on any prerequisite course, subject to review by the master's or doctoral committee of the College of Communications.

Students who have had no courses in their major area of concentration may expect to spend four or more full-time semesters in the program, including a media internship.

THE MASTER'S PROGRAM

The Master of Science with a major in Communications is intended for students who desire a career in the mass media with an emphasis on communications management and a deeper understanding of the communication process and social role of the mass media. The program follows a broad-based, multi-media approach, allowing the student to concentrate in one of five fields: advertising, broadcasting, journalism, public relations or speech communication. Both thesis and non-thesis options are available.

The prospective student who is interested only in course work in one of the areas listed above is advised to enroll for a second baccalaureate rather than an advanced degree.

Students planning to pursue a doctoral degree with a major in Communications may be accommodated in the M.S. program through special academic advising.

Degree Requirements

The M.S. program emphasizes communications management in the areas of advertising, broadcasting, journalism (publications), and public relations. For the non-thesis option, a minimum of 31 hours of approved graduate work is required. The non-thesis option requires 34 hours.

1. Ten hours of core courses—Communications 510, 512, 540, and 550 or 560, the first three of which must be taken during the first two semesters of the student's program, except with written approval of the Associate Dean for Graduate Studies for the College.

2. Twelve hours within one department of the college, at least 6 hours at the 500 level or above. An internship, if needed, is included.

3. Three hours for the thesis option and 9 hours for the non-thesis option of electives from a list provided by the department in area of concentration.

4. Six hours of thesis work (Communications 590) including a thesis seminar, or a 3-hour project (Communications 591).

Additional hours may be required for those who do not have academic prerequisites, and an internship may be required for those who do not have professional experience in the field they wish to study. A course in communications law is a prerequisite.

A student's internship experience requires approval by his/her advisor. Credit will be given through Advertising 598, Broadcasting 598, Journalism 598, or Public Relations 598 on the basis of 3 hours of credit for the equivalent of 15 weeks of full-time professional experience. This credit is to be included in the hour requirements for the M.S. program. Previous professional experience will be evaluated by the student's committee.

Students interested in subsequent entry into a doctoral program are advised to pursue the thesis option and to take additional courses in communications theory and research, subject to advisor's approval.

After completion of the formal program of coursework and research for the thesis option, the student must pass an oral examination conducted by his/her graduate committee. The non-thesis option requires a written comprehensive examination and an oral defense of the project.

THE DOCTORAL PROGRAM

The Ph.D. with a major in Communications is intended to prepare scholars for teaching, research, administration, and service in the field of mass communications. The program is interdisciplinary, consisting of a required core curriculum and recommended courses outside the College in the related social and behavioral sciences. The program is flexible and will accommodate a wide variety of career goals in communications. New students may be admitted to the program at any time; however, core courses begin only in the fall semester.

The master's degree is required for entry into the doctoral program. Students lacking academic or professional experience in communications will be required to take prerequisite courses. In general, however, the program may be completed within three academic years of full-time study beyond the master's degree.

The following are normally minimal requirements for admission to full potential candidate status:

1. a 3.0 (4.0 system) grade-point average in undergraduate studies, and 3.5 for graduate work in a master's degree;

2. at or above the fiftieth percentile in verbal, quantitative and analytical aptitude on the Graduate Record Examination;

3. endorsement by at least three former teachers or professionals, one of whom must be a member of the faculty of the graduate school;

4. a statement of the applicant's goals and reasons for pursuing the doctorate. Personal interviews with members of the Ph.D. Admissions Committee are recommended and may be required. Professional experience in some field of communications is a highly desirable criterion for admission.

A minimum of 88 hours of approved graduate work is required for the Ph.D.

1. Twenty-eight hours of core courses—Communications 610, 612, 620, 640, 641, 643, 644, and 662.

2. Fifteen hours in a primary concentration (advertising, broadcasting, information sciences, journalism, public relations, or speech communication) supplementing the core. Courses may be taken in one or more of the Departments of Advertising, Broadcasting, Speech Communication, and/or the Schools of Information Sciences and Journalism.

3. Twelve hours in a secondary concentration (outside the College of Communications).


5. Twenty-four hours of dissertation.

All courses require the approval of the student's advising committee. Admission to candidacy must be attained at least two semesters prior to graduation and requires successful completion of a written comprehensive examination.

Each doctoral student's progress will be reviewed annually by the Doctoral Committee of the College of Communications. Results will be reported to the student by his/her program advisor, who will convey the committee's recommendation concerning the student's remaining in the program (non-candidacy) and suggestions for improvement in performance. Candidates without prior teaching experience must register for Communications 521, Tutorial in Communications Teaching.

Planned course offerings in the College of Communications for a full calendar year are available the preceding November. This information is available from the Graduate Studies Office, 426 Communications Building, 974-6661. See also courses listed under Advertising, Broadcasting, Information Sciences, Journalism, and Speech Communication.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S. program in Communications is available to residents of Arkansas, Kentucky, Maryland, North Carolina, South Carolina or Virginia. The Ph.D. program is available to residents of the states of Alabama, Arkansas, Louisiana, Maryland, North Carolina, South Carolina and Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

ACADEMIC STANDARDS

A student in the College of Communications whose graduate grade-point average, not including incomplete grades, is below 3.0 at any time after the end of 12 hours of graduate credit will be placed on probation. A student on probation will be dropped from the program unless his or her cumulative grade-point average is 3.0 or higher at the end of the probationary period. The probationary period is defined as the next 12 semester hours of graduate coursework attempted that is specified in the student's degree program. Exclusions to this policy may be made only with the approval of the Associate Dean for Graduate Studies of the College of Communi-
GRADUATE COURSES

400 Mass Communications Law and Ethics (3) Legal issues directly affecting the mass media: libel, privacy, free press, and protection of governmental regulations. Ethical standards and practices of mass media in America. Prereq: News Writing or Advertising Creative Strategy; or Radio-TV News, Advertising and Promotion or History of Rhetorical Theory. Consist of instructor: E

500 Thesis (1-15) P/NP only. E

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

510 Orientation to Master's Studies (1) Degree and thesis requirements. Component formation and program planning. Overview of research methods and informational sources. Prereq: Consent of instructor or admission to program. S/NC only. F

512 Media Research Methods (3) Applications of communications research techniques for management. Gathering and analysis of data for assessing media audiences and message impacts. Prereq: Consent of instructor or admission to program. F

521 Tutorial in Communications Teaching (1) Experience as teacher under guidance of faculty member. Prereq: Consent of instructor. S/NC only. E

540 Communications Theory (3) Selected research hypotheses and theories in literature of mass communications. Prereq: Consent of instructor or admission to program. Sp

550 Seminar in Media Economics and New Technology (3) Electronic and print media ownership, finance and corporate structure. Roles of new technologies and marketing techniques in changing media content and function in future. Prereq: Consent of instructor or admission to program. Sp

551 Seminar in Media, Science, and the Mass Media (3) Investigation of interplay between scientific community and mass media; how scientific information reaches public and impact of journalism on scientific practice. Prereq: Consent of instructor or admission to program. Sp

552 Seminar in Health Communications (3) Methods, problems, and issues of communication in health field. Media's role in conveying health information. Pre req: Consent of instructor. F

560 Seminar in Communications Management (3) Organizational and functional structure and functioning of communications corporations; development of management theory, strategies, and tactics. Analysis of financial statements and case studies. Computer-intensive. F

590 Project (3) Capstone project under guidance of faculty. Application of principles from previous coursework. S/NC only. E

592 Thesis (1-15) P/NP only. E

593 Seminar in Mass Communications Issues (3) Contemporary topics in communications. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

597 Independent Study (1-3) Reading, research or projects on specific topics in communication. On individual basis, under faculty direction, with consent. May be repeated. Maximum 6 hrs. E

600 Doctoral Research and Dissertation (3-15) P/NP only. E

610 Orientation to Doctoral Research (1) Degree and dissertation requirements. Committee formation and program planning. Overview of research methods and informational sources. Prereq: Consent of instructor or admission to program. S/NC only. F

612 Fundamentals of Communications Research (3) Universal research process from defining ideas and problems to reporting results. Causal inference and relative strengths of various research designs. Funds...
courses to be counted as elective courses in the veterinary program.

THE MASTER'S PROGRAM

All students must take at least 4 credit hours in 500- or 600-level courses in basic mechanisms of disease and at least 7 credit hours of 500-level biochemistry or cell biology. See listings under Biochemistry and Cellular and Molecular Biology program for information on these courses. In addition, students must complete a minimum of 8 hours of coursework in a specified discipline. Exceptions to accommodate students with specific interests must be approved by the joint Graduate Coordinating Committee after application, in writing, to the director. The graduate committee (at least 3 members) is chosen after the first term and must include at least one member from the College of Veterinary Medicine and at least one member from the Graduate School of Medicine. If a minor is declared, one member must be from the minor discipline.

A final oral examination is given at the end of the program.

THE DOCTORAL PROGRAM

All students must take at least 4 credit hours in 500- or 600-level courses in basic mechanisms of disease and at least 7 credit hours of 500-level biochemistry or cell biology. See listings under Biochemistry and Cellular and Molecular Biology program for information on these courses. In addition, students must complete a minimum of 8 hours of coursework in a specified discipline. Exceptions to accommodate students with specific interests must be approved by the joint Graduate Coordinating Committee after application, in writing, to the director. Areas of emphasis may include hematology, oncology, comparative pathology, comparative pharmacology, toxicology, immunology, infectious diseases, or biochemistry of disease. At least 24 hours of coursework, including a minimum of 6 hours at the 600 level, and 24 hours of Dissertation 600 are required for a total of 48 hours. For students with professional degrees, a minimum of 18 hours of coursework beyond the professional degree is required for a total of 42 hours.

The doctoral committee (at least 4 members) is chosen during the first year. Three of the four members, including the chair, must be approved by the Graduate Council to direct doctoral research. At least one member must be from the College of Veterinary Medicine and at least one member from the Graduate School of Medicine. A comprehensive examination is given at the completion of coursework. A seminar and final oral defense of the dissertation culminate the program.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S. program is available to residents of Georgia. The M.S. program is available to residents of the state of Florida. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

Comparative and Experimental Medicine--Graduate School of Medicine

GRADUATE COURSES

Participating departments include: Anesthesiology, Medicine, Medical Biology, Obstetrics and Gynecology, Pathology, Pediatrics, Radiology, and Surgery.

500 Thesis (1-15) P/NP only. E

502 Registration for Use of Facilities (3-15) Required for the student to use University facilities and/or equipment before degree is completed. May not be used toward degree requirements. May be repeated. S/N/C only. E

508 Graduate Research Participation (3) Advanced research techniques while conducting individual research projects under supervision of faculty. Open to all graduate students. Prereq: Consent of instructor.

600 Doctoral Research and Dissertation (3-15) P/NP only. E

610 Medical Biology Seminar (1) Invited speakers. Topics posted in advance. May be repeated. S/N/C only. E

616 Medical Biology Seminar (1) Invited speakers. Topics posted in advance. May be repeated. S/N/C only. E

505 Laboratory Animal Care and Use (2) Review of basic laboratory animal care and use as prerequisite to conducting research using animal subjects. Compliance issues and techniques. F

506 Experimental Animal Surgery (3) Competence in performing surgical techniques in experimental animal model. Consent of instructor. Prereq: Consent of instructor. May be repeated maximum 3 hrs. E

508 Veterinary Pathology Seminar (1) Microscopic slides and transparencies of lesions from cases examined by pathologists, residents, and graduate students. Interpretation of observations. Prereq: Consent of instructor. May be repeated. Maximum 4 hrs. E

600 Doctoral Research and Dissertation (3-15) P/NP only. E

601 Clinical Epidemiology (3) Theory and principles of clinical disease and epidemiology. Prereq: Consent of instructor. May be repeated maximum 3 hrs. E

602 Surgical Pathology (1-2) Examination of biopsy specimens and interpretation of observations. Preparation of specimens for sectioning. Prereq: Consent of instructor. May be repeated maximum 4 hrs. E

603 Veterinary Pathology Seminar (1) Microscopic slides and transparencies of lesions from cases examined by pathologists, residents, and graduate students. Interpretation of observations. Prereq: Consent of instructor. May be repeated. Maximum 4 hrs. E

604 Veterinary Pathology Seminar (1) Microscopic slides and transparencies of lesions from cases examined by pathologists, residents, and graduate students. Interpretation of observations. Prereq: Consent of instructor. May be repeated. Maximum 4 hrs. E

605 Laboratory Animal Care and Use (2) Review of basic laboratory animal care and use as prerequisite to conducting research using animal subjects. Compliance issues and techniques. F

606 Clinical Epidemiology (3) Theory and principles of clinical disease and epidemiology. Prereq: Consent of instructor. May be repeated maximum 3 hrs. E

607 Diagnosis and Pathogenesis of Virus Diseases (3) Clinical disease and epidemiology of virus diseases of domestic animals. Prereq: Consent of instructor. May be repeated maximum 3 hrs. E

608 Descriptive and Applied Epidemiology (3) Principles of epidemiology and statistical methods. Application to diseases of animals. Prereq: Consent of instructor. May be repeated maximum 3 hrs. E

609 Mechanisms of Disease (3) Advanced topics in clinical and experimental medicine. Prereq: Consent of instructor. May be repeated maximum 3 hrs. E

Comparative and Experimental Medicine--Veterinary Medicine

GRADUATE COURSES

Participating departments include: Animal Science, Comparative Medicine, Microbiology, Pathology, Large Animal Clinical Sciences and Small Animal Clinical Sciences. Several faculty in the Department of Microbiology hold joint appointments in the College of Veterinary Medicine. See Microbiology under Fields of Study for additional courses.

500 Thesis (1-15) P/NP only. E

501 Special Topics in Comparative and Experimental Medicine (1-6) Specialized experience in comparative and experimental medicine. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

502 Registration for Use of Facilities (3-15) Required for the student to use University facilities and/or equipment before degree is completed. May not be used toward degree requirements. May be repeated. S/N/C only. E

503 Predictive Toxicology (3) Principles and techniques of predictive toxicology: structure-activity relationships. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

504 Laboratory Animal Care and Use (2) Review of basic laboratory animal care and use as prerequisite to conducting research using animal subjects. Compliance issues and techniques. F

505 Experimental Animal Surgery (3) Competence in performing surgical techniques in experimental animal model. Consent of instructor. Prereq: Consent of instructor. May be repeated maximum 3 hrs. E

506 Diagnostic and Pathological Techniques in Veterinary Medicine (3) Principles of diagnostic and pathological techniques in veterinary medicine. Consent of instructor. Prereq: Consent of instructor. May be repeated maximum 6 hrs. E

508 Veterinary Pathology Seminar (1) Microscopic slides and transparencies of lesions from cases examined by pathologists, residents, and graduate students. Interpretation of observations. Prereq: Consent of instructor. May be repeated. Maximum 4 hrs. E

600 Doctoral Research and Dissertation (3-15) P/NP only. E

601 Clinical Epidemiology (3) Theory and principles of clinical disease and epidemiology. Prereq: Consent of instructor. May be repeated maximum 3 hrs. E

602 Surgical Pathology (1-2) Examination of biopsy specimens and interpretation of observations. Preparation of specimens for sectioning. Prereq: Consent of instructor. May be repeated maximum 4 hrs. E

603 Veterinary Pathology Seminar (1) Microscopic slides and transparencies of lesions from cases examined by pathologists, residents, and graduate students. Interpretation of observations. Prereq: Consent of instructor. May be repeated. Maximum 4 hrs. E

604 Veterinary Pathology Seminar (1) Microscopic slides and transparencies of lesions from cases examined by pathologists, residents, and graduate students. Interpretation of observations. Prereq: Consent of instructor. May be repeated. Maximum 4 hrs. E

605 Laboratory Animal Care and Use (2) Review of basic laboratory animal care and use as prerequisite to conducting research using animal subjects. Compliance issues and techniques. F

606 Clinical Epidemiology (3) Theory and principles of clinical disease and epidemiology. Prereq: Consent of instructor. May be repeated maximum 3 hrs. E

607 Diagnosis and Pathogenesis of Virus Diseases of Domestic Animals (3) Advanced study of virus diseases of domestic animals. Prereq: Consent of instructor. May be repeated maximum 3 hrs. E

608 Descriptive and Applied Epidemiology (3) Principles of epidemiology and statistical methods. Application to diseases of animals. Prereq: Consent of instructor. May be repeated maximum 3 hrs. E

609 Mechanisms of Disease (3) Advanced topics in clinical and experimental medicine. Prereq: Consent of instructor. May be repeated maximum 3 hrs. E

Between the two programs, students have access to a wide range of courses and opportunities tailored to their interests in comparative and experimental medicine.
Comparative Medicine
See College of Veterinary Medicine and Comparative and Experimental Medicine

Computer Science
(College of Arts and Sciences)

MAJOR DEGREES

Robert C. Ward, Head

Professor:
Dongarra, Jack, Ph.D. ............. New Mexico
Langston, Michael A., Ph.D. ........ Texas A&M
Poore, J. H., Ph.D. ........................................... Georgia Tech
Sherman, Gordon R. (Emeritus), Ph.D. Purdue
Gregor, Jens, Ph.D. ............ Aalborg (Denmark)
Berry, Michael W., Ph.D. ......... ,
Vander Zanden, Bradley, Ph.D. .................. Cornell
MacLennan, Bruce J., Ph.D. .................. Purdue
Gregor, Jens, Ph.D. ............ Aalborg (Denmark)

Associate Professors:
Bryant, Michael, W., Ph.D. ............. Illinois
Gregor, Jens, Ph.D. ............. Aalborg (Denmark)
MacLennan, Bruce J., Ph.D. .................. Georgia Tech
Vander Zanden, Bradley, Ph.D. .................. Cornell
Vose, Michael D., Ph.D. ............. Texas

Assistant Professors:
Plank, James S., Ph.D. ............. Princeton
Raghavan, Padma, Ph.D. ......... Penn State
Straight, David W., Ph.D. ............. Texas
Wolski, Richard, Ph.D. ............. UC Davis

Instructor:
Meyo, J. Wallace (Liaison), M.S. .... Tennessee

THE MASTER'S PROGRAM

Two semesters of calculus plus two additional semesters of college mathematics (e.g., linear algebra, differential equations, probability) and a course in discrete structures and in systems programming are required for admission. For the master's degree, 30 semester hours of graduate credit are required, 24 of which must be 500 level or above. Computer Science 530, 560 and 580 are required for the degree. Graduate courses taken outside the department are sometimes allowed but must be approved by the Graduate Committee before enrollment.

Thesis Option

The student must reach agreement on a thesis topic with a faculty advisor and must take 6 hours of 500 Thesis. Six hours of 500 Thesis may count in the 24-hour requirement at the 500 level or above.

Non-Thesis Option

The student must take coursework in an area to prepare for the non-thesis master's examination. The student's advisor must verify that an acceptable set of coursework has been taken before the student may schedule the examination. Information concerning the examination is available in the departmental office.

Problems in Lieu of Thesis Option

The student must reach agreement on the problem topic with a faculty advisor and pass an oral exam on the problems before a committee of three or more faculty members, at least two of whom must be Computer Science faculty.

Master's Minor in Computer Science

The graduate minor consists of any two of the three core courses (590, 560, 580) plus an additional 3 hours of graded computer science graduate-level courses at or above the 400 level.

THE DOCTORAL PROGRAM

A student seeking admission to the Ph.D. program is expected to meet the following requirements:

1. The student should have three letters of recommendation sent directly to the department head from individuals capable of assessing the student's potential for advanced work in computer science (for example, college teachers or employers for whom the student has worked after earning a Bachelor's degree). The department reserves the right to contact these individuals or other knowledgeable people if additional information is deemed necessary or desirable.

2. The student is expected to have taken the GRE verbal and quantitative general test within the past three years and to have these scores sent to The Graduate School. Prerequisite: Completion of core curriculum or consent of instructor. Maximum 9 hrs.

3. The student must take coursework in an area to prepare for the non-thesis master's examination. The student's advisor must verify that an acceptable set of coursework has been taken before the student may schedule the examination. Information concerning the examination is available in the departmental office.

4. The student must reach agreement on the problem topic with a faculty advisor and pass an oral exam on the problems before a committee of three or more faculty members, at least two of whom must be Computer Science faculty.

5. The student should have three letters of recommendation sent directly to the department head from individuals capable of assessing the student's potential for advanced work in computer science (for example, college teachers or employers for whom the student has worked after earning a Bachelor's degree). The department reserves the right to contact these individuals or other knowledgeable people if additional information is deemed necessary or desirable.

DEGREES

Duke

Illinois

Texas A&M

Princeton

3. The student should satisfy the same background requirements as for the master's program. See the departmental brochure for details.

4. Original research reported in a dissertation of high quality is emphasized. The minimum hour requirements are 24 hours of course 600 Doctoral Research and Dissertation and 24 hours of graduate courses beyond the equivalent of a master's degree (i.e., beyond 30 graduate credit hours) graded A-F.

5. Computer Science 530, 560 and 580 are required for the degree. At least six hours of 600-level graded courses must be taken in computer science at UTK. The student's advisor and committee will establish the specific course requirements. The comprehensive examination consists of a departmental written examination and a subsequent oral examination conducted by the student's committee.

GRADUATE COURSES

420 Advanced Topics in Machine Intelligence (3) Search, learning, expert systems, neural networks, pattern recognition and natural language processing. Faculty research. Prerequisite: Completion of core curriculum or consent of instructor. May be repeated. Maximum 9 hrs.

430 Advanced Topics in Hardware Systems (3) Architecture, parallel processors, microprogramming, networks and communication, faculty research. Prerequisite: Completion of core curriculum or consent of instructor. May be repeated. Maximum 9 hrs.

460 Advanced Topics in Software Systems (3) Operating systems, compilers, parallel computation, software engineering, database systems and programming languages. Faculty research. Prerequisite: Completion of core curriculum or consent of instructor. May be repeated. Maximum 9 hrs.

470 Advanced Topics in Scientific Computation (3) Numerical methods, supercomputers and computer modeling and simulation of physical systems. Faculty research. Prerequisite: Completion of core curriculum or consent of instructor. May be repeated. Maximum 9 hrs.

471 Numerical Analysis (3) (Same as Mathematics 471.)

472 Numerical Algebra (3) (Same as Mathematics 472.)

480 Advanced Topics in Theoretical Computer Science (3) Theory of computation, complexity theory, formal languages and graph theory and its applications. Faculty research. Prerequisite: Completion of core curriculum or consent of instructor. May be repeated. Maximum 9 hrs.

484 Special Topics in Computer Science (1-3) May be repeated. Maximum 9 hrs.

500 Thesis (1-15) P/NP only. E

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when the student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N only. E

521 Artificial Intelligence (3) Heuristic search, automatic theorem proving, symbolic methods, semantic information processing, representation theory. Prerequisite: Discrete Structures and Problem Solving.

522 Cybernetics (3) Various functions in living systems and their actual or potential realization in computers. Prerequisite: Discrete Structures.

525 Software Engineering (3) Survey of key ideas in software engineering: formal methods, tools, testing, reliability, structured design and development, metrics, management and history of the field.

530 Computer Systems Organization (3) Architectures and systems organization for parallel and serial multiprocessors. Prerequisite: Discrete Structures and System Programming.

532 Boolean Algebra, Logic Design and Microprocessors (3) Boolean algebra, combinational and sequential logic design. Microprocessors, hardware lab. Prerequisite: One year college mathematics beyond algebra and trigonometry.

536 Theoretical Aspects of Computer-Aided Design (3) Algorithms for CAD of VLSI systems. Placement and routing algorithms, programmatic logic arrays. Prerequisite: Discrete structures and analysis of algorithms.

538 Computer Networks (3) Design and operation of networks. Hardware and software systems; communications subsystems. Prerequisite: System Programming and 532.

541 Database Management Systems (3) Data model theory, optimization, and normalization; intelligent database systems; comparison of implementations; analysis of distributed and networked databases. Techniques for evaluation of performance, integrity, security and reliability. Prerequisite: Discrete Structures.

551 Pattern Analysis (3) Decision-theoretic and structural pattern analysis. Deterministic and statistical decision rules, feature extraction and representation, syntactic and semantic methods, relational models. Prerequisites: Discrete Structures and probability or statistics.

552 Image Analysis (3) Enhancement and restoration of digital images, 2D transforms. Segmentation and description. Computational procedures for image reconstruction. Prerequisite: One year calculus and discrete structures.

560 Language Design and Implementation (3) Compilers: lexical analysis, parsing, code generation and optimization, and run-time storage allocation. Language design issues: description, structure, and design philosophies of high-level languages. Prerequisite: System Programming.

571-72 Numerical Mathematics (3) (Same as Mathematics 571-72.)
Consumer and Industry Services Management
(College of Human Ecology)

MAJORS

DEGREES

Human Ecology .................................................. Ph.D.
Recreation, Tourism and Hospitality Management ....................... M.S.
Textiles, Retailing and Consumer Sciences ................................ M.S.

Nancy B. Fair, Head

Professors:

Breeze, Randall R. (Liaison), Ph.D. ....................... Florida State
Duckett, Kermit E., Ph.D. .............................. Tennessee

Dyer, C. L., Ph.D. ................................. North Carolina
Hayes, Gene A. (Liaison), Ph.D. ............................... North Texas State
Wardsworth, Larry C., Ph.D. ................................. NC State

Associate Professors:

Bhat, Gajanan, Ph.D. .............. Georgia Tech
Blanton, Mary Dale, Ph.D. .............................. Indiana
Costello, Carol, Ph.D. ........................ Tennessee
Fair, Nancy B., Ph.D. .............................. NC State

Ph.D. ............................ Oklahoma State
Klick, Ken L., Ph.D. ............................... Indiana

The Department of Consumer and Industry Services Management offers the master’s degree with majors in Textiles, Retailing and Consumer Sciences, concentrations in textile science and in retail and consumer sciences; and in Recreation, Tourism and Hospitality Management, concentrations in therapeutic recreation, recreation administration, tourism, and hospitality management. An interdepartmental/interdisciplinary minor in gerontology gives the graduate student an opportunity for combining the knowledge and experience about aging in American society with his/her own major concentration.

The programs in Consumer and Industry Services Management prepare students for careers in industry, business, public and private agencies, and educational institutions. Master's level work enables students to conduct research in retail management and merchandising and in the consumer areas related to retail decision making. Students in textile science are expected to have a solid foundation in mathematics, as well as a formal background in a physical science or engineering.

Interested students should contact the department head for more information.

ADMISSION REQUIREMENTS

A complete file for review includes the Graduate School application files, Department of Consumer and Industry Services Management application, Graduate Record Examination (GRE) scores for the general section, and three Graduate School Rating Forms completed by individuals who can attest to the potential for graduate education. Forms may be obtained from the Dean's Office, College of Human Ecology.

In addition to specified entrance requirements stipulated by The Graduate School, admission to the master's degree program with a major in Textiles, Retailing and Consumer Sciences is dependent on completion of undergraduate courses that give the necessary background for success in the graduate program. For the concentration in retail and consumer science, students should have an adequate background in retailing and/or consumer science supported by coursework in economics, marketing, mathematics, and statistics. For the concentration in textile science, students should have a basic technical background in textile science or materials science supported by mathematics through differential equations, organic chemistry, and general physics.

Superior students deficient in one or more of the above requirements, may be admitted at the discretion of the department's graduate faculty.

THE MASTER'S PROGRAM

The requirements for the major in Textiles, Retailing and Consumer Sciences are listed below.

Textile Science (Thesis Option)

Major (Required RCS courses): 510, 511, 541, 550, 562, 590

Cognate Area .................................................. 6
Statistics ....................................................... 6
Electives ...................................................... 18
Total .......................................................... 30

Textile Science (Non-Thesis Option)

RCS 552 Research Methods* ............................................ 3
TS 590 Textile Science courses ...................................... 12
Cognate Area .................................................. 6
Statistics ....................................................... 6
Total .......................................................... 36

*Must include RCS 562 or equivalent; or 3 hours of laboratory techniques in materials analysis and characterization.

Recreation Administration

Nonwovens Core

(Required TS courses: 510, 521, 526, 528, 595)

Electives ...................................................... 9
Statistics ....................................................... 3
Professional Project, TS 501 ....................................... 12
Total .......................................................... 33

The major in Recreation, Tourism and Hospitality Management requires 33-36 hours for the thesis option and 36-39 hours for the non-thesis option depending upon the specific concentration. For all thesis concentrations, individuals not possessing an undergraduate degree in the discipline or having appropriate full-time work experience will be required to take 590 (graduate internship).

Requirements for each concentration are:

Habitatry Management

All students (28 hours): Hotel and Restaurant Administration 532, 537, 542; Nutrition 541; Hotel and Restaurant Administration/Nutrition elective (12 hours); related area (6 hours); statistics (3 hours);

Thesis Option (6 hours): 500;
Non-Thesis Option (9 hours): 535; Hotel and Restaurant Administration/Nutrition elective (3 hours); elective (3 hours).

For a description of courses in the hospitality management concentration, see Nutrition.

Recreation Administration

All students (27 hours): 415 or 440, 510, 515, 540, 541; Safety Education 443; Sport
of dissertation. Transfer students with a master’s degree from another institution are required to complete at least 42 hours (including dissertation hours) from UTK.

ACADEMIC STANDARDS

1. Evaluation of student progress will normally occur prior to enrollment for thesis hours (or the non-thesis option) and during the second semester of full time enrollment in the program. The review of the student will be undertaken by the faculty with consideration given to factors such as: GPA (minimum 3.0), portfolio evaluation, and demonstrated research capabilities.

2. If progress or performance is deemed insufficient, the faculty may recommend probation with specific goals set for a specified time or termination.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S. program in Textiles, Retailing and Consumer Sciences is available to residents of the state of Mississippi. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records. For the Ph.D., see Human Ecology.

Hotel and Restaurant Administration

GRADUATE COURSES

500 Thesis (1-15) P/NP only. E

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

530 Computer-Assisted Foodservice and Lodging Management (3) Application of computer technology to foodservice and lodging industry; inventory, cost accounting, production, room management, and sales planning and analysis. Prereq: Food Procurement, Production and Service, Microcomputer Applications. F.A

531 Advanced Financial Management (3) Financial planning, operations and evaluation techniques used in foodservice and lodging management; development, forecasting, accounting systems, and financial reports. Prereq: Food and Lodging Cost Control or consent of instructor. F.A

532 Advanced Human Resource Management (3) Identifying labor needs; development and maintenance of work force. Prereq: Food and Lodging Personnel Development or consent of instructor. F.A

533 Advanced Food Production and Delivery System Management (3) Analysis of food production and delivery systems; application of quantitative models and models to optimize decisions. Prereq: Quantity Food Procurement, Production and Service, or consent of instructor. F

534 Special Topics in Foodservice and Lodging Administration (1-3) Lecture/discussion format. Contemporary developments and trends in industry. Prereq: Consent of instructor. May be repeated. E

535 Directed Study in Foodservice and Lodging Administration (1-3) Problems selected for study by student with guidance of faculty member. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

537 Seminar in Foodservice and Lodging Administration (1) May be repeated. S/NC only. F

542 Advanced Hotel Administration (3) Strategic management of hotel organizations. Theoretical and applied literature in formulation and implementation of strategy, external and internal factors relevant for business and corporate level decisions. Consideration of role of marketing in hotel firms. Analysis of industry and case studies. Prereq: 531, 532. Sp.A

544 Experimental Study of Quantity Food Production (3) Design and preparation of food products applicable to foodservice, retail and consumer. Production research, sensory evaluation, production techniques and microbiological evaluation of food. Prereq: Quantity Food Procurement, Production and Service, or consent of instructor. F.A

547 Field Experience (3-9) Experience in food or lodging-related industry or agency under supervision of faculty. Prereq: Consent of instructor. S/NC only. E

555 Foodservice and Lodging Law (3) Management organization and policy as imposed or granted by law. Legal research to determine legal principles at state and federal levels which impact industry. Prereq: Hospitality Law or equivalent, or consent of instructor. Sp.A

600 Doctoral Research and Dissertation (3-18) P/NP only. E

620 Advanced Topics in Foodservice Administration (1-3) Individual study of foodservice management. Prereq: 533 or consent of instructor. F.A

Recreation and Tourism Management

GRADUATE COURSES

415 Development and Maintenance of Leisure, Sport, Tourism Services (3) Principles of planning, designing, outfitting and operating leisure and sport related facilities such as aquatic centers, tennis complexes, activity centers. Prereq: Leisure Program Development and Evaluation, or consent of instructor. (Same as Sport Management 415.) F

430 Organization and Administration of Leisure and Tourism Services (3) Principles of administration applied to provision of leisure services offered by public, private and/or commercial enterprises. Organizational structures, personnel management, evaluation, legal authority, introduction to budgeting and fiscal procedures. Prereq: 310 or consent of instructor. Sp.A


450 Specialized Study in Leisure Education (1-6) Special interest leisure activities; developing positive attitudes toward leisure. Demonstrates how leisure contributes to one’s mental and physical health. May be repeated. Maximum 6 hrs. E

470 Tourism and Leisure Industries (3) Symbiotic relationship between tourism and various sectors of leisure industry. Use of resources, both natural and developed, and economic impacts of ventures. Socio-cultural impacts on venue as well as venue impact on local population. Sp

500 Thesis (1-15) P/NP only. E

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

510 Perspectives and Trends in Leisure Services (3) Basic role of leisure delivery systems in today’s society, scope of leisure services, determinants of leisure behavior, developmental features of leisure and recreation. Current trends, problems, laws, and issues affected by and/or affecting delivery of leisure services. Sp
## Retail and Consumer Sciences

### GRADUATE COURSES

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>411</td>
<td>Entrepreneurship and Small Business Management (3)</td>
<td>3</td>
<td>Concepts of entrepreneurship within a single ownership and other business organizations; risk taking and risk management; management of small business; current issues and problems. PreReq: Retail Buying, Principles of Marketing.</td>
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<tr>
<td>501</td>
<td>Professional Project (3-6)</td>
<td>Application-oriented, capstone project to show competence in major academic area. Enrollment limited to retail and consumer sciences students in non-thesis program. PreReq: Consent of instructor. May be repeated. Maximum 6 hrs. S/NC only.</td>
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<tr>
<td>502</td>
<td>Registration for Use of Facilities (3-15)</td>
<td>Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. P/NP only.</td>
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<tr>
<td>510</td>
<td>Retail Strategy and Decision Making (3)</td>
<td>Strategy, strategic management and strategic process in retail sector. Analytical decision-making skills in retailing. Retail industry structure, International differences in retail systems. PreReq: 502 or consent of instructor.</td>
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<tr>
<td>515</td>
<td>Philosophical and Conceptual Foundations of Leisure (3)</td>
<td>Philosophy, concepts of leisure, recreation, play, work and other factors, history of field, and relationship of ideas to contemporary society and to professional practice.</td>
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<tr>
<td>520</td>
<td>Program Design and Evaluation in Therapeutic Recreation (3)</td>
<td>History, philosophy, nature, purpose, special populations served, programming process, professional aspects of therapeutic recreation. Basic overview of therapeutic recreation delivery systems. PreReq: Consent of instructor.</td>
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<tr>
<td>521</td>
<td>Facilitation Techniques in Therapeutic Recreation (3)</td>
<td>Role of therapeutic recreation in clinical and non-clinical settings; application of life-style planning, self-awareness, values clarification and assertiveness training in therapeutic recreation, relationship of leisure education to therapeutic recreation. PreReq: 520 or consent of instructor.</td>
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<tr>
<td>522</td>
<td>Clinical Aspects in Therapeutic Recreation (3)</td>
<td>Concepts and techniques utilized by experienced and advanced therapeutic recreation specialists; clinical issues, comprehensive program concerns, administrative funding and trends in practice of therapeutic recreation services. PreReq: 520. Sp</td>
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<tr>
<td>540</td>
<td>Fiscal Policies for Recreation and Sports Related Organizations and Facilities (3)</td>
<td>Application of fiscal policies and procedures to operation of recreation and sports related organizations and facilities. Finance, revenue generating strategies, cash and inventory control, commercial/public cooperative ventures and microcomputer applications. PreReq: 430 or consent of instructor. Sp</td>
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<tr>
<td>541</td>
<td>Management and Operation of Recreation and Sport Facilities (3)</td>
<td>Research for making program and management decisions, process of cost analysis, and basic design and maintenance of recreation and sport related facilities. PreReq: Consent of instructor. Su</td>
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<tr>
<td>542</td>
<td>Retail Consumer Analysis (3)</td>
<td>How consumers make decisions and how retailers attempt to influence decisions by offering environment, image and selection coinciding with customers' needs. PreReq: 541. Sp</td>
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<tr>
<td>545</td>
<td>Consumer Economics and Market Choices (3)</td>
<td>Economic framework for retail marketing; concepts of retailing and consumer choice within market system. Theory of consumer preferences and decision making; consumption and demand models for individuals and households. International consumer economics, issues and policies. PreReq: Textile and Apparel Economics, Mathematics 503 or equivalent. Sp</td>
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<tr>
<td>560</td>
<td>Special Topics in Retail and Consumer Sciences (1-3)</td>
<td>Application oriented, management, small business; current issues and problems. PreReq: Retail Buying, Principles of Marketing.</td>
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<tr>
<td>562</td>
<td>Retail and Consumer Sciences Literature and Thought (3)</td>
<td>Evaluation of retail and consumer sciences literature with emphasis upon research literature, development of scholarly thought, and identification of potential areas of further study. PreReq: 562, Marketing 501, Economics 501. A</td>
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<tr>
<td>563</td>
<td>Retail and Consumer Sciences Research Methods and Measurement (3)</td>
<td>Quantitative methods and analytical concepts in research process. Mathematical and statistical formulation of retail and consumer sciences phenomena, utilizing models, model building and measurement constructions. PreReq: 562, Statistics 538. Sp,A</td>
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<td>567</td>
<td>Retail Consumer Behavior (3)</td>
<td>Theories and concepts from social science in relation to ultimate consumer behavior. PreReq: 561.</td>
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<tr>
<td>568</td>
<td>Consumer and Public Policy (3)</td>
<td>Public policy issues within consumer environments. Analysis of past and present policies within economic, social, legal and business frameworks. PreReq: 567.</td>
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<tr>
<td>569</td>
<td>Advanced Topics in Retail and Consumer Sciences (3)</td>
<td>Group discussion, individual research on advanced topics and research areas of current significance to retail and consumer sciences. PreReq: 3 graduate hours in consumer sciences. PreReq: Consent of instructor.</td>
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<tr>
<td>570</td>
<td>Research Seminar (1)</td>
<td>Research topics in retail and consumer sciences. PreReq: Consent of instructor. May be repeated. S/NC only.</td>
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<tr>
<td>573</td>
<td>Directed Study (1-3)</td>
<td>Individual projects in retail and consumer sciences. Prereq: 9 hours retailing and consumer sciences graduate coursework. May be repeated. Maximum 9 hrs.</td>
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<tr>
<td>574</td>
<td>Special Topics in Retail and Consumer Sciences (1-6)</td>
<td>Application oriented, management, small business; current issues and problems. Prereq: Retail Buying, Principles of Marketing.</td>
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<tr>
<td>575</td>
<td>Dissertation (3-15)</td>
<td>P/NP only. E</td>
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<tr>
<td>576</td>
<td>Economics of Textile Complex (3)</td>
<td>Economics of textile associated with retail and consumer sciences. PreReq: Doctoral student and 9 hrs textiles graduate coursework. May be repeated. Maximum 9 hrs.</td>
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<tr>
<td>578</td>
<td>Laboratory Methods in Nonwovens Processing and Characterization (3)</td>
<td>Laboratory experience in nonwovens fabrication processes and characterization techniques. Effect of processing conditions on structure development and properties of different types of webs. PreReq: 510 and 521.</td>
<td></td>
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<tr>
<td>589</td>
<td>Research Seminar (1)</td>
<td>Research topics in textile science. May be repeated. S/NC only. F,Sp</td>
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<tr>
<td>593</td>
<td>Directed Study (1-3)</td>
<td>Individual projects in textile science. PreReq: 9 hrs textiles graduate coursework. May be repeated. Maximum 9 hrs.</td>
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<tr>
<td>594</td>
<td>Advanced Topics in Textile Science (1-3)</td>
<td>Group discussion on specialized topics. PreReq: 9 hrs textiles graduate coursework or consent of instructor. May be repeated. Maximum 9 hrs.</td>
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<tr>
<td>600</td>
<td>Dissertation (3-18)</td>
<td>P/NP only. E</td>
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<tr>
<td>610</td>
<td>Physical Chemistry of Fibers (3)</td>
<td>Physical chemistry of fibers and fiber forming polymers; surface chemistry and chemical properties. PreReq: 510.</td>
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## Textile Science

### GRADUATE COURSES

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>501</td>
<td>Professional Project (3-6)</td>
<td>Application-oriented, capstone project to show competence in major academic area. Enrollment limited to textile science students in none-thesis program. PreReq: Consent of instructor. May be repeated. Maximum 6 hrs. S/NC only.</td>
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<tr>
<td>526</td>
<td>Nonwovens Science and Technology (3)</td>
<td>Nonwoven fabric technology; different web forming processes; and relationships among the chemical, morphological and mechanical properties of fibers and orientation in webs to final performance properties of bonded structures. PreReq: Organic chemistry or consent of instructor.</td>
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<tr>
<td>561</td>
<td>Fiber Science (3)</td>
<td>Physical properties, mechanical properties and microstructure of polymeric fibers; relation to end-use properties. PreReq: Fundamentals of Physics, Wave Motion, Optics and Modern Physics or equivalent. 3 hrs and 2 labs.</td>
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<tr>
<td>574</td>
<td>Special Topics in Textile Science (1-6)</td>
<td>May be repeated. Maximum 6 hrs.</td>
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<tr>
<td>595</td>
<td>Directed Study (1-3)</td>
<td>Individual projects in textile science. PreReq: 9 hrs textiles graduate coursework. May be repeated. Maximum 9 hrs.</td>
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<tr>
<td>625</td>
<td>Physical Chemistry of Fibers (3)</td>
<td>Physical chemistry of fibers and fiber forming polymers; surface chemistry and chemical properties. PreReq: 510.</td>
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Counselor Education and Counseling Psychology

(College of Education)

MAJORS

Counseling .......................................................... M.S.
Education ............................................................ Ed.S., Ph.D.

Robert F. Kronick, Leader

Professors:
Davis, Kathleen L., Ed.D. ........................................ Georgia
DeRidder, Lawrence W. (Emeritus), Ph.D. .......... Michigan
Dietz, Siegfried C. (Emeritus), Ed.D. ................. Northwestern
Hector, Mark A., Ph.D. ......................................... Michigan State
Huck, Schuyler W., Ph.D. ....................................... Arizona State
Peterson, Marla P., Ph.D. ..................................... Ohio State
Popen, William A. (Laison), Ph.D. ...................... Ohio State
Thompson, Charles L., Ph.D. .............................. Ohio State

Dietz, Siegfried C. (Emeritus), Ph.D. .......... Michigan State
Huck, Schuyler W., Ph.D. ....................................... Arizona State
Popen, William A. (Laison), Ph.D. ...................... Ohio State

Associate Professor:
Hutcheson, Teresa A., Ph.D. ............................... Georgia

The Counselor Education and Counseling Psychology unit participates in graduate programs leading to degrees, majors, and concentrations in:

Master of Science
Counseling
Mental health counseling
School counseling
Educational Specialist
Education
School counseling
Doctor of Philosophy
Education
Counseling psychology

See Education Under Fields of Instruction for full description of all degree requirements.

The M.S. and Ed.S. degree programs with their respective concentrations are accredited by the Council for Accreditation of Counseling and Related Educational Programs. In addition, the counseling psychology concentration under the college-wide Ph.D. program is accredited by the American Psychological Association, and the specialization in counselor education within the counseling psychology concentration is accredited by the Council for Accreditation of Counseling and Related Educational Programs. The Counselor Education and Counseling Psychology unit emphasizes research-based practices that address the growth and development of the whole person throughout the lifespan. In its counseling programs, the unit concentrates on maximizing development and adjustment of individuals through preventive and treatment models in schools, colleges, community agencies, businesses, and private practice settings.

The application deadline for admission to the doctoral and Ed.S. programs is February 1; and November 1 and February 1 for the master’s program.

ADMISSION REQUIREMENTS

Admission requirements include up-to-date scores from the GRE, the unit admissions application form and letters of recommendation. For the doctoral program, a writing sample is also required.

GRADUATE COURSES

410 Gender Role Development: Implications for Education and Counseling (3) Theories and research: development of gender roles and their relevance to identity and behavior in socio-psychological, educational, and counseling settings. (Same as Women’s Studies 410.) F, S

431 Personality and Mental Health (3) Various perspectives of mental health with application to education and other social institutions. E

500 Thesis (1-15) P/NP only. E

502 Registration for Use of Facilities (3-15) Required for students who are not otherwise registered during any academic quarter when they register to use University facilities. May be used toward degree requirements. May be repeated. S/NC only. E

503 Problems in lieu of Thesis (2-3) May be repeated. Maximum 9 hrs. S/NC only. E

504 Special Topics (1-3) Instructor-initiated course offered at convenience of academic unit on topics of current interest. May be repeated. Maximum 15 hrs. S/NC or letter grade. E

518 Educational Specialist Research and Thesis (3) May be repeated. P/NP only. E

520 Statistics and Research Design: Conceptual (3) Consumer-oriented, conceptual treatment of statistics, research design, and quantitative basis of testing. E

525 Formal Measurement in Education and Counseling (3) Principles of test construction and item analysis. Survey of standardized tests of intelligence, achievement, aptitude, vocational interest, attitudes, and personality. Prereq: 520 or equivalent. F, S, Su

535 Ethical, Legal, and Professional Issues in Counseling (3) Professional practice issues in schools and community counseling and related fields. Education, research, standards of practice, and codes of ethics. Prereq: Admission to Counseling program or consent of instructor. S, A

550 Introduction to Pupil Personnel Programs (3) History, philosophy, professional standards, counselor role in relation to school staff and mental health professionals, and ethics of profession. F

551 Theory and Practice of Counseling (3) Philosophical bases of helping relationships; development of counselor-client self-awareness; counseling theory and techniques. F, S

552 Career Development: Vocational Theory, Research and Practice (3) Relationship of vocational theory, career development research and societal factors to life career roles. F

553 Career and Educational Information Systems and Resources (3) Use of print and non-print materials: computer-based systems, for career and educational planning. Prereq: 552 or consent of instructor and Internet access account. A, Sp

554 Group Dynamics and Methods (3) Theory and types of group practices, descriptions of group practices, methods, dynamics, and facilitating skills. Supervision of leadership skills. E

555 Practicum in Counseling (3) Supervised practice and application of counseling skills with individual clients. Prereq: Admission to program. 431, 525, 551, and consent of instructor. May be repeated. Maximum 15 hrs. S/NC only. E, F, Sp

556 Seminar in Community Agency Counseling (1) Orientation to professional organizations, codes of ethics, certification requirements, and role identity of community agency counselors. May be repeated. Maximum 2 hrs. S/NC only. E, F, Sp

558 Internship in School Counseling (1-6) Supervised practicum employment at academic unit approved sites. Prereq: 550 and consent of instructor. May be repeated. Maximum 12 hrs. S/NC only. E

559 Internship in Community Agency Counseling (1-6) Supervised practicum employment at academic unit approved human services’ agency. Prereq: Admission to community agency program. S/NC only. Instructor. May be repeated. Maximum 12 hrs. S/NC only. E

561 Development and Operation of School Counseling Programs (3) Management of comprehensive school counseling programs to include needs assessment, program goals, resource identification, evaluations, and use of computer-based program management software. Prereq: 550. Sp, Su

565 Facilitation of Technical Task Groups (3) Technical and social aspects of group dynamics in context of technical task groups. Application of counseling techniques to facilitate workplace teams. Prereq: 551, 554, or consent of instructor.

566 Approaches to Family Intervention and Counseling (3) (Same as Child and Family Studies 566.)

570 Cross-Cultural Counseling: Theory and Research (3) Theory and research in counseling of clients from different cultural backgrounds in U.S. and abroad. Sp

571 Individual Cognitive Assessment in Counseling (3) Basic concepts and applications in individual assessment of intelligence, proficiencies, aptitude in administrative and interpretative tests. Prereq: 525 and 526 and consent to counseling program or consent of instructor. S/NC only. Sp, A

585 Seminar in Gerontology (1) (Same as Human Ecology 585, Exercise Science 585, Nursing 585, Public Health 585, Psychoeducational Studies 585, Social Work 585, and Sociology 585.)

593 Independent Study (1-3) May be repeated. S/NC or letter grade. E

600 Doctoral Research and Dissertation (3-15) P/NP only. E

602 Directed Research (1-3) Instructor- or student-initiated research investigations. Prereq: Two-course sequence in selected area. May be repeated. Maximum 12 hrs. S/NC only. E

635 Ethical, Legal, and Professional Issues in Psychology (3) Same as Psychology 635 and Psychoeducational Studies 635. Sp

650 Seminar in Counselor Education (1) Professional issues related to role and function of counselor educator. Prereq: Admission to doctoral program in counselor education. May be repeated. Maximum 2 hrs. S/NC only. F

655 Practicum in Counselor Education (3) Supervised practice and application of counseling skills with clients. Prereq: Admission to counselor education program and consent of instructor. May be repeated. Maximum 6 hrs. Sp, A

659 Internship in Counselor Education (1-6) Supervised employment in academic unit approved internship sites in counselor education. May be repeated. Maximum 12 hrs. S/NC only. E

661 Education Implications of Neuropsychology (3) Theory and assessment: Common syndromes and their behavioral and cognitive manifestations. Prereq: 516 and 541 or equivalent. Instructor. May be repeated. Maximum 12 hrs. S/NC only. F


671 Personality and Vocational Assessment (3) Use and interpretation of personality and vocational measures in
The unit derives its intellectual identity and orientation from disciplines such as anthropology, history, philosophy, psychology, and sociology, and from more specialized areas of inquiry such as ethnography, semiotics, literary theory, hermeneutics, linguistics, and feminist theory.

As a unit founded upon and devoted to interdisciplinary inquiry, Cultural Studies in Education seeks to bring its disciplines to the service of students and faculty throughout the college as aids to understanding diverse cultural contexts that shape beliefs, values and practices. The main charge of the unit is to examine critically the social practices, institutions, "helping" agencies, and other social sites where disenfranchised and marginalized groups struggle for greater control over their futures.

**GRADUATE COURSES**

500 Thesis (1-15) P/NP only. E

501 Special Project (1) Culminating experience for nonthesis major. Research study suitable for publication or practicum requiring special written work. Prereq: 532.

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May be repeated with consent of instructor. S/NC only. E


504 Seminar in Curricular Studies (1) Required 2 consecutive semesters. S/NC only. E

505 History of Olympics: Ancient and Modern (3) Examination of various aspects of ancient and modern Games. Ancient Olympic Games: 776 BC to 393 AD: Panhellenic Games. Modern Olympic Games: 1896 to date: political, social, class, gender, and economic issues that influence games. F, S, Su

506 Seminar in Philosophy of Education (3) Truth, knowledge, and valuation in relation to work of schools. Prereq: 2 courses in philosophy of education. May be repeated with consent of instructor. Sp, Su

507 Seminar in Educational Policy (3) Historical and contemporary issues in educational policy. Prereq: 2 courses in educational policy. May be repeated with consent of instructor. Sp, Su

508 Special Topics (1-3) Advanced study in selected aspects of cultural studies. May be repeated. Maximum 9 hrs. S/NC or letter grade. E

510 Cultural Studies in Education Seminar (1-3) May be repeated. S/NC or letter grade. E

514 Special Topics (1-3) May be repeated. S/NC or letter grade. E

515 Issues in Cultural Studies (3) Discourse, schools, and selected principal contemporary issues in field. Prereq: Admission to doctoral program with concentration in cultural studies in education. E

516 Justice, Schools, and Sports (3) Social justice issues: education and sport practices. Social justice, moral commitments to others in educational and sport settings, and equal opportunity to acquire social, economic benefits. Prereq: Admission to doctoral program with concentration in cultural studies in education. E

517 Independent Study (1-3) May be repeated. S/NC or letter grade. E

518 Supervised Readings (1-3) May be repeated. S/NC or letter grade. E


530 Psychology of Sport (3) Social psychological factors influencing human behavior in sport context; discussion of contemporary theory, research, and methodology. Prereq: General psychology course or consent of instructor. F, Su

533 Motor Behavior and Skill Acquisition (3) Topical exploration and analysis of human movement behavior to acquisition and performance of skills; discussion of current research and methodology. F, Su

534 Advanced Research Methods in Education (3) Advanced research methods for education research. Prereq: 2 courses in educational research. May be repeated. S/NC or letter grade. E

535 Social Research Methods in Education (3) Advanced research methods for psychology research. May be repeated. S/NC or letter grade. E

536 Topics in Sociology of Education (3) May be repeated. S/NC or letter grade. E

542 Sociological Aspects of Sport (3) Social and cultural factors influencing sport and physical education. Prereq: Consent of instructor. F

545 Educational Sociology (3) Sociological analysis of American education system. Prereq: Consent of instructor. F

546 Topics in History of Education (3) May be repeated. E

547 Topics in Philosophy of Education (3) May be repeated. E

549 Topics in International Education (3) Historical, philosophical, sociocultural foundations; selected nations and their cultures. May be repeated. E

550 Introduction to Qualitative Research in Education (3) Fundamentals of qualitative research methods and development of skills for qualitative research proposals. E

551 Issues in Cultural Studies (3) Discourse, schools, and selected principal contemporary issues in field. Prereq: Admission to doctoral program with concentration in cultural studies in education. E

552 Advanced Research Methods in Education (3) Advanced research methods for education research. Prereq: 2 courses in educational research. May be repeated. S/NC or letter grade. E

553 Motor Behavior and Skill Acquisition (3) Topical exploration and analysis of human movement behavior to acquisition and performance of skills; discussion of current research and methodology. Prereq: General psychology course or consent of instructor. F, Su

600 Doctoral Research and Dissertation (3-15) P/NP only. E

604 Seminar in History of Education (3) Selected historical issues in education and philosophy of education. Prereq: 2 courses in history or philosophy of education. May be repeated with consent of instructor. E

625 Seminar in History of Education (3) Selected historical issues in education and philosophy of education. May be repeated with consent of instructor. S

633 Advanced Motor Behavior (3) In-depth analysis, synthesis, and discussion of contemporary theory and topics; research development and production in motor learning/cantral and psychological. May be repeated. Maximum 9 hrs. E

634 Topics in Sociology of Education (3) May be repeated. S


654 Educational Sociology (3) Sociological analysis of American education system. Prereq: Consent of instructor. F

655 Educational Sociology (3) Sociological analysis of American education system. Prereq: Consent of instructor. F

The Department of Ecology and Evolutionary Biology administers an interdisciplinary graduate program which offers the Master of Science and Doctor of Philosophy degrees with a major in Ecology and Evolutionary Biology and concentrations in behavior, ecology, (including mathematical ecology) and evolutionary biology.

REQUIREMENTS FOR ADMISSION

Applications are accepted once a year. The deadline for receipt of all application materials is 1 January for those applicants wishing to enroll in the following Fall or Spring semesters. Applications incomplete as of that date, or received after that date, will not be considered. Applicants are expected to have a bachelor's degree in one of the life sciences. They are expected to have completed a minimum of one year of general biology, two years of chemistry, one year of general chemistry, and one year of college-level calculus. Occasionally, applicants who are highly qualified otherwise but lack one of these courses or course sequences will be admitted with the expectation that the deficiency will be made up within the first year of graduate study. Applicants are required to submit scores from the Graduate Record Examination (GRE) and successful applicants will usually have a composite score on the verbal, mathematical and analytical sections of the GRE of at least 1550. Submission of scores on appropriate (e.g., biology, mathematics) advanced GRE examinations are recommended but not required. Applicants are also expected to have an overall grade-point average of at least 3.0, and 2.7 or above for all science and mathematics courses, on a 4.0 scale (successful applicants will usually have grade-point averages well above these minima).

Application must be made to both the Graduate School and the department. The graduate application requires 3 letters of recommendation from persons capable of assessing the applicant's suitability for graduate work in biology and a statement of professional goals and reasons for applying to this program. Applicants for the doctoral degree are expected to have made prior contact with potential research advisors in the department's graduate program and this approach is recommended for applicants for the Master's degree program as well. Inquiries should be directed to the Office of Graduate Studies, Graduate School and the department. The University of Tennessee, Knoxville, TN 37996-1610.

THE MASTER'S PROGRAMS

In addition to general requirements of the Graduate School, aspirants for the Master of Science degree are expected to: (1) during the first semester in residence, take a prescriptive diagnostic examination covering major concepts in ecology and evolutionary biology. The examination may be taken twice and must be passed before the student is admitted to candidacy; (2) complete course requirements as determined by the department and the student's faculty thesis research committee; and (3) satisfactorily complete and defend a research thesis.

THE DOCTORAL PROGRAMS

In addition to general requirements of the Graduate School, aspirants for the Doctor of Philosophy degree are expected to: (1) during the first semester in residence, take a prescriptive diagnostic examination covering major concepts in ecology and evolutionary biology. The examination may be taken twice and must be passed before the student is admitted to candidacy; (2) complete course requirements as determined by the department and the student's faculty dissertation research committee; (3) pass a written and oral comprehensive examination designed to test for adequate knowledge in those areas essential to the student's research program; and (4) satisfactorily complete and defend a dissertation. The department does not require a reading knowledge of a foreign language, but this may be imposed by the student's faculty dissertation research committee. If so, the student has the option of demonstrating reading knowledge of the prescribed language by either (a) passing the official reading examination given by the language department or (b) earning a grade of at least B in the second semester of a special language reading course for graduate students.

MINOR IN ENVIRONMENTAL POLICY

The department participates in a program designed to give graduate students an opportunity to develop an interdisciplinary specialization in environmental policy. See Economics for program description.

GRADUATE COURSES

403 Plant Evolution (3) (Same as Botany 403.)
411-412 Minicourse in Ecology and Evolutionary Biology (3) Selected advanced topics in ecology, behavior, and evolutionary biology, concentrated in time and subject matter. Consult departmental listing for topics offered. Prereq: As announced. May be repeated. Maximum 4 hrs may apply toward degree major.
431 Plant Ecology (4) (Same as Botany 431.)
446 Introduction to Oceanography (4) Basic oceanography: physical, chemical, geological and biological processes and patterns. Oceanic subsystems: upwellings, polar oceans, hydrothermal vents, gyres, coral reefs, estuaries, and coastal regions. Field trip to coast required. Prereq: General Biology and General Chemistry; General Ecology recommended.
450 Comparative Animal Behavior (3) Principles and methods of ethology: ecological, developmental, physiological and evolutionary aspects. (Same as Psychology 450.)
459 Comparative Animal Behavior Laboratory (3) Introduction to observational and experimental research in ethology. Coreq: Coreq. 450. (Same as Psychology 459.)
461 Special Topics in Organismal Biology (3) Evolution, ecology, biogeography, classification, and anatomy of selected animal and plant taxa. Prereq: General Ecology or consent of instructor.
470 Aquatic Ecology (3) Introduction to the physical-chemical nature of inland waters with description of aquatic communities and their interrelationships. Prereq: General Chemistry and General Ecology 2 hrs and 1 lab.
500 Thesis (1-15) P/NP only. E

502 Registration for Use of Facilities (3-15) Required for the student not otherwise enrolled during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

503 Ecology and Evolutionary Biology Seminar (1) Advanced topics in ecology, behavior, and evolutionary biology. Senior departmental majors encouraged. Required of all first- and second-year graduate students. May be repeated. Maximum 4 hrs. S/NC only.

504 Special Topics (1-3) Selected directed readings or special course in topics of current interest. Consult departmental listing for offerings. May be repeated with consent of instructor. Maximum 9 hrs. S/NC only.

505 Basic Concepts in Organic Evolution (3) Processes and patterns in organic evolution. Prereq: Admission to program in Ecology and Evolutionary Biology. Required of all first-year students. F

507 Basic Concepts in Ecology (3) Contemporary issues in ecology. Prereq: Admission to program in Ecology and Evolutionary Biology. Required of all first-year students. S

508 Introduction to Faculty Research (1) Orientation of new graduate students to current research of departmental graduate faculty. Prereq. Admission to program in Ecology and Evolutionary Biology. Required of all first-year students. S/NC only.


511 Foundations: Readings in Evolution (1-2) Readings and discussion of classic papers in evolution.

513 Foundations: Readings in Behavior (1-2) Readings and discussion of classic papers in behavior.

515 Foundations: Readings in Environmental Toxicology (1-2) Readings and discussion of classic papers in environmental toxicology.

516 Colloquium in Ethology (1) (Same as Psychology 516)

520 Ecology for Planners and Engineers (3) Ecological principles and effects that human-caused changes have on living organisms. Lectures and field trips. Appropriate for students in Planning and Environmental Engineering. Not intended for graduate students in Ecology and Evolutionary Biology.

524 Physiological Ecology of Animals (3) Adaptive physiological response of animals to natural changes in or extremes of physical and/or biotic environments. Prereq: Undergraduate courses in animal physiology and ecology. Biochemistry and Cellular and Molecular Biology 440 and General Ecology equivalent.

535 Ecology and Development in the Amazon (3) Natural history, ecosystem dynamics and function, and opportunities for sustainable economic development in the Amazon Basin. Includes field trip of 7-10 days to Manaus, Brazil.

540 Insect Taxonomy I: Major Orders (3) Survey of classification of major orders of insects, with practical experience in identification of insects at family level. Prereq: Consent of instructor. 4 hrs combined lecture and lab.

541 Insect Taxonomy II: Minor Orders (3) Survey of classification of minor orders of insects, with practical experience in identification of insects at family level. Prereq: 540 or consent of instructor. 4 hrs combined lecture and lab.

542 Insect Structure and Function (3) Integrated study of morphology and functional aspects of tissues and cellular level of insects. Prereq: Consent of instructor.

543 Aquatic Insects (3) Taxonomy and biology of aquatic insects; immature forms. Prereq: Consent of instructor. 2 hrs and 1 lab.

544 Fresh Water Invertebrate Zoology (3) Ecology and taxonomy of fresh water invertebrates exclusive of insects. Prereq: Comparative Invertebrate Biology or equivalent and consent of instructor. 3 hrs lab and field study.

545 Advanced Animal Behavior (3) Second-level course in ethology, stressing evolutionary, genetics, physiology, ecology, and human behavior. Prereq: 540 or equivalent. (Same as Psychology 545)

547 Conceptual Foundations of Evolution and Behavior (3) (Same as Psychology 547)

552 Development Planning in the Third World (3) (Same as Planning 552)

555 Environmental Planning (3) (Same as Planning 555)

556 Age-Environment and Global Climate Change (3) Glacial-interglacial climatic cycles and dynamic responses of landscapes within glacial, periglacial, and non-glacial environments across North America over past 2.5 million years. (Same as Geological Sciences 556)

560 Biometry (3) Statistical applications in biological research. Prereq: Statistics course or consent of instructor.

561 Environmental Toxicology (3) Basic concepts in toxicology, molecular toxicology and detoxification, reproduction, toxicology, mutagens, teratogens, carcinogens, pathologic changes and environmental impact. Prereq: Biochemistry and Cellular and Molecular Biology 410, Organic Chemistry or consent of instructor. (Same as Biochemistry and Cellular and Molecular Biology 561)

575 Ecological Genetics (3) Genetics of natural populations, including both single-locus and quantitative genetic approaches. Prereq: 573 and statistics course.

577 Landscape Ecology (3) Ecological structure, function, and change through time of landscape mosaic: quantitive measures of landscape heterogeneity; responses of organisms to changes in landscape heterogeneity. Prereq: General Ecology or equivalent or consent of instructor.

581-582 Mathematical Ecology (3,3) (Same as Mathematics 581-582)

593 Zoogeography (3) Processes determining geographic distribution of species and distribution and composition of animal communities. Prereq: Ecology course or consent of instructor.

585 Mathematical Evolutionary Theory (3) (Same as Mathematics 585)

591 Foreign Study (1-15) See College of Arts and Sciences.

592 Off-Campus Study (1-15) See College of Arts and Sciences.

593 Independent Study (1-15) See College of Arts and Sciences.

600 Doctoral Research and Dissertation (3-15) P/NP only. E

601 Advanced Topics (1-3) Reading and discussion of recent advances. Consult the departmental listing for offerings. May be repeated with consent of department. Maximum 9 hrs.

604 Current Topics in Environmental Toxicology (1) Critical reviews of research problems and methods in environmental toxicology, behavioral toxicology, biochemical and ecological effects, bioassays and epidemiology. Prereq: Biochemistry and Cellular and Molecular Biology 410, General Ecology or equivalent. S/NC only.

607 Seminar in Ecology and Evolutionary Biology (1) Readings and discussion based on current literature. May be repeated. Maximum 12 hrs.

635 Environmental Assessment and Sustainable Development in Third World Countries (3) Concepts and methods of environmental impact assessment and risk assessment. Sustainable development concepts and issues in developing countries. The role of risk and impact assessment in achieving sustainable development. Prereq: General Ecology or equivalent. (Same as Botany 635 and Planning 639)

681-682 Advanced Mathematical Ecology (3,3) (Same as Mathematics 681-682)
STUDENT'S RIGHT TO PETITION

Graduate students in good academic standing have the right to petition the department for modification of departmental degree requirements and redress of grievances. Petitions must be in writing and addressed to the Director of Graduate Studies.

THE MASTER'S PROGRAM

Admission to the M.A. program is based on undergraduate academic performance and on scores from the general portion of the GRE. The student may choose either the thesis or non-thesis option. The non-thesis option requires 30 hours of coursework at the 400 level or above. Of these, at least 24 hours (at least 18 hours of which are in economics) must be at the 500 level or above. Of the remaining 18 hours in economics at the 500 level or above, 12 hours must consist of 511, 512 and 514, and the remaining 6 hours must be in one field of economics. Of the 30 hours, a maximum of 9 hours in courses approved by the department may be taken in fields other than economics. Students electing the non-thesis option are required to pass a final comprehensive examination. The thesis option requires 30 hours of coursework at the 400 level or above, including at least 24 hours at the 500 level or above, 6 hours of which may be thesis hours. Of the remaining 18 hours at the 500 level or above, at least 15 hours must be in economics and must include 511, 512, 513, and 514. A maximum of 6 hours may be in an area other than economics.

THE DOCTORAL PROGRAM

Admission to the Ph.D. program is based on promise of outstanding scholarship, as demonstrated by previous academic performance, by scores achieved on the general portion of the GRE, and by recommendations. The program requires a minimum of 48 hours of coursework beyond the bachelor's degree or 24 hours beyond the master's degree, at least 24 hours of 500 level Doctoral Research and Dissertation, and successful completion of the following:

1. Students are required to complete the following core requirements:
   a. Economic Theory: Microeconomic theory and macroeconomic theory by a qualifying exam taken not later than the beginning of the fourth semester of study.
   b. History of Economics: Completion of 515 or 615 with a grade of B or better, or by qualifying examination.
   c. Quantitative Methods: Completion of 581, 582 and 583 with grades of B or better, or by qualifying examination.

2. Students failing a qualifying examination must retook the examination the next time offered. A qualifying examination may be taken a third time only with approval of the department. Failing a qualifying examination for a third time will result in dismissal from the doctoral program.

3. Students are required to demonstrate competence by comprehensive examination in at least two fields of specialization in economics. Students failing a comprehensive examination must retake the examination the next time offered. A comprehensive examination in a specific field may be taken a third time only with approval of the department.

4. Students are required to complete with a grade of B or better two elective courses in economics at the 500 level or above, outside the core subject areas and outside the fields of specialization.

5. Students are required to complete a doctoral dissertation and to defend it successfully before the faculty.

MINOR IN ENVIRONMENTAL POLICY

The program is designed to give master's and doctoral level graduate students an opportunity to develop an interdisciplinary specialization in environmental policy. While administered through the Economics Department, the program is coordinated by a committee of representatives from the following participating departments and programs: Agricultural Economics and Rural Sociology; Botany; Civil and Environmental Engineering; Ecology and Evolutionary Biology; Economics; Forestry; Wildlife and Fisheries; Geography; Management; Planning; Political Science; and Sociology.

Students may request admission to the minor following admission to a graduate program in one of the participating departments. Students in good standing in one of these programs may apply for admission to the minor in environmental policy. The coordinating committee will consider the admission of interested students. Applicants should have a background in both natural and social sciences evidenced by prior coursework or experience. One course in environmental studies from the student's major discipline and one course in quantitative methodologies are required. These requirements may be fulfilled before or after admission to the minor. All students admitted to the minor will be required to register for at least three hours of Economics 579, Environmental Policy Research Workshop, and to complete successfully the following:

1. Ecology and Evolutionary Biology 520 or Plant and Soil Sciences 414 or Geography 433 or an equivalent course approved by the coordinating committee.
2. Six hours of coursework outside the major discipline approved by the coordinating committee.

Doctoral students seeking a minor in environmental policy must also complete, in addition to above, a policy-relevant dissertation approved by the coordinating committee.

BUSINESS ADMINISTRATION

For complete listing of MBA program requirements, see Business Administration. MBA Concentration: Economics.

Minimum course requirements are approved by the area MBA faculty advisor.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The Ph.D. program is available to residents of the state of Kentucky. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE COURSES

400 Special Topics (3) Topics vary. Prereq: Determined by department. May be repeated.

413 Macroeconomic Fluctuations (3) Analysis of historical data, methods of analyzing macro-economic fluctuations, theoretical foundations of growth and development, role of monetary and fiscal policies in aggregate economy. Major writing requirement. Prereq: Intermediate Macroeconomics or consent of instructor.

415 History of Economics (3) Same as History 415.

424 Political Economy of World Development (3) Topics vary. Latin America, Asia, Soviet Europe, and Eastern Europe. Analysis of major economic strategies, policies, and problems. Prereq: 201. This course includes a major writing requirement. May be repeated when topics vary. Maximum 9 hrs.


462 Economics of Resources and Environmental Policy (3) Economic analysis of environmental policy and allocation of resources. Benefits and costs of development of natural resources and impacts of growth on environment. Major writing requirement. Prereq: 201.

471 Public Finance: Optimal Government Functions and Expenditure Analysis (3) Problems of collective consumption, external effects, public investment, social decision making. Major writing requirement. Prereq: 201.

472 Public Finance: Taxation and Intergovernmental Relations (3) Analysis of individual taxes and of tax systems, non-tax sources of revenue, fiscal federalism. Major writing requirement. Prereq: 201.

482 Introduction to Mathematical Economics (3) Application of basic mathematical tools: calculus, matrix algebra, etc., to major topics of economic theory. Prereq: Intermediate Microeconomics with B or better and Calculus.

500 Thesis (1-15) P/NP only. E

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or facility time before degree is completed. May not be used toward degree requirements. May be repeated. S/N/C only. E

511-12 Microeconomic Theory (3,3) Theory of consumer choice and demand, theory of revealed preference, attributes of goods and implicit prices. Prereq: 201. This course includes a major writing requirement. May be repeated. E


513-14 Macroeconomic Theory (3,3) Determination of national income, prices, and employment. Results using Keynesian, non-market-clearing, monetarist, and rational expectations paradigms.


525 Economic History of Europe (3) Nature and functioning of economic systems and policies in history of Western civilization, major issues of method and interpretation. Prereq: Graduate standing in economics or consent of instructor.

526 Economic History of the U.S. (3) Interpretation of American economic structure and policies from colonial times. Prereq: Graduate standing in economics or consent of instructor.

537 Managing in a Regulated Economy (3) Economic effects of antitrust and public utility, international and environmental regulation on business. Development of decision-making skills in areas of governmental-business relations.

577 Environmental Economics and Policy Management (3) Interdisciplinary perspectives on goals of sustainable economic development and environmental quality. Development of decision-making tools and conflict resolution.
Education

MAJORS

College Student Personnel
Counseling
Education

DEGREES

M.S. M.S., Ed.S., Ed.D., Ph.D.
M.S.
M.S.

College of Education offers the Master of Science, Educational Specialist, Doctor of Education, and Doctor of Philosophy degrees in cooperation with eleven individual units:

Counselor Education and Counseling Psychology (CECP)
Cultural Studies in Education (CSE)
Education in the Sciences, Mathematics, Research and Technology (ESMRT)
Exercise Science (ES)
Holistic Teaching/Leaming (HTL)
Inclusive Early Childhood Education (IECE)
Language, Communication, and Humanities Education (LCH)
Leadership in Industry in Education (LSE)
Psychosocial Developmental Studies (PSS)
Rehabilitation, Deafness and Human Services (RDHS)
Sport and Physical Activity (SPA)

The College also offers initial teacher licensure programs and the graduate level. The program features a professional year with accompanying coursework which may lead to a master's degree with a major in Education. See Track 2 under Master's Programs, Education, and Teacher Licensure.

For admission, most programs require current scores from the GRE general section, and all require a unit application form and letters of recommendation as indicated on the chart of Majors and Degree Programs. For additional information about the various programs of study and admission, write to the Graduate Center in the College of Education, CA 213, The University of Tennessee, Knoxville, TN, 37996-3400, tel. (423) 974-0906, www.utk.edu/advising/advising.html.

THE MASTER'S PROGRAMS

College Student Personnel
Students who major in College Student Personnel (LSE) are prepared to enter the field of student personnel administration in colleges, universities, and community or junior colleges.

The program has both a thesis and non-thesis option. A minimum of 36 hours, which includes 6 hours of practicum experience, is required in either option. Students must complete a minimum of 12 hours in Higher Education courses.

Counseling
The master's degree with a major in Counseling offers concentrations (with abbreviated unit designations) in:

Clinical health counseling (CECP)
Rehabilitation counseling (RDHS)
School counseling (CECP)

The program includes thesis and non-thesis options. The concentration in mental health counseling is fully accredited by the Council for Accreditation of Counseling and Related Educational Programs (CACREP) and requires completion of 60 hours of coursework plus supervised practicum and internship experiences working with clients. The concentration in rehabilitation counseling is fully accredited by the Council on Rehabilitation Education, Inc. and requires 54 semester hours, including internship. A minimum of 12 hours of Rehabilitation, Deafness and Human Services courses is required. The concentration in school counseling is fully accredited by the Council for Accreditation of Counseling and Related Educational Programs and requires 48 hours of coursework, including supervised practicum and internship experiences working with clients. A final examination is required of all students.

Education
The master's degree with a major in Education has two tracks. Track 1 is intended for students who are licensed to teach English, elementary education, foreign language, mathematics, natural science, social science, early childhood special education, modified and comprehensive special education, or education of the deaf and hard of hearing. (Non-licensed applicants to Track 1 must have a minimum of 12 hours in Higher Education courses.) Track 2 is designed for students seeking initial teacher licensure in one of the above fields. Thesis and non-thesis options are available for both tracks.

Track 1 - Concentrations (with abbreviated unit designations) are available in:

Art education (LCH)
Curriculum, assessment, and instruction (ESMRT)
Education of the deaf and hard of hearing (RDHS)
Elementary education (HTL and IECE)
English education (LCH)
Foreign language/ESL education (LCH)
Instructional technology (ESMRT)
Mathematics education (ESMRT)
Modified and comprehensive special education (HTL)
Reading education (HTL)
Science education (ESMRT)
Social foundations (CSE)
Sociocultural studies in education (HTL)

The thesis option requires the completion of 30 hours, including 6 hours of Thesis 500. The non-thesis option requires the completion of 48 hours in coursework (36 hours for special education concentrations). Both options
require a minimum of 12 hours in the major discipline (18 hours for special education concentrations).

**Track 2 - Concentrations** (with abbreviated unit designations) are available in:
- Art education (LCHE)
- Education for the deaf and hard of hearing (RDHS)
- Elementary teaching (HTL and IECE)
- Modified and comprehensive special education (HTL)
- Secondary teaching (ESMRT, HTL, and LCHE)

Special education: early childhood (IECE)

The thesis option requires completion of 36 hours, plus 6 hours of Thesis 500 for a total of 42 hours. The non-thesis option requires 36 hours, including 24 hours of prescribed licensure coursework and 12 hours in the academic discipline as approved by the student's committee.

For both tracks, a comprehensive written examination is required. An oral exam is given over the thesis.

**Educational Psychology**

The master's degree with a major in Educational Psychology is offered with concentrations (with abbreviated unit designations) in:
- Adult education (PES)
- Individual & collaborative learning (PES)

Both programs include thesis and non-thesis options. The major in Educational Psychology requires 36 hours. The concentration in adult education requires a minimum of 12 hours in adult education courses. A final examination is required of all master's degree students.

**Human Performance and Sport Studies**

The master's degree with a major in Human Performance and Sport Studies offers concentrations (with abbreviated unit designations) in:
- Exercise science (exercise physiology; biomechanics/sports medicine) (ES)
- Sport studies (HTL)
- Sport management (SPA)

Applicants must submit a unit admission application and 3 letters of recommendation. Both thesis and non-thesis options are available. The non-thesis option requires 32 hours, including a project, and a course in research design or an approved specialized research class. The thesis option requires the completion of 30 hours, including 6 hours of Thesis 500. Both options require a minimum of 12 hours of sport studies, exercise science, or sport management courses.

**Leadership Studies in Education**

The master's degree program with a major in Leadership Studies in Education offers a concentration in educational administration and supervision (LSE), requiring a minimum of 30 hours, including 6 hours of Thesis 500 for the thesis option, or 33 hours for the non-thesis option.

The concentration in educational administration and supervision consists of a minimum of 18 hours of coursework in Educational Administration and Supervision. A final oral examination is required for the thesis option, with a written exam at the option of the committee. A final written comprehensive examination is required for the non-thesis option, with an oral exam at the option of the committee. Students entering either of these options must complete the introductory core consisting of Educational Administration and Supervision 513, 515, 516, and 535 or a demonstrated computer proficiency. These courses are prerequisites to other courses in the unit.

**THE SPECIALIST IN EDUCATION PROGRAM**

The Educational Specialist degree program with a major in Education encompasses concentrations (with abbreviated unit designations) in:
- Curriculum, assessment, and instruction (ESMRT)
- Educational administration & supervision (LSE)
- Elementary education (HTL)
- Foreign language/ESL education (LCHE)
- Instructional technology (ESMRT)
- Mathematics education (ESMRT)
- Reading education (HTL)
- School counseling (CECP)
- School psychology (PES)
- Science education (ESMRT)
- Social science education (HTL)

The instructional and curricular concentrations require completion of a minimum of 30 hours of coursework beyond the master's degree, including 8 hours in core courses, 18 hours in specialized courses, and 6 hours to be determined by the student's committee. The educational administration and supervision concentration requires a minimum of 30 hours beyond the baccalaureate, including a 6-hour cognate within or external to the college, and a highly recommended internship. Both thesis and non-thesis options are available. The school counseling concentration requires a minimum of 22 hours beyond the master's degree but not fewer than 60 hours beyond the baccalaureate, including practicum and internship experiences. The school psychology concentration requires the completion of a minimum of 66 semester hours beyond the baccalaureate. Refer to Degree Requirements under The Graduate School for complete program requirements.

**THE DOCTOR OF EDUCATION PROGRAM**

The Ed.D. program with a major in Education is available in the following concentrations (with abbreviated unit designations):
- Curriculum, assessment, and instruction (ESMRT)
- Educational psychology: collaborative learning (PES)
- Elementary education (HTL)
- English/foreign language/ESL education (LCHE)
- Instructional technology (ESMRT)
- Leadership for teaching and learning (LSE)
- Mathematics education (ESMRT)
- Reading education (HTL)
- School education (ESMRT)
- Social science education (HTL)

In addition to the requirements of The Graduate School, the hour requirements in the curricular and instructional concentrations are determined by the student's doctoral committee. A comprehensive examination and an oral examination on the dissertation are required.

The concentration in educational psychology: collaborative learning requires the completion of a minimum of 90 hours beyond the baccalaureate degree and incorporates a cohort model through which students participate in core courses as a group. This program offers an alternative residency which includes a two-year, on-campus, continuous enrollment in six to nine hours per semester including summers. During this time period, students are enrolled in a doctoral seminar (930) for four of the six semesters and participate with faculty on research teams for 12 of the required hours. Contact the program coordinator for additional information and program requirements.

The requirements for the concentrations in educational administration and supervision and higher education are determined on an individual basis by each student's doctoral committee. Course requirements include a 6-9 hour cognate within the college and a 6-9 hour minimum external to the college. Additional course requirements include completion of two consecutive semesters of Educational Administration and Supervision 604 during residence. Though an internship is highly recommended, it is not required. A foreign language requirement is at the discretion of the committee. A written comprehensive examination, as well as an oral examination on the dissertation, is required. An alternative residency, which includes a two-year, on-campus, continuous enrollment in LSE 606, Leadership Forum, is available for qualified students.

**THE DOCTOR OF PHILOSOPHY PROGRAM**

The intercollegiate Ph.D. program with a major in Education provides fourteen concentrations. The units participating in the Ph.D. program are Counselor Education and Counseling Psychology; Cultural Studies in Education; Education in the Sciences, Mathematics, Research, and Technology; Exercise Science; Holistic Teaching/Learning; Inclusive Early Childhood Education; Language, Communication, and Humanities; Leadership Studies in Education; Psychocultural Studies; and Rehabilitation, Deafness, and Human Services.

The program requirements are:

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Minimum Hours</th>
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<tbody>
<tr>
<td>Research Area</td>
<td>15</td>
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<tr>
<td>Foreign or Computer Language (demonstrate proficiency)</td>
<td>6</td>
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<td>General Core Requirements</td>
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<tr>
<td>Option A</td>
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<tr>
<td>- History and philosophy of education (both areas must be represented)</td>
<td>4</td>
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<tr>
<td>- Learning theory and curriculum (both areas must be represented)</td>
<td>4</td>
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<tr>
<td>- Administrative/Leadership theory</td>
<td>2</td>
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<tr>
<td>- Trans-college seminar; two consecutive semesters</td>
<td>2</td>
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<tr>
<td>Option B</td>
<td></td>
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<tr>
<td>- Philosophy of education</td>
<td>3</td>
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<tr>
<td>- History of education</td>
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<tr>
<td>- Administrative theory</td>
<td>3</td>
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<tr>
<td>- Learning theory</td>
<td>3</td>
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</tbody>
</table>
---Curriculum theory 3
---Trans-college seminar: two consecutive semesters 2

Option C
---Philosophy of science 3
---Trans-college seminar: two consecutive semesters 2
---Seminar(s) in primary concentration 3
---Learning theory/group dynamics or independent study in this area 3

Concentrations
---Primary Concentration: A minimum of 9 hours normally selected from one or two specializations within the primary concentration 15
---Supporting Concentration: A minimum of 9 hours selected from a concentration other than the primary concentration 9
---Cognate: A minimum of 6 hours selected from outside the college in addition to the designated research courses 6

Dissertation 24

The concentrations are:
Adult education
Counseling psychology (counseling psychology; counselor education)
Cultural studies in education (cultural studies; sport history; sport philosophy; sport sociology)
Early childhood education
Educational administration and supervision/higher education
Elementary education
English, foreign language, ESL education
Exercise science (exercise physiology; biomechanics/sports medicine)
Instructional technology/curriculum
Literacy studies/reading/language arts
Mathematics, science, and social science education
Rehabilitation and special education
Research/assessment/evaluation
School psychology
Residence is three consecutive semesters of full-time coursework. The program requires coursework in both a supporting concentration and a cognate area, as well as either foreign language or computer proficiency. Coursework in statistics and research design is required in all specializations. Pre-dissertation research participation is also a requirement. The following minimum number of hours is required: counseling psychology, 98; counselor education, 98; school psychology, 97. The concentration in counseling psychology requires a year-long practicum sequence and the equivalent of a year's full-time work as an intern in an appropriate counseling setting.
Under Psychoeducational Studies, the following minimum number of hours is required in each program: educational psychology, 92.

The concentration in educational psychology also requires a supervised practicum experience in classroom teaching.
The guidelines for each program may be consulted for further requirements.

TEACHER LICENSURE

In addition to the above cited degree programs, the College of Education offers graduate level teacher licensure courses. Students completing requirements for initial teacher licensure earn 24 semester hours of graduate credit which may be applied to a 36 semester hour Track 2 master's degree with a major in Education.

To earn initial teacher licensure, students must complete undergraduate prerequisite courses, gain admission to The Graduate School as a degree seeking student, and the following 24 hours of coursework:

Fall Semester
575 Internship 4 hrs
--- Specialty Studies 6 hrs
574 Analysis of Teaching for Professional Development 2 hrs

Spring Semester
575 Internship 8 hrs
591 Clinical Studies 4 hrs
TOTAL 24 hrs

Further details concerning the teacher licensure program and the Track 2 master's degree program are available through the College of Education Advising Center (Claxton Addition, Room 214).

MINOR IN GERONTOLOGY

Graduate students in the units of Counselor Education and Counseling Psychology, Exercise Science, or Psychoeducational Studies, may pursue a specialized minor in gerontology. This interunit/interdisciplinary minor gives the student an opportunity for combining the knowledge about aging in American society with his/her major concentration. Please refer to Human Ecology for specific requirements.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S. program in Counseling is available to residents of Kentucky. The M.S. program in Education is available to residents of the states of Kentucky, Louisiana (concentration in education of the deaf and hard of hearing or early childhood special education), Louisiana (concentration in foreign language/ESL education-Track 1 only), or Maryland, South Carolina, Virginia, or West Virginia (concentration in education of the deaf and hard of hearing). The M.S. program in Human Performance and Sport Studies is available to residents of Arkansas or Maryland; and Alabama, South Carolina, or Virginia (concentration in sport management only). The Ed.D. program in Education (concentration in educational psychology only) is available to residents of Kentucky. The Ph.D. program in Education is available to residents of the state of Arkansas (concentration in counseling psychology, educational administration and supervision/Higher education, educational psychology, or school psychology). Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE COURSES

510 Advanced Educational and Clinical Procedures (3-6) Integration of advanced educational and clinical procedures; skills and knowledge for implementing instruction and for consulting with others in treatment of exceptional individuals. May be repeated. Maximum 6 hrs.
517 Seminar (1-3) Curriculum, instructional technology, elementary education, secondary education, or social foundations as related to goals of students courses. May be repeated. Maximum 8 hrs. S/N Only. E
532 Instructional Research: Analysis and Application (3) Analysis of research findings into instructional performance; translation and application of research findings into instructional performance. Prereq: Consent of instructor. F, Su
540 Topics in Improvement of Instruction (1-3) Special conferences, workshops, and seminar programs. May be repeated. Maximum 6 hrs. S/N only. E
562 Direction and Supervision of Student Teaching (3) Roles and responsibilities of cooperating teachers and student teacher; objectives and policies of student teaching program; elements of clinical supervision; overview of research. F, Su
568 Teacher-Parent-Community Relations (3) Techniques for effective relations between parents and teachers; examination of roles and expectations; parental involvement; volunteer roles; influence of community on educational process. Prereq: Consent of instructor. Sp, Su
574 Analysis of Teaching for Professional Development (2) Strategies to document and analyze effectiveness of teaching and of professional development. Study and application of various approaches. Coreq. 575. F
575 Professional Internship in Teaching (1-8) Immersion teaching and teaching-related experiences in professional settings in public schools. Enrollment limited to postbaccalaureate students in pre-internship program. Prereq. Admission to Teacher Education program. May be repeated. Maximum 12 hrs. S/N only. F, Sp
576 Practicum in Classroom Teaching (1-8) Teaching and teaching-related experiences in elementary and secondary school settings. Specific hours are school level assignment determined by license or certification requirements. May not be used for probationary licensure year. May not be used toward degree requirements. May be repeated. Maximum 12 hrs. S/N only. E
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. Coreq. 575.
601 Trans-College Seminar (1) Introduction to Ph.D. program in Education: research requirements, meaning of scholarship in academic and issue problems in education Minimum of two consecutive semesters preceded or followed by summer term required of all Ph.D. students. Prereq. Admission to Ph.D. program or consent of Ph.D. program coordinator. May be repeated. Maximum 3 hrs. May not be used to meet 600 requirement. S/N only. E
618 Interpretation and Application Curriculum and Instruction Research (3) Analysis of research in curriculum and instruction, newer methodologies and strategies, utilization of research to improve curriculum and instruction practice, application of research principles in context of specific professional assignments. Prereq. Consent of instructor. Sp
635 Teacher Education in America (3) For students preparing to enter teacher education. Brief historical development, program analysis and evaluation, current issues, and future directions. F
Electrical and Computer Engineering

(College of Engineering)

MAJOR DEGREES

Electrical Engineering .......... M.S., Ph.D.

T. V. Blalock, Acting Head

Professors:

Abidi, Mongi A., Ph.D. .......... Tennessee
Alvea, Igor (Emeritus), PE, Ph.D. .... Wisconsin
Bailey, J. Milton (Emeritus),
Ph.D. ........................................ Georgia Tech
Birdwell, J. Douglas, Ph.D. .......... MIT
Bishop, A. O., Jr., Ph.D. .......... Clemson
Blatock, T. Vaughn (Emeritus),
Ph.D. ........................................ Tennessee
Bodenheimer, Robert E. (Emeritus),
Ph.D. ........................................ Northwestern
Bose, Bimal K. (Condra Chair of Excellence),
Ph.D. ........................................ Calcutta
Boudin, Donald W., PE, Ph.D. ...... Vanderbilt González, R. C. (Emeritus), Ph.D. .... Florida
Goode, Joseph M. (Emeritus), PE,
Ph.D. ........................................ Georgia Tech
Green, Walter L. Ph.D. ......... Texas A & M
Hung, James C. (Emeritus), PE,
Ph.D. ........................................ New York
Karm, Mohammad A. (Liaison), Ph.D. Alabama
Kennedy, Eldredge J. (Emeritus), PE,
Ph.D. ........................................ Tennessee
Lawler, J. S., Ph.D. ............... Michigan State
Neff, Herbert P. (Emeritus), PE, Ph.D. .... Auburn Pace, Marshall O., PE, Ph.D. ...... Georgia Tech
Pierce, J. Frank (Emeritus), PE,
Ph.D. ........................................ Pittsburgh
Pujo, Alfonso Jr. (UTSI), Ph.D. ...... Vanderbilt
Roberts, M. J., Ph.D. .............. Maryland
Rochelle, Robert W. (Emeritus),
Ph.D. ........................................ Rochelle, J. Renee, Ph.D. ............... Cornell
Symonds, Frederick W. (Emeritus),
Ph.D. ........................................ Nottingham
Tillman, James D. (Emeritus), Ph.D. .... Auburn

Associate Professors:

Bomar, Bruce W. (UTSI), Ph.D. ...... Tennessee
Critt, Paul B., Ph.D. .......... New Mexico State
Joseph, Roy D. (UTSI), Ph.D. .... Case Western
Koch, Daniel, Ph.D. .......... Missouri (Rolla)
Newport, Danny, Ph.D. ...... Tennessee
Rochelle, James M., Ph.D. ...... Tennessee
Walker, Alverno, Ph.D. .......... NC State
Waller, J. Wayne, Ph.D. ...... Tennessee

Assistant Professors:

Montoya, Tom P., Ph.D. ......... Georgia Tech
Smith, L. Montgomery (UTSI),
Ph.D. ........................................ Smith, Philip W. ......................... Virginia
Whittaker, Ross T., Ph.D. ....... North Carolina

The Department of Electrical and Computer Engineering offers graduate degrees leading to the Master of Science and a Doctor of Philosophy with a major in Electrical Engineering. Graduate students are able to conduct research in a wide variety of electrical engineering areas including communication, computer engineering, computer vision and robotics, electromagnetic, electro-optics, image processing, information processing, intelligent control, microelectronics, mixed-signal VLSI, monolithic sensors, industrial plasma engineering, power electronics and systems, sensor fusion, and signal processing.

The department sustains a strong joint program in mixed-signal VLSI and monolithic sensors with the Oak Ridge National Laboratory, Instrumentation Science Division. This program provides students with unique opportunities to receive career-related training at ORNL and to diversify their educational experiences in this field.

THE MASTER'S PROGRAM

Graduate work leading to the Master of Science with a major in Electrical Engineering may be completed during one academic year of full-time study, or two to three years of part-time study.

Admission Requirements

Applicants for admission to the M.S. degree program are expected to have completed a bachelor's degree in Electrical Engineering with an average of at least 3.0 out of 4.0 both overall and in the senior year. All applicants whose native language is not English, including those who have earned degrees at U.S. institutions, must score at least 550 on the TOEFL test.

The Departmental Graduate Committee is responsible for administrating, promoting, and advising the general well-being of the graduate program. Departmental actions regarding a graduate student may be appealed in writing, first to the departmental graduate committee and then to the department faculty.

Master's Degree Requirements

Students may choose between a thesis option and a project (non-thesis) option M.S. program. All students must file a Master's Program Plan with the departmental graduate committee specifying which option they have selected. The student must complete 30 semester hours including:

1. Electrical Engineering 503 and 504.
2. Six semester hours of mathematics at the 400 level or above selected from a list approved by the graduate committee, or 6 semester hours of EE courses at the 500 level or above, or 6 semester hours of non-EE courses approved by the student's master's committee and the graduate committee.

3. An additional 12 semester hours of 500-level work in electrical engineering including 6 semester hours in the student's major area of electrical engineering and 6 semester hours in a second area of electrical engineering approved by the student's master's committee.


5. A final oral examination covering the thesis and related coursework.

**Non-Thesis Option:** Specific requirements of the project (non-thesis) option are a minimum of 33 semester hours including:

1. Electrical Engineering 503 and 504.

2. Six semester hours of mathematics at the 400 level or above selected from a list approved by the graduate committee, or 6 semester hours of EE courses at the 500 level or above, or 6 semester hours of non-EE courses approved by the student's master's committee and the graduate committee.

3. An additional 18 semester hours of 500-level work in electrical engineering courses, with at least 6 hours of 500-level work in each of two areas of electrical engineering.

4. Electrical Engineering 501 (project in lieu of thesis) must be at a minimum grade of B. This course will be administered by the student's master's committee. A written project proposal describing what the student will do in the course must be submitted in advance for the graduate committee's approval. A written final report and oral presentation is required and one copy of the final draft must be submitted to the graduate committee.

5. A final written and oral examination covering the project and related coursework.

**THE DOCTORAL PROGRAM**

The Ph.D. degree program in Electrical Engineering may be pursued in the concentration areas of circuit theory, computer engineering, and communication theory, electromagnetic theory, plasma engineering, power systems, solid-state electronics, power electronics, and control systems.

Applicants are required to submit scores on the Graduate Record Exam. A TOEFL score of 550 is required for non-native speakers of English, including those who have earned degrees at U.S. institutions. Specific departmental requirements for the Ph.D. include the following:

1. A Master of Science or Master of Engineering degree in Electrical Engineering.

2. A minimum of 24 semester hours of coursework beyond the Master's, excluding research and dissertation credit. These hours must include:

   a. A minimum of 12 semester hours in electrical engineering at the 500 and 600 levels.

   b. A minimum of 12 semester hours of 600-level course work. At least 3 hours of this work must be in an area other than the student's major area.

   c. A minimum of 6 hours of mathematics courses at the 500 level or above and approved by the electrical engineering graduate committee.

3. One foreign language if the student's faculty committee feels that a reading knowledge of a foreign language is crucial to the student's research efforts.

4. Satisfactory performance on a qualifying examination and comprehensive examination. The qualifying examination is prepared by the Electrical Engineering faculty and consists of two 4-hour written examinations covering courses required in the undergraduate electrical engineering curriculum through the junior level. The qualifying examination is offered twice each year (January and August) and is to be taken the first time it is offered after the student enrolls in the program. A student who fails the qualifying examination must take and pass the examination the next time it is offered to remain in the program. A minimum of 18 hours of coursework must be completed after the student has taken the qualifying examination the first time.

   A comprehensive examination is required by the Graduate School and must be administered by the student's committee; the examination results are reported to the graduate committee for approval, and the exam is filed in the department. The comprehensive exam is given when the student is ready to apply for admission to candidacy. The comprehensive exam consists of both written and oral parts. The written part consists of at least two sections: a complete review of the literature in the student's dissertation topic, and a review of the major tools to be used in the dissertation work. The student's committee will require additional written sections. The students must demonstrate a mastery of the dissertation area, ability to think analytically and creatively, skill in using academic resources, and ability to complete the dissertation satisfactorily. The oral part consists primarily of a professional presentation of a proposal for dissertation work and its defense. The committee may cover additional topics in the oral part.

5. Participation in departmental seminars.

   A. A minimum of 24 hours of doctoral dissertation.

**GRADUATE COURSES**

Note: Courses required in the Electrical Engineering undergraduate curriculum may be used toward a graduate degree in Electrical Engineering except when required by the program.


**411 Digital Signal Processing and Filter Design** (3) Discrete-time signals and systems, sampling, discrete Fourier transforms, analog filter characteristics, non-recursive and recursive systems, and CAD tools for filter design. Level 1 design projects which require laboratory work. Prereq: Frequency-Domain Analysis of Signals and Noise, Linear System Analysis, Systems and Power Laboratory.

**412 Linear Control System Design** (4) Classical and modern techniques for design and compensation of linear feedback control systems. Bode design, root locus design, state variable pole placement design. Level 2 design projects which require laboratory work. Prereq: 411.

**421 Electric Energy Systems** (3) Structure and operation of electrical energy grid; load flow; power flow; control; reliability. Balanced and unbalanced faults; system protection; system stability. Level 1 design projects which require laboratory work. Prereq: Electrical Energy System Components, Systems and Power Laboratory.


**432 Electronic Amplifiers** (4) Feedback amplifier principles; wideband linear amplifier design; low-noise preamplifier design; audio amplifier design; linear regulated power supply design and switching regulator principles. Radio frequency amplifier design; oscillator principles. Laboratory experiments and design projects. Level 2 design projects which require laboratory work. Prereq: 431.

**441 Digital Communications** (3) Discrete Fourier Transforms. Binary and M-ary Signaling, digital communication in present of noise, matched filtering and equalization, Information theory. Level 1 design projects. Prereq: Analog Communication Amplitude and Frequency Modulation.

**442 Communication System Design** (4) Application of communication theory to system design. Development of communication system specifications. System simulation utilizing graphical programming language. Hardware and software design and simulation. Construction and performance evaluation of completed analog or digital transmitter and receiver or significant subsystems. Level 2 design projects.

**443 Antennas and Propagation** (3) Antenna theory; fundamental antenna parameters (directivity, gain, patterns, etc.) and signal propagation. Theory and design of linear and linear antennas, arrays, and other simple antennas. Level 1 design projects. Prereq: Transmit Analysis Fields. Analog Communication Amplitude and Frequency Modulation.

**451 Microprocessors and Microcontrollers in Electrical Engineering** (3) Project-oriented course using microcomputer and microcontroller hardware and software development system with cross-assemblers, file management, and emulation board. Interfacing and software tradeoffs in interfacing applications. Grade dependent upon number of projects completed, design work, solution to problems, and understanding of design notebook. Level 1 design projects which require laboratory work. Prereq: 451.

**452 Organization and Design of Digital Systems and Computers** (4) Considerations for hardware organization of computer and digital systems. ALU and CPU architectures, control unit organization, storage systems, and I/O choose interface controller. Engineering design notebook. Level 1 design projects which require laboratory work. Prereq: 451.

**453 Physics of Fusion Energy** (3) High temperature plasma physics relevant to fusion plasma, principles of fusion reactors, and engineering and physics constraints on fusion reactors. Level 1 design projects. Prereq: Senior standing. Non-majors require consent of instructor. (Same as Nuclear Engineering 453.)
614 Optimal Control (3) Deterministic and stochastic dynamic programming in continuous and discrete time, minimum principle and matrix minimum principle, computational methods in optimal control. Prereq: 611.

617 Special Topics in Systems Theory I (3) Topics of current interest to students and faculty: large scale systems, model order reduction, algebraic and geometric system theories, and advanced design methods. Prereq: 503 and consent of instructor.

618 Special Topics in Systems Theory II (3) Topics of current interest to students and faculty: large scale systems, model order reduction, algebraic and geometric system theories, and advanced design methods. Prereq: 617.

623 Advanced Power Electronics and Drives (3) Phase-controlled cycloconverters, cycloconverter-fed ac drives, resonant converters, vector and scalar control of synchronous machines, static Kramer drives, static Scherbius drives, VSCF generation, modern control theory in ac drives.

624 Electrical Instrumentation (3) Principles, testing, and case studies. Basic principles of aging, losses, charging, conduction, and breakdown in vacuum, gas, liquid, solid, and composite instrumentation systems. Testing with low-noise instrumentation, pulse height analysis, optics, acoustics, and bridges; associated statistics and distributed parameter effects. Studies drawn from active research power systems, electronic circuits and devices, shielding, and stress grading. Prereq: 503, 504, and consent of instructor.

631 Advanced Topics in Electronic Instrumentation (3) Based on particular interests of students. Fundamental physical processes in instrumentation transducers: thermoelectric, magnetostrictive, electromagnetic, and quantum-mechanical devices. Prereq: 531-32 and consent of instructor.

632 Advanced Topics in Electronic Instrumentation II (3) Physical operation of modern discrete, monolithic, and hybrid electronic structures and their application in signal processors, resolution, sensitivity, response time, and noise considerations in signal processors used in modern electronic instrumentation. Prereq: 631.

643 Detection and Estimation Theory (3) Detection theory; coding theory; system identification. Signals with unknown parameters; optimal filter synthesis; adaptivedetection; sequential detection; suboptimal detection. Prereq: 504 or consent of instructor.

644 Coding and Information Theory (3) Structure of algebraic and probabilistic codes; linear codes, convolutional codes, error-correcting codes, decoding methods; identification schemes; deterministic, stochastic, and hierarchical methods. Prereq: 643.

651 Computer-Aided Design of VLSI Systems I (3) Fabrication of monolithic devices; computer architecture design; algorithmic state machines; partitioning; structured design methodology. Prereq: 551-52 or consent of instructor.

652 Computer-Aided Design of VLSI Systems II (3) Computer-aided design tools; design and implementation of fully custom very large scale integrated (VLSI) circuits; design for testability; testing of fabricated chips. Prereq. 651.

653 Advanced Plasma Physics I (3) Basic concepts of high temperature plasma physics; magnetohydrodynamics and kinetic descriptions of plasma, plasma transport, plasma waves, equilibrium, and stability. Prereq: Physics 541-52; 561-52 or 563-54, or consent of instructor. (Same as Physics 583.)


671 Image Processing and Robotics (3) Three-dimensional scene modeling and recognition, multi-sensor systems. Prereq: 572 or 573 or consent of instructor.

672 Image Processing and Robotics II (3) Stereovision, shape theory. Prereq: 671.

673 Image Processing and Robotics III (3) Time-varying imagery, path planning and navigation. Prereq: 672.

691 Advanced Graduate Seminar (1) Research in department. May be repeated. S/N or letter grade.

692 Special Topics (1-3) Advanced topics of current interest to Ph.D. students in Electrical Engineering. May be repeated. Maximum 9 hrs.

**Engineering Science**

**See Mechanical and Aerospace Engineering and Engineering Science**

## English

(College of Arts and Sciences)

### MAJOR

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<th>English</th>
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<tr>
<td>Adams, Percy G. (Emeritus), Ph.D.</td>
<td>Texas</td>
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<td>Carroll, Edward W., Ph.D.</td>
<td>Illinois</td>
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<tr>
<td>Cox, John D., Ph.D.</td>
<td>Missouri</td>
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<tr>
<td>Curry, Kenneth (Emeritus), Ph.D.</td>
<td>Yale</td>
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<tr>
<td>Drake, Robert Y., Ph.D.</td>
<td>Yale</td>
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<tr>
<td>Ensor, Allison R., Ph.D.</td>
<td>Indiana</td>
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<tr>
<td>Finneran, Richard J. (Hodges Chair of Excellence), Ph.D.</td>
<td>North Carolina</td>
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<tr>
<td>Fisher, John H. (Emeritus), Ph.D.</td>
<td>Pennsylvania</td>
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<tr>
<td>Garner, M. Donald, Ph.D.</td>
<td>Princeton</td>
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<tr>
<td>Gill, J. S., Ph.D.</td>
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<td>Goslee, David F., Ph.D.</td>
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<td>Goslee, Nancy M. (Distinguished and Lindsay Young Prof.), Ph.D.</td>
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<tr>
<td>Haffner, Thomas J., Ph.D.</td>
<td>Cambridge</td>
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<td>Hutchison, George, Ph.D.</td>
<td>Indiana</td>
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<tr>
<td>Kalten, Marilyn, Ph.D.</td>
<td>Rutgers</td>
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<tr>
<td>Keene, Michael, Ph.D.</td>
<td>Texas</td>
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<tr>
<td>Kelly, Richard M. (Lindsay Young Prof.), Ph.D.</td>
<td>Duke</td>
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<tr>
<td>Leggett, B. J. (Distinguished Prof.), Ph.D.</td>
<td>Florida</td>
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<tr>
<td>Lek, I., Ph.D.</td>
<td>Illinois</td>
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<td>Lofaro, Michael, Ph.D.</td>
<td>Maryland</td>
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<tr>
<td>Maland, Charles J. (Lindsay Young Prof.), Ph.D.</td>
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<tr>
<td>Penner, A. Richard (Emeritus), Ph.D.</td>
<td>Colorado</td>
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<tr>
<td>Reese, John E. (Univ. Prof.), Ph.D.</td>
<td>Kentucky</td>
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<td>Sanders, Norman J. (Emeritus), Ph.D.</td>
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<td>Schneider, Daniel J. (Emeritus), Ph.D.</td>
<td>Shakespeare Institute</td>
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<td>Scour, D. H. (Emeritus), Ph.D.</td>
<td>Northwestern</td>
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<td>Shott, William (Emeritus), Ph.D.</td>
<td>North Carolina</td>
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<td>Stillman, Robert, Ph.D.</td>
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<td>Tram, Joseph B., Jr., Ph.D.</td>
<td>Princeton</td>
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<td>Wier, Allen, M.A.</td>
<td>Bowling Green</td>
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<tr>
<td>Wheeler, Thomas V., Ph.D.</td>
<td>North Carolina</td>
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<tr>
<td>White, Jon M. (Emeritus), Ph.D.</td>
<td>Cambridge</td>
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<td>Wright, Nathalia (Emeritus), Ph.D.</td>
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<th>Associate Professors:</th>
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<tr>
<td>Atwill, Janet, Ph.D.</td>
<td>Purdue</td>
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<tr>
<td>Bensel-Myers, Linda D., Ph.D.</td>
<td>Oregon</td>
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<td>Dumas, Bethany K., Ph.D.</td>
<td>Arkansas</td>
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<td>Dunn, Allen, Ph.D.</td>
<td>Washington</td>
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<td>Hirst, Russell, Ph.D.</td>
<td>Rensselaer</td>
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<td>Anderson, Misty G., Ph.D.</td>
<td>Vanderbilt</td>
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<td>Bhattacharyya, Rakesh, Ph.D.</td>
<td>Illinois</td>
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<td>Black, Joseph L., Ph.D.</td>
<td>Toronto</td>
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<td>Ely, John, Ph.D.</td>
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<td>Fong, Peter, Ph.D.</td>
<td>Hammotree, G., M.A.</td>
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<td>Gorman, W. R., Ph.D.</td>
<td>Mostek, Kenneth, Ph.D.</td>
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The Department of English offers the Master of Arts and the Doctor of Philosophy degrees with a major in English. Thesis and non-thesis options are available for the M.A. as well as a special concentration in writing.

Detailed information about the master's and doctoral programs, and about individual graduate courses, may be obtained by writing to the Director of Graduate Studies in English, 306 McClung Tower. A prospective student must contact the department to receive the proper information and forms with which to apply. For additional information, please visit the graduate website through the College of Arts and Sciences homepage at www.arts.utk.edu.

The Department of English does not accept students in non-degree or provisional status. A student who wishes to enter the department must apply in degree-seeking status for his/her application to receive consideration for admission to any graduate program in English.

### THE MASTER'S PROGRAM

#### Requirements

**Coursework:** A minimum of 24 semester hours in English beyond the B.A., to include 6 hours at the 600 level; 12 additional hours at the 500-600 level (Only 3 hours of 593 Independent Study may be applied toward the M.A.); and 6 hours for graduate credit at any level, including the 400 level. In this coursework, students must maintain a minimum of 3.0 GPA.

**Thesis Option:** Written under the direction of a faculty member of the department and approved by a committee of two other faculty members. Six semester hours of credit will be given.

**Non-Thesis Option:** Six hours of additional coursework at the 500-600 level, making a total of 30 hours of required coursework.

#### Language Requirement:

Evidence of proficiency in one foreign language, to be fulfilled in one of the following ways:

1. Completion of the second year of a language at college level with a grade of C or better.
2. Completion of French 302 or German 302 at UT Knoxville with a grade of B or better.
3. Passing of the regular Ph.D. foreign language examination as currently administered at UT Knoxville.

#### Capstone Experience Requirement:

An integral part of all options in the master's degree program in English is a capstone experience which allows the student to synthesize and apply the knowledge and skills gained through the completion of the program in a substantial way. Examples of capstone experiences include, but are not limited to, the completion of a thesis or the formal public
presentation of a paper at a professional meeting or departmental colloquium. All capstone experiences normally occur after the completion of 24 hours of coursework and must be approved by the Director of Graduate Studies.

**Final Examination:** A candidate presenting a thesis must pass a one-hour oral examination; a candidate presenting a creative project must pass a ninety-minute oral examination. The examination consists of a short written defense, but chiefly of questions covering the general history of English and American literature, not merely the coursework taken. A reading list of primary works designed to help the student prepare for these questions is available in the office of the Director of Graduate Studies in English.

A non-thesis student must pass a written examination, followed by a one-hour oral examination, both consisting of the same sort of questions as the examination taken by the thesis student.

**Residence Requirement:** There is no residence requirement for the M.A., but students should attempt to pursue a full-time program whenever possible.

**WRITING CONCENTRATION**

The master's program with writing concentration is intended for those students who plan to do free-lance writing, specialize in teaching writing courses at the college level, or work as professional writers in business or industry.

**Requirements**

The requirements for the writing concentration are the same as those for the thesis option above with the following exceptions:

**Coursework:** Writing students may substitute two 400-level writing courses for two 500-level courses. Students must take at least 9 hours in writing and 9 in literature, the remaining 6 to be selected from any English courses at the proper level. Of the courses in writing, at least 3 hours must be taken at the 500 level; additional 500-level courses are strongly recommended.

**Writing Projects:** One of the following writing projects for six hours of credit:

1. A thesis, using research to analyze some aspect of a work or of some theory.
2. A creative project, such as a collection of poems or short stories, a short novel, a play, or a creative work of non-fiction prose.

The nature and length of each project will be determined by the Director of Graduate Studies after consulting with the student and the project director. In addition to the director, two other English Department faculty members will supervise and approve the project; at least one should be from the literature faculty.

**Final Examination:** The reading list may be modified by the M.A. examining committee, meeting as a body with the student, to reflect the candidate's particular writing emphasis. However, most of the oral examination should focus upon the literature outlined in the original reading list.

**THE DOCTORAL PROGRAM**

**Requirements**

A student must successfully complete a program of study, normally 6 full semesters as outlined below, approved by the candidate's committee or the Director of Graduate Studies in English.

**Coursework:** At least 51 semester hours beyond the B.A. (of which at least 24 semester hours must be beyond the M.A.) to include at least 21 semester hours at the 600 level; at least 15 semester hours at the 500 level or above (only 3 hours of 593 Independent Study may be applied toward the M.A. and 3 after the M.A.); a special three-hour course in teaching composition; and 12 additional hours at any level, including the 400 level. Up to 6 of these additional hours may be taken in some cognate field or fields such as history, philosophy, French. These courses must be drawn from those approved for graduate credit. All other coursework must be in the English department. In this coursework, students must normally maintain a 3.5 GPA.

**Dissertation:** Twenty-four semester hours of dissertation. This represent the research for and writing of the dissertation. The research and dissertation will be directed by a faculty member of the department and approved by a doctoral committee of three or four other faculty members.

**Language Requirement:** A language requirement must be met in one of the following ways:

1. Two languages approved by the Director of Graduate Studies in English. The requirement for each language may be fulfilled by (a) completion of French 302 or German 332 with a grade of B or better; (b) completion at UT Knoxville of any two courses on the 300 level or above in the foreign language or literature with at least a grade of B in each course; (c) passing of the regular Ph.D. foreign language examination as currently administered at UT Knoxville.
2. One modern language approved by the Director of Graduate Studies in English. This requirement must be fulfilled by a passing grade on the language examination given by UT Knoxville and completion of two courses given in the foreign language at the 400 level or above, at least one of which must be at the 500 or 600 level. A minimum grade of B must be received in each course.
3. One modern language approved by the Director of Graduate Studies in English and intensive study of the English language. This requirement must be fulfilled by completion of (a), (b), or (c) above for one foreign language; and completion of 6 semester hours in English language courses with grades of B or better, at least three of which must be from English 506 or 509 History of the English Language (offered in alternate years). For the other three hours, the student may either complete the history of the language sequence or choose one other course in English taught in the Department of English at the 500 or 600 level and approved by the Director of Graduate Studies in English. These courses will not count toward the minimum number of courses for the Ph.D., and anyone electing this language option may not take the comprehensive examination in linguistics.

**Examinations:**

1. A 4-hour qualifying examination taken before the end of the first year of Ph.D. coursework; this examination is given three times a year, with the M.A. written examination. (2) A comprehensive written examination which may be divided as the department directs; see the English Department graduate brochure. The comprehensive examination is given twice a year, normally in March and September. Before a student may take it, he/she must have completed all coursework required. A student must also have met all requirements for foreign languages before beginning the first part of the examination.

**Dissertation Defense:** A one-hour examination on the dissertation and other related areas.

**Residence Requirement:** Two consecutive semesters as a full-time student. For students not on teaching assistantships, full-time consists of 9 or more hours of coursework and/or dissertation hours each semester. For students on assistantships, full-time consists of at least 6 hours of courses and/or dissertation hours and 3 hours of teaching each semester.

**GRADUATE COURSES**

Note: Students enrolling in English graduate courses must first register in the office of the Director of Graduate Studies in 306 McClung Tower.

**401** Medieval Literature (3) Reading and analysis of selected medieval literary masterpieces in modern English.

**402** Chaucer (3) Reading and analysis of Chaucer's works and Chaucerian Middle English.

**404** Shakespeare I: Early Plays (3) Shakespeare's dramatic achievement before 1601. Reading and discussion of selected plays from romantic comedies, including Twelfth Night; English histories, including Henry IV; and early tragedy, including Hamlet.

**405** Shakespeare II: Later Plays (3) Shakespeare's dramatic achievement between 1601 and 1613. Reading and discussion of selected plays from great tragedies, including Othello; problem plays, including Measure for Measure; and dramatic romances, including The Tempest.

**406** Renaissance Drama (3) English theatre between 1590 and 1640 through reading of representative plays by Shakespeare's contemporaries: Marlowe, Webster, Jonson.

**409** Spenser and his Contemporaries (3) Principal achievements in prose and poetry of sixteenth century authors: Spenser, Wyatt, Marlowe, More, Sidney, and Bacon.

**410** Milton, Donne, and their Contemporaries (3) Principal achievements in prose and poetry of first two-thirds of seventeenth century: poetry of Milton, Donne, Marvell; and prose of Browne, Bacon, Walton.

**411** Literature of Restoration and Early Eighteenth Century: Dryden to Pope: Study of English literature and culture from 1660 to 1745.

**412** Literature of Later Eighteenth Century: Johnson to Burns: Study of English literature and culture from 1745 to 1800.

**413** Restoration and Eighteenth-Century Genres and Modes (3) A survey of major genres and literary modes: drama, novel, poetry, non-fiction prose, satire, romance, or epic, written between 1660 and 1800. May be repeated.

**414** Romantic Poetry and Prose I (3) Wordsworth, Coleridge, and Blake: readings from Lamb, De Quincey, and other prose writers.

**415** Romantic Poetry and Prose II (3) Keats, Shelley, and Byron: readings from Hazlitt, Peacock, and other prose writers.

**416** Victorian Poetry and Prose I (3) Tennyson, Pre-Raphaelites, Carlyle, Newman, and Mill.

**419** Victorian Poetry and Prose II (3) Browning, Arnold, Hopkins, Hardy, Ruskin, Darwin, and Wilde.

**420** The Nineteenth-Century British Novel (3) Scott to Hardy.

**421** Modern British Novel (3) Works from authors such as Joyce and Woolf through contemporary British fiction writers.
472 Sociolinguistics (3) Study of language in relation to society. Empirical and theoretical focus. Large-scale units: tribes, nations, social groups. Prereq: 371 or 372 or Linguistics 200 or consent of instructor. (Same as Linguistics 471 and Sociology 471.)

470 Special Topics in Rhetoric (3) Topics vary. Prereq: Advanced Expository Writing or consent of instructor. May be repeated with consent of department. Maximum 6 hrs. (Same as English 470.)

466 Writing, Layout, and Production of Technical Documents (3) Principles of design for desktop publishing. Production of various document types to be incorporated into professional portfolio. Prereq: Technical and Professional Writing or consent of instructor.

464 Advanced Fiction Writing (3) Further development of skills acquired in basic writing fiction course. Prereq: 365 or consent of instructor. May be repeated with consent of department. Maximum 6 hrs. (Same as English 464.)

505 Teaching Freshman Composition (3) Introduction to teaching freshman composition, through study of various techniques and philosophies of composition. Required of all first-year teaching associates.

506 Introduction to Literary Research (3) Critical examination of aims of English studies, profession of English teacher, theory of literature, and methods of research: collecting of information, evaluation of materials, and transmission of results of scholarship.

507 Applied Criticism: The Rhetoric of Literary Forms (3) Study and application of procedures in which major critical writers have represented form in poetry and prose fiction. May be repeated. Maximum 6 hrs.

508 History of the English Language (3) Phonological, morphological, and syntactic development of English language: Old and Middle English, F. A

509 History of the English Language II (3) Phonological, morphological, and syntactic development of English language: Old and Middle English, and their Continental sources in Modern English. May be repeated. Maximum 9 hrs. each.

513-14 Readings in Medieval Literature (3, 3) Reading and analysis of selected masterpieces of Old and Middle English literature and their Continental sources in Modern English. May be repeated. Maximum 6 hrs. each.

520-21 Readings and Analysis in Selected Areas of Sixteenth- and Seventeenth-Century Prose, Poetry, and Drama (3, 3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

530-31 Readings in English Literature of the Restoration and Eighteenth Century (3, 3) Topics vary: genre, poetry, prose, fiction, drama, or period. May be repeated. Maximum 6 hrs. each.

532-33 Readings in the Nineteenth Century (3, 3) Topics vary: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

534 Readings in American Literature (3, 3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

535 Readings in Black American Literature (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

536 Readings in Black American Literature (3, 3) Topics vary: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

537 Introduction to Contemporary Criticism (3) Introduction to contemporary critical theory. Required of all first-year teaching associates.

538 Fiction Writing (3) Advanced fiction projects under supervision of instructor. May be repeated. Maximum 6 hrs. Enrollment by consent of director of graduate studies only.

539 Special Topics in Writing (3) Topics vary: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 6 hrs. Each.

540 Colloquium in Poetry Writing (3) Major poetic project or selection of projects begun in 463, 464. Individual consultation with instructor and emphasis on independent study. Prereq: Extensive background in reading and writing fiction. May be repeated. Maximum 6 hrs.

541 Introduction to Literary Research (3) Critical examination of aims of English studies, profession of English teacher, theory of literature, and methods of research: collecting of information, evaluation of materials, and transmission of results of scholarship.

542 Issues in Invention, Style, and Audience (3) Theoretical perspectives on contemporary research in rhetoric and composition.

543 History of Rhetoric (1) Survey of rhetoric from Sophista to Ramus.

544 History of Rhetoric II (3) Survey of rhetoric from Bacon to the present.


Entomology and Plant Pathology

(Collar of Agricultural Sciences and Natural Resources)

MAJOR: Entomology and Plant Pathology...... M.S.

Charles D. Pless, Acting Head

Professors: Bernard, Ernest C., Ph.D. ............ Georgia
Gerhardt, Reid R. (Liaison), Ph.D. ............ NC State
Grant, Jerome F., Ph.D. ..................... Clemson
Hilly, James W. (Emeritus), Ph.D. ....... Ohio State
Johnson, Leander F. (Emeritus), Ph.D. ...... Louisiana State

Associate Professor:

Gwinn, Kimberly D., Ph.D. .............. NC State
Owens, Bonnie H., Ph.D. ............... NC State
Reddick, Bradford B., Ph.D. ............ NC State

Assistant Professor:

Perea, Roberto M., Ph.D. ............... Florida

The Department of Entomology and Plant Pathology offers a graduate program leading to the Master of Science with a concentration in entomology or plant pathology. Students in entomology may specialize in crop entomology, medical and veterinary entomology, insect biology, insect pest management, or biological control. Students in plant pathology may specialize in foliar and stem fungus diseases, soilborne pathogens, disease physiology, biocides, plant nematicology, or virology. For specific information, contact the department head.

THE MASTER'S PROGRAM

Admission Requirements

For admission to the M.S. degree program, a student must meet all requirements of The University of Tennessee Graduate School and must have completed (1) general botany or biology, 8 hours; (2) advanced biological sciences, 8 hours; (3) general inorganic chemistry, 2-6 hours; (4) organic chemistry, 3 hours. In addition, three completed rating forms and a written statement of career goals and interests in entomology or plant pathology are required.

Degree Requirements

The program requires a written thesis based on original research and the completion of a minimum of 24 hours of coursework for graduate credit, approved by the student's advisory committee. Included in the course requirements are two acceptable seminar presentations for 1 hour each. An oral final exam must be passed to the satisfaction of the advisory committee after the thesis has been completed. A minor is not required but may be selected at the option of the student. The minor will include at least 6 hours and not more than 10 hours of graduate-level credit in the minor department. The student's committee shall include a member of the faculty from the minor department to assist in designing courses required for the minor.

GRADUATE COURSES

410 Diseases and Insects of Ornamental Plants (3)
Symptoms, identification, and management of diseases and insect pests that affect plants in greenhouse, nursery, and landscape environments. Prereq: Plant Pathology or Economic Entomology or consent of instructor. Sp,A

500 Thesis (1-15) P/NP only. E

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

510 Plant Disease Fungi (4) Morphology, taxonomy, and genetics of plant pathogenic fungi. Isolation and identification of plant pathogenic fungi. Prereq: 313 or consent of instructor. 2 hrs and 2 labs. (Same as Ornamental Horticulture and Landscape Design 511). F,A

512 Soilborne Plant Pathogens (3) Causal agents: host-parasite-soil environment interactions; epidemiology; biological control; resistance and resistance; diagnosis, detection, effect of environmental factors, and management of soilborne plant diseases; beneficial soil-borne interactions. Prereq: Plant Pathology or consent of instructor. 3 hrs and 1 lab. Sp,A

515 Physiology of Plant Disease (3) Biochemical and physiological processes involved in host-pathogen interactions. Mechanisms of disease resistance. Prereq: Introductory plant physiology, or consent of instructor. F,A

520 Plant Parasitic Nematodes (4) Morphology, physiology, taxonomy, ecology, and management of plant parasitic nematodes. Prerequisite: parasitic-host relationships. Prereq: 6 hrs. (Same as Plant and Soil Science 530). 3 hrs. (Same as Plant and Soil Science 530). 3 hrs. and 2 labs. Sp,A

521 Plant Virology (3) Symptomatology, epidemiology, and management of virus infection; structure, morphology, replication, transmission, purification, characterization, and classification of plant viruses; virology and virology and virology and virology. Prereq: 313 or consent of instructor. 2 hrs and 1 lab. Sp,A

523 Field Crop and Vegetable Insects (5) Identification, behavior, and management of insects affecting agricultural crops and horticultural crops. Prereq: 312 or 325, or consent of instructor. 2 hrs and 1 lab. Sp,A

525 Medical and Veterinary Entomology (3) Morphology, taxonomy, biology, and control of arthropod pests and vectors of pathogens of humans and animals. Ecology and behavior of vectors in relation to pathogen transmission and control. Prereq: 321 or 325, or consent of instructor. 2 hrs and 1 lab. Sp,A

530 Integrated Pest Management (3) Principles and application of biological, cultural, genetic, behavioral, and chemical methods of control to maintain pest control programs below economic threshold levels. Prereq: 321, or consent of instructor. (Same as Plant and Soil Science 530). F,A

531 Special Problems in Entomology (1-3) Comprehensive individual study of current problems. May be repeated. Maximum 6 hrs. E

532 Special Problems in Plant Pathology (1-4) Comprehensive individual study of current problems. May be repeated. Maximum 6 hrs. E

533 Concentrated Study in Entomology (1-3) Selected subjects in entomology for advanced work. Prereq: in time and subject matter. Prereq: 321 or basic entomology course. May be repeated. Maximum 6 hrs. F,Sp

541 Seminar (1) Review of literature and current research in entomology and plant pathology. May be repeated. Maximum 2 hrs. E
The following retention policy applies to all graduate students seeking a degree in the Exercise Science unit:

1. Graduate students are required to maintain an overall 3.0 GPA.
2. Any student who falls below this standard will be advised in writing by the unit leader of the need to discuss the matter with his/her advisor.
3. If a student’s overall GPA remains below 3.0 for a second semester, the student will have his/her degree status revoked.

**GRADUATE ASSISTANTSHIPS**

A limited number of graduate assistantships are available for qualified women and men who are students at accredited colleges or universities. These assistantships are open to students in the master’s and doctoral programs. Students interested in these opportunities should file their applications before February. Letters should be addressed to Graduate Assistantships Coordinator, Exercise Science Unit, The University of Tennessee, Knoxville, TN 37996-2700.

**GRADUATE COURSES**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
<th>Prerequisites</th>
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<tbody>
<tr>
<td>500</td>
<td>Theories of Exercise (3)</td>
<td>1-15</td>
<td>P/NP only. E</td>
</tr>
<tr>
<td>501</td>
<td>Special Problems in Exercise Science (3)</td>
<td>1-15</td>
<td>P/NP only. E</td>
</tr>
<tr>
<td>502</td>
<td>Research in Exercise Science (3)</td>
<td>1-15</td>
<td>P/NP only. E</td>
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<tr>
<td>503</td>
<td>Problems in Exercise Science (3)</td>
<td>1-15</td>
<td>P/NP only. E</td>
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<tr>
<td>504</td>
<td>Research in Exercise Science (3)</td>
<td>1-15</td>
<td>P/NP only. E</td>
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<tr>
<td>505</td>
<td>Thesis (1-15)</td>
<td>1-15</td>
<td>P/NP only. E</td>
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</table>

**DEGREES**

- **Thesis**: 1-15 credits
- **Thesis**: 1-15 credits
- **Thesis**: 1-15 credits
- **Thesis**: 1-15 credits

**ADMISSION REQUIREMENTS**

Applicants are required to complete the unit application which will be sent to all persons upon their initial inquiry about the program. This is in addition to The Graduate School application.
availability of funds for real estate lending. Effects of government intervention (taxation, subsidization, and regulation) in both real estate and mortgage markets. Prereq: Business Administration 504 and 505 or consent of instructor.

599 Special Topics in Finance (1-3) Topics vary. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. S/NC or letter grade.

600 Doctoral Research and Dissertation (3-15) P/NP


642 Seminar in Finance II: Recent developments in microfinance literature. Topics vary. May be repeated. Maximum 6 hrs.

The Department of Food Science and Technology offers the Master of Science in Food Science and Technology degree program. Students in the doctoral program may choose research in the concentration areas of food processing, food chemistry, food microbiology or sensory evaluation of foods. Commodity interests (meats, dairy, fruits, vegetables, bakery products) can be emphasized in any of the areas by careful selection of courses and the research topic. Minor courses are available in cognate fields. For detailed information, contact the department head.

Admission requirements of The Graduate School of UTK apply. In addition, applicants must submit scores from the general section of the Graduate Record Exam (GRE), a written statement of educational and career goals, and Graduate School rating forms or letters of recommendation from at least three people familiar with the applicant's scholastic ability and professional potential. Admission to the program is contingent upon faculty evaluation of the applicant's undergraduate/graduate GPA, GRE scores, rating forms, relevant work experience, and scores from the Test of English as a Foreign Language (TOEFL), if applicable.

THE MASTER'S PROGRAM

Applicants must have a B.S. in food technology, food science or a related scientific field.

Thesis Option

1. Prior to research for the thesis, the student must develop a detailed written research plan. Registration for 6 hours of 500 Thesis is required.

2. In addition to the thesis requirement, a minimum of 24 semester hours of graduate coursework is required. This work must be approved by the student's committee and a minimum of 14 hours must be courses numbered above 500. The committee may require additional coursework if the student's progress or background indicates such need.

3. All students are required to take 2 hours of 501 Seminar in their program and are expected to attend this course and participate in discussions during their master's program. Completion of 510 or equivalent is also required.

4. An oral, final examination covering the thesis and coursework is required.

Non-Thesis Option

1. In lieu of a thesis, students are required to complete a problem in cooperation with their employer (company or governmental agency) and their faculty committee. Students working on a problem must register for 6 hours of 503. A minimum of 24 semester hours of graduate coursework is required. This work must be approved by the student's committee and a minimum of 14 hours must be courses numbered above 500. The committee may require additional coursework if the student's progress or background indicates such need.

2. In addition to the requirement for 24 semester hours of 503, a minimum of 24 semester hours of graduate coursework is required. This work must be approved by the student's committee and a minimum of 14 hours must be courses numbered above 500. The committee may require additional coursework if the student's progress or background indicates such need.

3. All students are required to take 2 hours of 501 Seminar in their program and are expected to attend this course and participate in discussions during their master's program. Completion of 510 or equivalent is also required.

4. Students will be required to take a written comprehensive examination covering their coursework. In addition, an oral, final examination covering the problem and coursework is required. The oral examination will be held on the Knoxville campus.

THE DOCTORAL PROGRAM

1. Completion of a master's degree in the field, or a closely related field, or passing a special qualifying examination is required for admission.
3. A minimum of 72 hours beyond the Bachelor’s degree, excluding credit for the master’s thesis, is required. Of this, 24 semester hours must be 600 Doctoral Research and Dissertation.
4. At least 24 hours of coursework numbered above 500 are required exclusive of doctoral research and dissertation. At least 6 of the 24 hours must be courses numbered above 600.
5. A minimum of 6 hours of courses for graduate credit must be taken outside the Department of Food Science and Technology.
6. All candidates must complete 601 (2 hrs.) and are expected to attend 601 during their Ph.D. program.
7. Each candidate must pass both written and oral comprehensive examinations prior to admission to candidacy. Major professors will advise candidates on competencies expected. A final oral examination is required that includes a defense of the dissertation and subject matter that the student’s committee considers appropriate.

**GRADUATE COURSES**

430 Sensory Evaluation of Food (3) Principles and methods of sensory evaluation of foods. Prereq: Basic statistics. 2 hrs and 1 lab. F

452 Science of Dairy Foods (3) Science and technology of processing of milk and its products. Prereq: Food Laws and Regulations, Food Chemistry, Food Microbiology and Lab, and Food Preservation or consent of instructor. 2 hrs and 1 lab. Sp

460 Meat Science (3) Carcass characteristics of meat animals, muscle structure and composition, cut identification, curing, freezing, and refrigeration. Prereq: Food Industry or consent of instructor. Sp

469 Meat Science Lab (1) Slaughter and processing methods for beef, pork, lamb, and poultry. Coreq: 460. Sp

470 Food Crop Products (3) Food products from plants, types, manufacturing systems, quality attributes and utility. Prereq: Food Preservation and 3 hrs biological science or consent of instructor. 2 hrs and 1 lab. Sp

480 Cereal Science and Bakery Products (3) Chemistry and technology of processing cereal grains, interactions of ingredients during production and storage of baked products. Prereq: Food Laws and Regulations, Food Chemistry, and Food Preservation or consent of instructor. 2 hrs and 1 lab. Sp

490 Food Laws and Regulations (3) Laws and regulations designed to preserve safety, wholesomeness, and nutritional quality of United States food supply; precedent case studies and their impacts on laws and regulations. Prereq: The Food Industry; consent of instructor for non-majors. Recommended prereq: Core courses in Food Science and Technology. F

495 Food Processing System Analysis and Evaluation (3) Design and evaluation of food processing operation to produce safe and acceptable quality food product. Prereq: Food Chemistry, Food Microbiology, Food Preservation or consent of instructor. Sp

500 Thesis (1-15) P/NP only. E

501 Seminar (1) Individual reports and discussion on topics from current literature. May be repeated. Maximum 3 hrs. F,Sp

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E, F

503 Problems in Lieu of Thesis (2-3) May be repeated. S/NC only. E

507 Professional Development Seminar (1) (Same as Agriculture 507, Animal Science 507, Biosystems Engineering 507) Biosystems Engineering Technology 507, Ornamental Horticulture and Landscape Design 507, and Plant and Soil Sciences 507). S/NC only. F

509 Scientific Communication (1) (Same as Agriculture 509, Animal Science 509, Ornamental Horticulture and Landscape Design 509, and Plant and Soil Sciences 509). F

510 Instrumental Analysis of Foods (3) Modern instrumental methods for control of food manufacturing processes. Prereq: Food Chemistry. 2 hrs and 1 lab. F

511 Color of Foods (2) Chemical basis, measurements, and reactions involved in color changes in foods. Manufacture and application of materials used to modify color of foods. Prereq: Food Chemistry or equivalent. 1 hr and 1 lab. F, A

512 Flavor of Foods (2) Chemical basis, measurements, and reactions involved in flavor changes in foods. Manufacture and application of flavorings in foods. Prereq: Food Chemistry or equivalent. 1 hr and 1 lab. F, A

515 Food Carbohydrates, Proteins and Lipids (4) Advanced study of chemical and physical attributes of carbohydrate, protein, and lipid components of foods; effects of components on production of safe and consistent quality food products; and changes during processing and/or distribution of food products. Prereq: Food Chemistry or equivalent. 3 hrs and 1 lab. Sp

520 Food and Industrial Fermentations (3) Microbiology, biochemistry, and technology of food-related fermentations involving dairy products, meats, cheeses, fruits and vegetables. Production of food ingredients and by-product utilization. Prereq: Food Microbiology and Lab, Food Preservation, Biochemistry and Cellular and Molecular Biology. 4 hrs or equivalent. 2 hrs and 1 lab. Sp, A

521 Advanced Food Microbiology (3) Extensive and intrinsic factors associated with foods and food processing that relate to growth, survival, inhibition, detection, and recovery of foodborne pathogens and spoilage organisms; traditional and current approaches to microbiological food safety and quality. Prereq: Food Microbiology and Lab or equivalent. 2 hrs and 1 lab. Sp

540 Food Product Development (3) Art, science, and technology of developing and marketing new food products. Prereq: Food Preservation. 2 hrs and 1 lab. Sp

560 Advanced Meat Science (3) Physical and chemical changes that occur in conversion of muscle to meat; effect of postmortem treatments on meat quality, composition and palatability, packaging, preservation and quality control. Prereq: 460. 2 hrs and 1 lab. Sp

565 Special Topics in Food Technology and Science (1-3) Critical reviews of current research and production concerns for food industry. May be repeated. Maximum 9 hrs. F,Sp

593 Directed Studies (1-3) Research on non-thesis topics chosen by student and major professor. Supervised experience in food industry or governmental laboratories. May be repeated. Maximum 6 hrs. E

600 Doctoral Research and Dissertation (3-15) P/NP only. E

601 Seminar (1) Reports and directed discussion on research topics from current literature. May be repeated. Maximum 3 hrs. F, Sp

620 Food Toxicology (2) Basic and applied concepts in food toxicology; toxicoological aspects of processed foods. Mode of action, prevention and control of food toxicants in food supply. Prereq: Food Chemistry, 501, or consent of instructor. Sp

640 Advanced Food Processing (3) Role of processing treatments in modification of food properties; texture, flavor and color changes. Prereq: Food Preservation, 510, 511, 512 or consent of instructor. Sp

650 Food and Nutritional Science (3) Science and principles of food and nutrition; structure, properties, and utilization in food. Prereq: Food Science and Technology. F

660 Food in Biologically Utilized Systems (3) Principles of food transport, storage, and utilization in biologically utilized systems. Prereq: Food Science and Technology. F

670 Food and Agricultural Policy (3) Principles and applications of food and agricultural policy; analysis of food and agricultural policy issues and the impact of policy on food and agriculture. Prereq: Food Science and Technology. F

680 Food and Agricultural Economics (3) Principles and applications of food and agricultural economics; analysis of food and agricultural economics issues and the impact of economics on food and agriculture. Prereq: Food Science and Technology. F

690 Food and Agricultural Law (3) Principles and applications of food and agricultural law; analysis of food and agricultural law issues and the impact of law on food and agriculture. Prereq: Food Science and Technology. F

695 Food and Agricultural Ethics (3) Principles and applications of food and agricultural ethics; analysis of food and agricultural ethics issues and the impact of ethics on food and agriculture. Prereq: Food Science and Technology. F

697 Food and Agricultural Policy, Economics and Law (3) Principles and applications of food and agricultural policy, economics and law; analysis of food and agricultural policy, economics and law issues and the impact of policy, economics and law on food and agriculture. Prereq: Food Science and Technology. F

700 Waste Management and Recycling (3) Principles and applications of waste management and recycling; analysis of waste management and recycling issues and the impact of management and recycling on food and agriculture. Prereq: Food Science and Technology. F
forestry, wildlife, fisheries, or other natural resource area. Applicants must take the general Graduate Record Examination (GRE) with minimum scores required. Graduates must be of letters or recommendations from three individuals familiar with the applicant's academic ability are required. The graduate school also has an application that must be submitted at the time of application to The Graduate School.

**Thesis Option**
1. Prior to research for the thesis, the student is required to develop a written research proposal. Registration for the initial 6 hours of thesis work (Forestry 500 or Wildlife and Fisheries Science 500) is required.
2. A graduate committee of no fewer than 3 faculty members will be selected by the student. At least one member shall be from outside the department. In addition to the thesis requirement, a minimum of 24 hours of graduate coursework is required. This work must be approved by the student's committee and no more than 10 hours of the minimum 50 can be below the 400 level. The committee may require additional coursework if the student's progress or background indicates such need.
3. All students are required to include Forestry 511 or Wildlife and Fisheries Science 512, Seminar, in their programs. This is required of each graduate student in residence in the fall semester.
4. An oral examination covering the thesis and coursework is required.

**Non-Thesis Option (Forestry only)**
1. Thirty-five hours of graduate coursework of which 23 must be at the 500 level or above is required.
2. A graduate committee of no fewer than 3 faculty members will be selected. At least one member shall be from outside the department. The committee will meet and schedule the student's program during the first semester in residence.
3. Three hours of Forestry 511 are required.
4. Nine hours of coursework in the department must be at the 500 level or above, exclusive of Forestry 511.
5. Five additional written and oral examinations shall be taken upon completion of no fewer than 28 hours of approved study.

**MINOR IN ENVIRONMENTAL POLICY**
The department participates in a program designed to give graduate students an opportunity to develop an interdisciplinary specialization in environmental policy. See Economics for program description.

**Forestry**

**GRADUATE COURSES**

421 Forest and Wildland Resource Economics (3) Production functions, supply-demand and market analysis; non-market programs and projects; economic analysis and decision models; investment and financial analysis; managerial economics; taxes; forest products marketing. Prereq: Forest Resource Analysis or consent of instructor. F

422 Forest and Wildland Resource Policy (3) Policy formulation; criteria for policy determination; forest and wildland law and regulation; theory of conflict resolution; formal and informal resolution. Prereq: Senior standing or consent of instructor. F

423 Wildland Recreation Planning and Management (3) Planning processes, recreation site design and physical planning, site design projects; management strategies, methods of visitor and recreation site management; case studies. Weekend field trips. Prereq: Wildland Recreation or consent of instructor. 2 hrs and 1 lab. Sp

433 Wood Adhesives and Glued Wood Products (2) Theory and practice of adhesive bonding of wood; wood substrate-adhesive interface for bonding; principles of adhesion; wood adhesives; gluing of solids and composite wood manufacturing practices; laboratory manufacture and testing of adhesives, adhesive bond strength and glued-wood product performance; dries field trips. Prereq: Wood Properties and Uses and Wood Identification, or consent of instructor. 1 hr and 2 labs. Sp

434 Wood Processing and Machining (2) Primary log breakdown and secondary processing into major products. Fundamental methods and technology for major types of cutting operations: sawing, grading, dimensioning, veneer cutting, and machine machining; day field trip. Prereq: Wood Properties and Uses and Wood Identification, or consent of instructor. 1 hr and 2 labs. Sp

500 Thesis (1-15) P/NP only. E

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May be repeated. 30 credits only. E

511 Problem Analysis in Forest Resources (3) Problem identification, analysis and solution in forest resources management. Identify, analyze and prepare written report. Topics and report must have approval of graduate committee. Available only to students in non-thesis option for M.S. in Forestry. E

512 Seminar (1-3) Current developments in forestry. Required of all graduate students in residence in fall. May be repeated. Maximum 2 hrs. S/NC only. E

520 Advanced Forest Tree Biology (3) Growth, reproduction, and physiology of forest trees. Prereq: Graduate standing in forestry or biological science, or consent of instructor. F,A

525 Management of Forestry, Wildlife and Fisheries Resources (4) Current technologies and management strategies concerning wise use of forestry, wildlife, and fisheries resources. 4 hrs and 1 lab for six weeks. Sp,A

530 Advanced Forest Resource Management (3) Analysis of forest management problems as exemplified in public agencies and private firms. Forest organization and management problems; financial and operational planning tools, as applied to forest resource management. Prereq: Senior-level forest management or consent of instructor. Sp,A

540 Genetics in Forestry (3) Genetic improvement of forest trees, selection of superior genotypes; field testing for genetic variability; tree breeding; development of seed orchards; hybridization; tree cytoplasm and tissue culture; use of biochemical variation; phylodend and conducting forest genetics research. Prereq: Silvicultural methods and Biology 220 or consent of instructor. Sp,A

550 Recreation Planning for Forests and Associated Lands (3) Planning process for recreation development on forests and associated lands. Analysis and critique of specific contemporary alternatives. Weekend field trips. Prereq: Senior level in forest recreation or consent of instructor. F,A

570 Management & Policy of Forest Resource Organziation (3) Theory and application of management as applied to natural resource organizations: institutional direction and culture, and strategic management. Development of policy as a process tool and as results from conflict resolution. Linkages between policy development and execution, and structure and management of organizations. Prereq: Forest administration or policy or consent of instructor. F,A

580 Advanced Silviculture (3) Silvicultural characteristics, silvicultural practices and systems applied to commercially important hardwoods and softwoods. In-depth analysis of silvicultural principles involved and tools used. Prereq: Principles of silviculture and management. P, F,A

585 Advanced Forest Biometry (3) Application of sampling techniques to forest inventory; fixed and variable plot sampling; list sampling; Poisson sampling; regression estimators; multistage and multiphase sampling; Growth and yield prediction for even-aged and uneven-aged forests. Prereq: Forest and Wildlife Management or Forest Resource Inventory or consent of instructor. F,A

590 Advanced Topics in Forestry (1-3) Recent advances and concepts; research techniques and analyses of current problems. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

592 Independent Study in Forestry (1-4) May be repeated. Maximum 6 hrs. E

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**Wildlife and Fisheries**

**GRADUATE COURSES**

410 Wildlife Habitat Evaluation and Management (3) Ecological relationships between wildlife and habitat. Evaluation, modeling, and management of wildlife habitat. Effects of land use practices on wildlife habitat. Weekend field trips. Prereq: Principles of Wildlife and Fisheries Management or consent of instructor. Applicable to majors in Forestry and in Wildlife and Fisheries Science. Sp,A

416 Planning and Management of Forest, Wildlife and Fisheries Resources (3) Integrated forest and wildlife resource management through developing land management plans and analyzing case studies including conflict resolution. Applicable to majors in Forestry and in Wildlife and Fisheries Science. Prereq: Senior standing 1 hr and 2 labs. Sp

525 Management of Forest, Wildlife and Fisheries Resources (2) Current technologies and management strategies concerning wise use of forestry, wildlife, and fisheries resources. 4 hrs and 1 lab for six weeks. Sp,A

535 Environmental Impacts to Natural Ecosystems (3) Current environmental problems impacting natural ecosystems: climatic change, acid deposition, air pollution, species declines, and introduction of exotic species. Management methodologies to mitigate environmental problems. Weekend field trips. Prereq: 416 or equivalent or consent of instructor. Applicable to majors in Forestry and in Wildlife and Fisheries Science. Sp,A

540 Seminar in Integrated Resources Management in Biosphere Reserves (2) MAB program, UNESCO-sanctioned global conservation initiative. Analysis of integrated resources management policies that demonstrate concept of sustainable development. Environmental policy and application of science to management practice. Application to majors in Forestry and in Wildlife and Fisheries Science. Sp,A

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**Wildlife and Fisheries Science**

**GRADUATE COURSES**

440 Wildlife Techniques (2) Methods of wildlife damage control, forest, farmland, and wildlife habitat management, food chain studies, and the determination of basic wildlife capturing techniques and management plan preparation. Weekend field trips. Prereq: Principles of Wildlife and Fisheries
Management or consent of instructor. 1 hr and 1 lab or field. F

442 Fisheries Techniques (2) Active and passive sampling techniques for fish and aquatic organisms; population estimation methodologies; fish handling and transport; feeding; habitat analysis; marking and tagging techniques; age determination and incremental growth analysis; stream assessment; equipment and instrumentation usage and maintenance; safety in sampling methods. Weekend field trip. Prereq: Principles of Wildlife and Fisheries Management or consent of instructor. 1 hr and 1 lab or field. F

443 Fisheries Science (3) Quantification and management of freshwater and estuarine populations; estimation, age and growth, biological assessment, and stocking. Prereq: Principles of Wildlife and Fisheries Management or consent of instructor. 2 hrs and 1 lab. Sp

444 Ecology and Management of Wild Mammals (3) Biological and ecological characteristics of game mammals and endangered mammals. Current principles and practices of wild mammal management. Prereq: Principles of Wildlife and Fisheries Management or consent of instructor. 2 hrs and 1 lab. Sp

490 Ethics in Wildlife and Fisheries Management (1) Ethical bases for decision-making and application of principles in wildlife and fisheries management. Seminars by ethicists, wildlife and fisheries scientists, and managers, and foresters to acquaint students with diverse perspectives of ethical behavior in practices of wildlife and fisheries management. Lectures, panel discussions, and case studies. Team taught. Prereq: Senior standing. Sp

500 Thesis (1-15) P/NP only. E

501 Seminar in Wildlife and Fisheries Science (1) Current developments in wildlife and fisheries science. Required of all graduate students in residence in fall. May be repeated. Maximum 2 hrs. S/NC only. F

520 Planning and Administration of Fisheries and Wildlife Programs (2) Factors influencing policy and program planning activities of fisheries and wildlife agencies. Decision-making policies, case histories. Prereq: Principles of Wildlife and Fisheries Management or consent of instructor. 2 hrs and 1 lab. Sp

525 Endangered Species Management and Conservation of Biodiversity (2) Status, ecology and management of endangered wildlife and plant species. Historic aspects, policy implications and philosophical issues surrounding recovery efforts. Approaches to monitor and manage for biodiversity. Prereq: Graduate standing or consent of instructor. Sp

530 Wildlife Diseases (2) Necropsy of birds and mammals. Recognition of various diseases and methods of preparing pathological materials in field and lab. Investigative procedures concerning wildlife diseases. Prereq: 1 yr biology, 444 or 445, or consent of instructor (Same as Comparative and Experimental Medicine - Veterinary Medicine 530). F

540 Predator Ecology (2) Dynamics of terrestrial vertebrate predator-prey populations in human-altered and relatively unaltered environments. Prereq: 444 or 445 or consent of instructor. F

545 Population and Habitat Analysis (2) Detailed characteristics, assumptions, and current techniques for fish and wildlife population analysis. Technological, methodology, and goals for wildlife habitat analysis. Use of computers. Prereq: Animal Science 571 or Statistics 538 or consent of instructor. F

555 Fish Culture (3) Principles, concepts and techniques of culturing economically important fish and shellfish species. Prereq: 443 or consent of instructor. 2 hrs. and 1 lab. Sp

556 Recirculating Aquaculture (3) Growing fish in intensive, indoor systems with reconditioned water. Techniques of solids removal, nutrient, and gas balance. Practical experience with operating system. Prereq: 443 or consent of instructor. Sp

560 Advanced Topics in Wildlife and Fisheries Science (1-4) Recent advances and concepts, research techniques, and analysis of current problems. Prereq: 443, 444, 445, or consent of instructor. May be repeated. Maximum 6 hrs.

593 Independent Study in Wildlife and Fisheries Science (1-4) May be repeated. Maximum 6 hrs. E

French

See Modern Foreign Languages and Literatures

Geography

(College of Arts and Sciences)

MAJOR DEGREES

Geography........................................M.S., Ph.D.

Carol Harden, Head

Professors:

Aiken, Charles S., Ph.D. .......... Georgia
Bell, Thomas L., Ph.D. .......... Iowa
Foresta, Ronald, Ph.D. .......... Rutgers
Hammond, E. H. (Emeritus), Ph.D. .......... California
Jumper, Sidney R. (Liaison), Ph.D. .......... Tennessee
Long, Robert G. (Emeritus), Ph.D.

Northwestern

Minkel, C. W., Ph.D. .......... Syracuse
Pulsipher, Lydia, Ph.D. .......... Southern Illinois
Ralston, Bruce, Ph.D. .......... Northwestern
Schmudde, Theodore H. (Emeritus), Ph.D.

Ph.D.

Associate Professors:

Brinkman, Leonard W., Jr., Ph.D. .......... Wisconsin
Harden, Carol P., Ph.D. .......... Colorado
Horn, Sally P., Ph.D. .......... California
Rehder, John B., Ph.D. .......... Louisiana State
Shaw, Shih-Lung, Ph.D. .......... Ohio State

Assistant Professor:

Carroll, Bruce, Ph.D.

The department offers the Master of Science and Doctor of Philosophy degrees. The master's degree emphasizes development of professional competence as a geographer and offers opportunities to gain substantial depth in a concentration or a major technique. An emphasis in geographic information systems is available for students who have appropriate backgrounds in mathematics and computer science. The doctoral program is for those who have demonstrated proficiency in conducting independent research. The department is particularly well-qualified to direct graduate work in location analysis, transportation geography, urban and rural geography, cultural ecology, and the geography of the natural environment (especially biogeography and geomorphology). The faculty is qualified to direct students from a variety of approaches ranging from historical and humanistic to rigorously analytic and GIS-based.

THE MASTER'S PROGRAM

The department offers the thesis and nonthesis options for the Master of Science. Both options require a minimum of 30 semester hours beyond the completion of a sound graduate major program. At least two-thirds of the total hours in the degree outside of the program must be at or above the 500 level and must include 501 (at each offering during residency). 504 and 3 semester hours at the 600 level. In the thesis option, 6 hours must be Thesis 500. A final examination is required in both programs.

THE DOCTORAL PROGRAM

The doctoral is a research degree and is granted only to those who demonstrate proficiency in conducting independent research. Students must have a broad foundation and understanding of the discipline; these should have been achieved in a comprehensive master's program. Course requirements for the degree shall be determined by the student's faculty committee in accordance with specific interests and needs. The program must include 504, 515, 599, 9 hours of 600-level seminars, and (at each offering during residency) 501. A minimum of 9 hours must be earned in related fields outside the department. Competence in cartography and quantitative techniques is required. Additional tools, including languages, will be required as appropriate to the student's areas of research specialization. Examinations required for admission to candidacy include a written comprehensive examination, comprised of two written examinations in which the student will be tested on his/her knowledge of two special fields, and related areas of geography; an oral examination on the student's program, the special fields and related areas, and the dissertation proposal. All parts of the written comprehensive examination should be taken within the same semester.

MINOR IN ENVIRONMENTAL POLICY

The department participates in a program designed to give graduate students an opportunity to develop a minor in environmental specialization in environmental policy. See Economics for program description.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The Ph.D. degree in Geography is available to residents of the states of Alabama, Arkansas, Mississippi, Virginia, or West Virginia. The master's program is also available to residents of Texas. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE COURSES

410 Global Positioning Systems and Geographic Data (3) Theory, field and laboratory use of Global Positioning Systems for capturing digital geographic data; management of geographic data; coordinate systems; datum issues, scanning and digitizing, map standards, and uncertainty in Geographic Information Systems. 2 hrs and 1-2 hr lab.
449 Geography of Transportation (3) Examination of transportation systems, their effects on trade patterns, land use, location problems, and development. Prereq: Economic Geography: Core Concepts or consent of instructor.

450 Process Geomorphology (3) (Same as Geology 450.)

466 Teaching and Learning Geography (3) Preparation of prospective teachers in content, skills, strategies, and understandings needed for effective teaching and assessment of geography in K-12 schools. Course organization and content based largely on that of National Geography Standards.

500 Thesis (1-15) P/NP only. E

501 Colloquium in Geography (1) Discussion of departmental research, current research literature, and general topics. Registration required of resident graduate students whenever offered. May be repeated. Maximum 4 hrs. May be applied toward graduate degree. S/NC only.

502 Registration for Use of Facilities (0-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or for faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only, E.

504 Introduction to Geographical Research (1) Research interests and methods of departmental faculty. Research frontiers in geography. Required of new graduate students.

505 Directed Research (2-6) Research on problems as defined by individual students. Prereq: Written consent of instructor and department prior to registration. May be repeated with consent of instructor. Maximum 9 hrs. S/N or letter grade.

506 Directed Readings (2-6) Readings on topics of interest as defined by individual students. Prereq: Written consent of instructor and department prior to registration. May be repeated with consent of instructor. Maximum 9 hrs. S/N or letter grade.

509 Topics in Geography (2-3) Topics vary. Prereq: Consent of instructor. May be repeated with consent of instructor. Maximum 5 hrs. S/N or letter grade.

510 Geographic Software Design (3) Algorithms for spatial analysis, software design, and program implementation in stand alone and distributed computing environments. Prereq: Consent of instructor.

513 Topics in Remote Sensing (3) Applied research using imagery for interpretation and mapping of geodetic data. Prereq: 413 or consent of instructor. May be repeated with consent of instructor. Maximum 8 hrs.

515 Topics in Quantitative Geography (3) Multivariate analysis applied to problems of geography, research problems utilizing appropriate computer programs; usefulness to geographic research of techniques developed by other disciplines. Prereq: 415 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

517 Geographic Information Management and Processing (3) Concepts and methods in management of geographic information. Database design, manipulation, sampling and analysis. Prereq: Consent of instructor.

519 Graduate Practicum in Cartography/Remote Sensing/GIS (2-6) Prereq: Written consent of instructor before registration. May be repeated with consent of instructor. Maximum 6 hrs.

521 Topics in Cultural Geography (3) Examination of trends, problems, and methods in cultural geography. Prereq: 421 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

532 Topics in Global Change (3) Emerging trends, anticipated problems and methods in global change research and response. Prereq: 432 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

533 Topics in Physical Geography (3) Examination of trends, problems, and methods in physical geography of an environment system or in modern climatology. Prereq: 433 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

534 Topics in Climatology (3) Trends, problems and methods in the field of climatology. Prereq: 434 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

535 Topics in Biogeography (3) Examination of trends, problems, and methods in biogeography. Prereq: 435 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

541 Topics in Urban Geography (3) Analysis of research on urban systems, internal morphology, urban problems and urban spatial behavior. Prereq: 441 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

549 Topics in the Geography of Transportation (3) Examination of trends, problems, and methods in transportation geography and transportation networks. Prereq: 449 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

550 Regional Geomorphology (3) (Same as Geology 550.)

557 Biological Conservation (3) Analytical treatment of policies, politics, and forms of biological conservation as practised in U.S. and abroad. Prereq: Consent of instructor.

591 Foreign Study (1-15) See College of Arts and Sciences. Prereq: Written consent of department prior to registration. S/N or letter grade.

592 Off-Campus Study (1-15) See College of Arts and Sciences. Prereq: Written consent of department prior to registration. S/N or letter grade.

593 Independent Study (1-15) See College of Arts and Sciences. Prereq: Written consent of department prior to registration. S/N or letter grade.

599 Geographic Concept and Method (2) Traditional and modern geographic thought; readings on nature, scope, problems, and methods of geography. Prereq: Consent of instructor.

600 Doctoral Research and Dissertation (3-15) P/NP only. E

600 Seminar in Geography (2-3) Topics vary. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

631 Seminar in Natural Hazards (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

632 Seminar in Physical Geography (2) Prereq: 532 or consent of instructor. May be repeated. Maximum 6 hrs.

634 Seminar in Climatology (2) Prereq: 534, 532 or consent of instructor. May be repeated. Maximum 6 hrs.

635 Seminar in Biogeography (2) Prereq: 535 or consent of instructor. May be repeated. Maximum 6 hrs.

641 Seminar in Urban Geography (2) Prereq: 541 or consent of instructor. May be repeated. Maximum 6 hrs.

643 Seminar in Geography of Transportation (2) Prereq: 543 or consent of instructor. May be repeated. Maximum 6 hrs.

663 Seminar in Geography of the American South (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

673 Seminar in Geography of Latin American (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

677 Seminar in Biological Conservation (2) Conduct of original research. Prereq: 577 or consent of instructor. May be repeated. Maximum 6 hrs.

Geological Sciences

(College of Arts and Sciences)

MAJOR

DEGREES

Geology

William M. Dunne, Head

Professors:

Broadhead, Thomas W., Ph.D. .... Iowa

Driese, Steven G. (Liaison), Ph.D., .... Wisconsin

Dunne, William M., Ph.D. .... Bristol
Hatcher, Robert D., Jr. (Distinguished Scientist), Ph.D. Tennessee
Kopp, Otto C., Ph.D. Columbia
Labotka, Theodore C., Ph.D. Caltech
McLaughlin, Robert E. (Emeritus), Ph.D. Tennessee
McSween, Harry Y., Ph.D. Harvard
Misra, Kula C., Ph.D. Western Ontario
Taylor, Lawrence A., Ph.D. Lehig
Walker, Kenneth R. (Carden Prof.), Ph.D. Yale

Associate Professors:
Byerly, Don W., Ph.D. Tennessee
Clark, G. Michael, Ph.D. Penn State
McKay, Larry D. (Jones Prof.), Ph.D. Waterloo
Makinley, Michael L., Ph.D. Yale
Mora, Claudia I., Ph.D. Wisconsin
Williams, Richard T. II, Ph.D. Virginia

The Department of Geological Sciences offers both the M.S. and Ph.D. degrees in Geology. Persons interested in these programs should contact the Director of Graduate Admissions in the department. For admission, an applicant must provide transcripts of previous university work, two rating forms or letters of recommendation, and GRE scores (general). Students are not normally admitted under non-degree status. Prerequisites for both degrees is a Bachelor's degree, including coursework in mineralogy, optical mineralogy, petrology, stratigraphy, paleontology, structural geology, and field geology. One year each of coursework in calculus and chemistry and one year of coursework in biology, physics, or statistics are also required. Applicants lacking any of these may be admitted, but the deficiencies must be removed within the first year without graduate credit. Substitutions may also be allowed.

THE MASTER'S PROGRAM

The department offers the thesis option in the master's program. Graduation requires successful oral defense of a written thesis and a minimum 3.0 GPA in all graduate coursework. Course requirements are a minimum of 30 semester hours, including:
1. Six hours of Thesis 500.
2. Registration in 555 during the first two years in residence. Two hours may be counted toward the 30-hour minimum. This requirement may be waived in unusual circumstances.
3. Sixteen hours of geology courses, with at least 14 hours at the 500 or 600 level, including at least one course from any of the following five groups:
Group 1: 410, 460, 480, 500, 520, 565, 568
Group 2: 420, 520, 525, 545, 546, 556
Group 3: 470, 570, 571, 575, 578
Group 4: 401, 435, 460, 521, 535, 550, 561
Group 5: Any 400-500-level courses with graduate credit from related departments (allied sciences, mathematics, and engineering), selected with approval of advisor.

4. Eight hours of additional graduate coursework.

THE DOCTORAL PROGRAM

The prerequisite for the Ph.D. program, in addition to that for the M.S. program, is either a master's degree in Geology, or a Bachelor's degree plus completion of 9 hours of coursework from the list in #3, above, including one course from each group. These courses may be taken while completing other course requirements.

Graduation requires passing a comprehensive examination, taken no later than the end of the second year, completion of all course requirements with a minimum 3.0 GPA, completion of the language requirement, and successful oral defense of the dissertation.

The comprehensive examination includes both written and oral parts in which the candidate will be tested on his/her knowledge of the area concerning the proposed dissertation and of related fields. The dissertation is expected to be conversant in a wide field of geological sciences.

A minimum of 24 hours of graded coursework beyond the master's degree is required in addition to the 24 hours of Dissertation 800. The coursework includes the sum of 9 hours of 600-level geology courses, 9 hours of 500-level or higher geology courses, and 6 hours of additional graduate courses. Extra-departmental coursework is limited.

The student must demonstrate a reading knowledge of a foreign language in which there is a body of geologic literature, as approved by the student's dissertation committee. The foreign language requirement may be waived for Ph.D. students whose native language is not English and who have demonstrated mastery of the English language, as determined by the student's dissertation committee.

GRADUATE COURSES

401 Quantitative Methods in Geography (3) Applications of calculus and differential equations to problems in earth sciences. Examples of diffusion equation in hydrogeology, wave equation in geophysics, and wave propagation in geology. Geometric modeling and boundary conditions in structural geology and tectonics. Prerequisites: The Dynamic Earth or Earth, Life, and Time, and two semesters of Calculus.

410 Mineral Science (3) Crystal chemistry of rock-forming minerals. Interaction of electromagnetic radiation and crystalline solids. Optical properties of minerals, visible and infrared spectroscopy, and X-ray diffraction. Laboratory exercises emphasize thin section and X-ray diffraction methods of mineralogy. Prerequisite: Calculus 310. 2 hrs and 1 lab.

411 Optical Mineralogy (2) Laboratory course on principles of optical microscopy. Use of petrographic microscope to identify rock-forming minerals with applications to petrology and environmental mineralogy. Prerequisite: Calculus 310. 2 hrs and 1 lab.

412 Elements of X-ray Diffraction (2) Laboratory course on principles of X-ray diffraction. Phase identification, quantitative determination of mineral abundances in mixtures, and crystal structure determination. Prerequisite: Calculus 310.

420 Paleocology (3) Principles of geological analysis as applied to fossils and fossil assemblages, data collection and interpretation. Laboratory designed around examination of scientific reports on field and laboratory analysis. Writing emphasis course. 3 hrs and 1 lab.

421 Invertebrate Paleontology (4) Survey of invertebrate animal phyla: skeletal structure and preservation, functional morphology, ecology, and stratigraphic distribution. Prerequisite: Paleobiology or consent of instructor. 3 hrs and 1 lab.

440 Field Geology (5) Summer field course for advanced undergraduate geology majors and first-year graduate students in geology. Taught off-campus and requires full-time student. Synthesis of major aspects of geological sciences in societal context. Field techniques demonstrated, practiced, and applied to solution of geologic problems. Prerequisite: Completion of major core courses and consent of instructor.

450 Process Geomorphology (3) Integrative approach to development of surface processes using case histories, maps, remote sensing imagery. Prerequisites: Calculus 101-02. (Same as Geography 450.) 2 hrs and 1 lab.

455 Basic Environmental Geology (3) Applications of geological sciences toward comprehension of effects of geological processes on current and future human activities on earth's environment. Prerequisite: The Dynamic Earth. 2 hrs and 1-3 hr lab or field period.

460 Principles of Geochemistry (3) Application of chemical principles to geologic problems. Crystal chemistry and relation between atomic structure and distribution of elements in earth's crust. Prerequisite: Calculus 120-30. Recommended prerequisite: Calculus 330. 2 hrs and 1 lab.

470 Applied Geophysics (3) Principles of geophysical exploration: applications to environmental problems. Seismic and electromagnetic methods. Prerequisite: 6 hours of geology courses numbered above 300, Elements of Physics.

471 Fieldwork in Geophysics (2) Geophysical investigations applied to solution of problems in tectonics, hydrogeology, or environment. Summer field course offered. Requires full time for 2 or more weeks. Prerequisite: Geology 470 or consent of instructor.

475 Physical and Chemical Systems of the Earth (3) Development of physical earth from solar nebula to present. Formation, classification, and evolution of hydrothermal, volcanic, and crustal systems. Interdependence of earth processes, planetary geology, and chemical and isotopic processes of the earth. Historical perspective on major controversies of past earth processes and problems of the future. Prerequisite: 16 hrs of geology courses numbered 300 and above. 2 hrs and 1 discussion.

480 Principles of Economic Geology (3) Ore-forming processes. Classification of mineral deposits, survey of different types of mineral deposits with examples, and metallogenesis. Prerequisite: Calculus 310 and 330 or equivalents. Recommended prerequisite: Calculus 460. 1 hr and 1-2 hr lab.

485 Principles of Hydrogeology (3) Principles of flow and transport. Geologic controls, aquifer analysis, water well design/testing. Introduction to transport processes. Prerequisites: The Dynamic Earth; Calculus; Fundamentals of Physics or equivalent, or consent of instructor. (Same as Civil Engineering 485.)

496 Hydrogeology Laboratory (1) Application and demonstration of hydrogeological principles in field laboratory. Prerequisite: Calculus 330 or Calculus 535 or consent of instructor.

500 Thesis (1-15) Prerequisite: E.

502 Registration for Use of Facilities (2-15) Required for the student not otherwise registered during any semester when student uses University facilities. Enrollment in this course must be renewed each semester before the course is completed. May not be used toward degree requirements. May be repeated. S/N only. E.

505 Structure of the Southern and Central Appalachian (3) Structural development of Southern and Central Appalachians from extraneous Late Proterozoic—Early Paleozoic rift-grab-system margin through processes related to compressional events producing accretionary complexes that formed Appalachian mountains. Prerequisite: Structure Geology. (Same as Geology 505.)

510 Clay Mineralogy (3) Origin, chemistry, structures, and properties of clay minerals; application of mineralogical techniques to clay minerals. Prerequisite: Principles of Geology or equivalent. Recommended prerequisite: Calculus 310. 2 hrs and 1 lab.

521 Data Analysis in Geology and Environmental Science (3) Application of statistical and other quantitative techniques to processing geologic data; environmental applications. Prerequisite: Calculus 310. 2 hrs and 1 lab.

530 Petrogenesis of Crystalline Rocks (4) Origin and properties of igneous and metamorphic rocks, magmatic and solidus processes and physical conditions. Laboratory exercises in petrographic study of crystalline rocks in thin section. Prerequisite: Calculus 410. 3 hrs and 1 lab.

535 Ground Water Hydrology (3) (Same as Environmental Engineering 535.)

540 Seminar in Local Geology (1) Introduction to geology of Southern Appalachians. 1 hr plus fieldtrips.
Health and Safety Sciences

Health and Safety Sciences offers graduate programs, leading to the Master of Public Health degree in Public Health. The department provides doctoral preparation through a concentration in Human Ecology. Inquiries should be directed to the department head. Application packets are available by request to the department.

The department fosters development of pre-professional and professional competencies by those interested in the disciplines of health education/promotion, public health, and safety. The Health and Safety Sciences academic programs emphasize health promotion (lifestyle behaviors) and health protection (regulatory, environmental, and safety) strategies for improving individual and community well-being, directly relating to two UTK thematic areas of strength, health and biomedical sciences and children and families. The faculty are committed to the educational value of community-based services learning, applied research, and community outreach. For more information, http://hss.he.utk.edu.

The Master of Public Health (M.P.H.) degree program in Health Promotion and Health Education provides a career-oriented curriculum designed to prepare graduates for leadership roles in community health and the safety sciences to incorporate with educational models appropriate for addressing community health needs.

Health

A graduate program is available leading to the Master of Science with a major in Health Promotion and Health Education (thesis and non-thesis options), requiring completion of 30 semester hours. This program emphasizes research skills development by those already employed in the health professions with each student completing a realistic health-related research proposal as a major developmental component. For more information, http://hss.he.utk.edu.

German

See Modern Foreign Languages and Literatures

Health and Safety Sciences

Health and Safety Sciences (College of Human Ecology)

MAJORS

Health Promotion and Health Education ................................................................. M.S.
Public Health ............................................. M.P.H., M.S.-M.P.H.
Safety Education and Service ................. M.S.

Charles B. Hamilton, Head

Professors:
Gorski, June, Dr.P.H. ....................... UCLA
Hamilton, Charles B. (Liaison), Dr.P.H. ......................... Oklahoma
Kirk, Robert H., Ph.D. ....................... Indiana
Wallace, Bill C. (Liaison), Ed.D. ...................... Northern Colorado

Associate Professors:
Pursley, R. Jack, Ph.D. ....................... Iowa
Zermel, Paula, Ph.D. ....................... Wayne State

Assistant Professors:
Ellison, Jack S. (Liaison), Ed.D. ........ Tennessee
Fitzhugh, Eugene C., Ph.D. ................. Alabama
Smith, Susan M. (Liaison), Ed.D. ........ Tennessee

The Health and Safety Sciences Department offers graduate programs leading to the Master of Science with majors in Health Promotion and Health Education; and Safety Education and Service; and to the Master of Public Health degree in Public Health. The department provides doctoral preparation through a concentration in Human Ecology. Inquiries should be directed to the department head. Application packets are available by request to the department.

The department fosters development of pre-professional and professional competencies by those interested in the disciplines of health education/promotion, public health, and safety. The Health and Safety Sciences academic programs emphasize health promotion (lifestyle behaviors) and health protection (regulatory, environmental, and safety) strategies for improving individual and community well-being, directly relating to two UTK thematic areas of strength, health and biomedical sciences and children and families. The faculty are committed to the educational value of community-based services learning, applied research, and community outreach. For more information, http://hss.he.utk.edu.

THE PH.D. CONCENTRATION

The community health concentration integrates the behavioral and natural sciences with public health, community health education, health promotion and the safety sciences to prepare scholars with an interest in improving the health of the nation.

Requirements include:
1. Minimum 21 hours of foundation courses: 610, 620, 6 hours of statistics, 3 hours of specialized research methods, and 6 hours of natural or behavioral sciences.
2. Minimum 21 hours in primary specialization: 530, 540, 650, 655, 660 and 6 hours of electives.
3. Minimum 12 hours in supporting specialization in a focused area: public health, safety, gerontology or a program approved by doctoral committee.
4. Minimum 6 hours in a cognate area.

GRADUATE COURSES

400 Consumer Health (3) Survey of major consumer health care providers and health care services; selecting, purchasing, evaluating and financing medical and health care services/products. (Same as Public Health 400.) Sp

405 Alcoholism and Alcohol Education (3) Problems of alcoholism. Factors which make alcoholism serious health and safety problem. Various types of instructional educational and intervention programs. F
Public Health

Graduate study with a major in Public Health leads to the Master of Public Health (M.P.H.). Three professional preparation concentrations are available: community health education, gerontology, and health planning/administration. For professional practice in improving community health emphasizes a population perspective, service-learning and application opportunities through rigorous internships. The M.P.H. program is accredited by the Council on Education for Public Health. A midriff requirements is available to interested M.P.H. students due to the public health affiliation with the Intercollegiate Graduate Statistics Programs.

ADMISSION REQUIREMENTS

A statement of the applicant's educational and career goals and three rating forms are required. Request application packet from the department. Preferential consideration for admission to degree status shall be given to those with a minimum undergraduate grade point average of 2.8 and with at least one year of professional experience in a health-related occupation. As a restricted program, non-degree admission requires department recommendation. Deadlines for completed applications are 1 February for Summer term and 1 April for Fall semester.

THE M. P. H. PROGRAM

The M.P.H. is a non-thesis program requiring completion of 38 semester hours of coursework including 9 weeks of field practice. The field internship provides a full-time experience with an affiliated health agency or organization offering one or more health programs. Of importance, field practice allows the student to apply academic theories, concepts, and skills in an actual work setting. Students must complete all assigned prerequisite courses and 21 semester hours of the curriculum with a minimum overall GPA of 3.0 prior to placement in the field. As an alternative to field practice, preparation of a master's essay may be used to fulfill the professional skills development component of the curriculum. Approval must be received from the Public Health Academic Program Committee and is contingent on consent of major advisor, formal written proposal by the student, and completion of an additional research methods course. Written guidelines stipulating expectations and eligibility criteria are available.

Requirements include:
1. Public Health Foundation courses (16 hours): 509, 510, 520, 530, 540, 555.
2. Internship (6 hours): 587, 588.
3. Concentration of Study (18-21 hours). Required and recommended electives will be selected by the student in consultation with the major advisor. A list of courses is available for each concentration: community health education, gerontology, and health planning/administration.

DUAL M.S.-M.P.H. PROGRAM

The College of Human Ecology offers a coordinated dual program leading to the conferral of both the Master of Science with a major in Nutrition/public health nutrition concentration and the Master of Public Health. The dual program allows students to complete both degrees in less time than would be required to earn both degrees independently. The program is designed to meet the needs of students who are interested in the benefits of majors in both nutrition and public health.

Therefore, it accommodates the interests of students who: 1) plan a career in public health and nutrition and want to acquire the knowledge and skills of the nutritionist and public health professional; or 2) plan a career in nutrition and want to acquire the knowledge and skills of the nutritionist.

Admission Requirements

Applicants for the M.S.-M.P.H. program must make separate application to, and be competitively and independently accepted by, the Department of Nutrition for the M.S., Department of Health and Safety Sciences for the M.P.H., and the Public Health Academic Program Committee.

Students who have been accepted by both departments may apply for approval to pursue the dual program anytime prior to, or after, matriculation in either or both departments. Such approval will be granted, provided that the dual program studies be started prior to entry into the fourth semester of the M.S. and M.P.H. programs.

Curriculum

A dual degree candidate must satisfy the requirements for both the M.S. (public health nutrition concentration) and the M.P.H. degrees, as well as the requirements for the dual program. All candidates for the dual degree must successfully complete Health and Society (PH 555), two credits of Seminar in Public Health (PH 509), and a minimum of 60 credits. The Department of Nutrition will award a maximum of 9 semester hours of credit toward the M.S. degree for successful completion of approved graduate level courses offered in the Department of Health and Safety Sciences. The Department of Health and Safety Sciences will award a maximum of 11 semester hours of credit toward the M.P.H. degree for successful completion of approved courses offered in the Department of Nutrition.

All courses for which credit is awarded must be approved by the Public Health Academic Program Committee and the student's graduate committee. A single block field experience (or public health internship) is required of all students and the analytical field paper incorporates public health nutrition and the student's public health concentration.

Dual degree students who withdraw from the program before completion of the requirements for both degrees will not receive credit towards the M.S. or M.P.H. degree for courses taken in the other program, except as such courses qualify for credit without regard to the dual program.

Approved Dual Credit

M.S. courses to be counted toward the M.P.H. program must include 10 semester hours of Field Study in Community Nutrition (NTR 515) and 1 semester hour of Graduate Seminar in Public Health (NTR 509). M.P.H. courses to be counted toward the M.S. include Public Health Administration (PH 520).
MINOR IN GERONTOLOGY

Graduate students in Public Health may pursue a specialized minor in gerontology. This interunit/interdisciplinary minor gives the student an opportunity for combining the knowledge about aging in American society with his/her major concentration. Please refer to Human Ecology for specific requirements.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.P.H. program in Public Health is available to residents of the states of Arkansas or Kentucky. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

COURSE REGISTRATION

Non-degree students must obtain permission from the department head to register for 500-level public health courses. Prerequisite coursework assigned as a condition of admission to the M.P.H. program must be completed promptly, with a grade of B or better, typically within the first semester or two of enrollment in graduate studies.

GRADUATE COURSES

400 Consumer Health (3) (Same as Health 400.)

410 Worksite Health Promotion (3) Foundations of health promotion programs delivered in worksites that revolve around issues relevant to employees and management; theory, program design, implementation, and evaluation from the perspective of health promotion specialist. Prereq: Health Education, Promotion, and Behavior.

403 Directed Independent Study (1-3) Individual in-depth study of selected issues. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. F, Sp

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

509 Graduate Seminar in Public Health (1-3) In-depth discussion of timely topics reflecting scope of public health as discipline and its interrelationships with public health sciences and other academic and professional disciplines. Speakers both internal and external. May be repeated. Maximum 4 hrs. (Same as Nutrition 509, Nursing 529, Exercise Science 569 and Social Work 509.) S/NC only. F, Sp

510 Environmental and Occupational Health (2) Complexities of personal and environmental issues that impact on public health as discipline and its interrelationships with many other academic and professional disciplines. Survey of contemporary issues and their implications for public health today and in the future. F, Sp

511 Fundamentals of Industrial Hygiene (3) Occupational health, safety, and environmental issues. Basic elements of industrial hygiene including recognition, evaluation, and control of workplace hazards. Prereq: 2 yrs of chemistry and biology and consent of department.

520 Public Health Policy and Administration (3) Administrative considerations in public health care programs and public health practice. Health policy formulation, political environment and governmental involvement in health care delivery system; recognition of major concepts/techniques/process. F, Su

521 Organization Theory and Health Care Delivery (3) Administrative and Organization theory related to health facilities, operation and management of community hospital. Case discussion and problem-solving exercises; managerial functions and skills. F

523 Management in Extended Care Settings (3) Managerial concepts and theoretical foundations essential to supervision and administration of domiciliary and special psycho-social environmental needs. Programs for home health services, comprehensive medical rehabilitation, nursing homes, corporate living centers and similar type health programs. Prereq: 521 or consent of instructor. Sp

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. Prereq: 520 or consent of instructor. Sp

530 Biostatistics (3) Application of descriptive and inferential statistical methods to health-related programs and problems. Emphasis on computer applications, use and interpretation of vital statistics and introductory research methodology preparatory for first course in epidemiology. Prereq: Introductory statistics or consent of instructor. E

540 Principles of Epidemiology (3) Distribution and determinants of health-related outcomes in specified populations, with application to control of health problems. Historical origins of discipline, hypothesis formulation, evaluation of evidence, and sources of measures of frequency and association, etiologic reasoning, disease screening, and injury control. Prereq or consq: 530. F, Sp


550 Principles and Practices of Community Health Education (3) Theoretical foundations for community health education; opportunities for skill development in various educational processes; and introduction to community health analysis. F

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 techniques in realistic setting. Prereq: 550 or consent of instructor. Sp

555 Health and Society (3) Understanding of social and behavioral factors which influence health and illness in an American society. Application to behavior in health-related organizations, and social psychological aspects of disease, and sociocultural aspects of health care delivery systems. Prereq: 550 or consent of instructor. Sp

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 development, evaluation and implementation. Health problems of institutions, communities and selected population groups, appropriate diagnoses, and programs for addressing health needs. Sp

568 Physical Activity and Positive Health (3) (Same as Exercise Science 568.)

569 Fitness Testing, Programming, and Leadership for Diverse Populations (3) (Same as Exercise Science 569.)

585 Seminar in Gerontology (1) (Same as Human Ecology 585, Counselor Education and Counseling Psychology 585, Exercise Science 585, Nursing 585, Psychodiagnostics Studies 585, Social Work and Community 585.)

597-48-69 Internship (3,3,3) Internship (community health education, gerontology, or health planning/administration) in either approved organization or research setting under supervision of designated supervisor. Prereq: M.P.H., major, one semester graduate notice and consent of major advisor. F, Sp only available for approved extended placements. S/NC only. E

590 Research Methods in Health (3) (Same as Health 590.)

593 Directed Independent Study (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

598 Field Placement (3) Field experience in health institutions or in governmental agencies. Prereq: M.P.H., major, one semester graduate notice and consent of major advisor. F, Sp

600 International Health (3) (Same as Health 600.)

650 Health Aspects of Gerontology (3) (Same as Health 650.)

655 Seminar in Nation's Health (3) (Same as Health 655.)

660 International Health (3) (Same as Health 660.)

Safety

Graduate study with a major in Safety, Education and Service (thesis and non-thesis options) leads to the Master of Science degree. The M.S. requires completion of 30 semester hours. Students may elect an internship experience with private industry or nonprofit organizations. Curricular experiences will assist graduate in preparation for certified safety professional examination.

The graduate program contributes to The University of Tennessee's mission of health protection by preparing safety professionals with the knowledge and skills necessary to create and maintain safer environments in the workplace (industrial and commercial), home, school, and community. The offering of all core classes on an evening class schedule enables those working full-time in a safety-related field to pursue the M.S. degree with a major in Safety Education and Service on a part-time basis.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S. program in Safety Education and Service is available to residents of the states of Alabama, Arkansas or Florida. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE COURSES

443 Sports & Recreational Safety (3) Accident prevention and injury control in sports activities: philosophy of sports safety, human environmental factors and relationships in sports injury and control; risk-taking and decision making in sports participation; and contributions of sports medicine to safety. 3 hrs. F, Sp

542 General Safety (3) Principles, practices, and procedures in general safety. Safety problems in school, traffic, recreation, industry, home and other public areas. F, Su

500 Thesis (1-15) P/N only. E

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

522 Behavioral Problems in Safety Education & Accident Prevention (3) Problems of behavior, causes of accidents. Application of principles of psychology in development of safe behavior in all segments of environment. F

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. F

534 Organization, Administration and Supervision of Safety Programs (3) National, state and local program development, administrative, instructional, and supervisory aspects. Implementation of relevant programs. Sp

535 Emergency Management (3) Civil and defense problems: hurricanes, floods, fires, mass civil disorders, and nuclear and personnel attack by alien countries. Sp
The Department of History offers graduate study leading to the Master of Arts and Doctor of Philosophy degrees. The M.A. program includes a thesis and non-thesis option. The doctoral program has concentrations in American and European history with special focuses in the areas identified under group II doctoral fields and group III teaching fields.

THE MASTER'S PROGRAM

Admission Requirements

1. Successful completion of a baccalaureate degree from an accredited institution, preferably with a major in history.

2. Acceptable scores on the Graduate Record Examination (general).

General Requirements

Complete 510 and a 600-level research seminar normally during the fall and spring semesters of the first year in the graduate program. Complete 521 in preparation for the M.A. examination. As many as 9 related hours may be taken outside the department. As many as 9 graduate credits taken elsewhere may be applied toward the M.A. degree. Except by prior approval of the Director of Graduate Studies, a student's coursework must be at the 500 level or above.

Thesis Option

Twenty-four hours of coursework and 6 hours of Thesis 500 for a total of 30 hours are required. Thesis students are required to select one M.A. field and write a thesis. At the end of the program the thesis student will stand for a two-hour oral examination on both the thesis and the field.

Non-Thesis Option

A total of 30 hours of coursework and 6 hours of courses (21 hours graded A-F) at UT Knoxville, and History 621 are required. Thesis students are required to complete 510 and a 600-level research seminar (must be taken at UT Knoxville) before taking the oral examination. The student's doctoral committee may specify any other languages or research seminars. (One must be completed at UT Knoxville.) Students who have completed a master's thesis need complete only one research seminar (must be taken at UT Knoxville), and History 621.

1. Complete History 510 at UT Knoxville (may be waived for comparable experience elsewhere).

2. Complete a minimum of 6 related hours outside the department.

3. Spend two consecutive semesters in residence.

4. Complete 9 hours in one Group I doctoral field. There is no minimum hours requirement for a Group II field. Complete 9 hours in one Group III field, including the appropriate 511, 512, or 513 course and two additional courses at the 500 level. The Group III field must be in a different geographic area from the Group II field. Courses taken to fulfill M.A. degrees may be counted toward all field requirements.

5. Fulfill the foreign language requirement.

6. Complete two 600-level research seminars. (One must be completed at UT Knoxville.)

7. Maintain a 3.0 overall grade-point average in graduate work attempted.

8. Complete 24 hours of graduate coursework (21 hours graded A-F) at UT Knoxville beyond that required for the M.A.

9. Except by prior approval of the Director of Graduate Studies, a student's coursework must be at the 500 level or above.

Language Requirements

Students must demonstrate competence in one foreign language through coursework or examination. The student's doctoral committee may specify any other languages or research tools, such as statistics, essential for the student's preparation. The foreign language requirement must be fulfilled before taking the comprehensive examination.

Group III (Teaching Field) Examination

This is a one-hour oral exam which must be completed at any time before the comprehensive examination is taken. If a student fails this, he or she may retake the exam one time only and must do so the following semester.

Comprehensive Examination

The comprehensive examination is to be taken no later than the semester following the term in which the student has completed the residence, coursework, and language requirements. A student stands examination in one field selected from Group I and one field selected from Group II below. Both parts are 4-hours, written, and taken during the same semester. The comprehensive examination is taken following the successful completion of the two written portions. The two written and oral exams are separate examinations, and Group I must be passed before taking Group II, and the latter passed prior to taking the oral portion. A student who fails any one of the three parts (Group I or Group II or the Oral) which constitute the Comprehensive Exam must repeat the failed exam the following semester, excluding summer. A second failure on any one of the three parts (regardless of which one) will cause the student to be dropped from the History graduate program. Likewise, a student who does not repeat a failed exam within the allotted time (one semester) will be dropped from the program.
Admission to Candidacy
Upon successful completion of the above requirements, a doctoral student may be admitted to candidacy.

Doctoral Fields
Group I:
Premodern Europe
Modern Europe
United States (colonial to present)

Group II:
To be defined by the student's doctoral committee from within one of the following fields:
United States
Colonial and Early Republic
19th century
20th century
Regional
Military and Foreign Relations
Social and Cultural
American Political
European
Medieval
Early Modern
Modern
Political and Diplomatic
Intelectual and Cultural
Social and Economic
National Fields

Group III (Examined Teaching Field):
World Civilization
Western Civilization
U.S. Civilization

Dissertation and Defense
Original research forms the basis for the dissertation. Doctoral candidates must register for a minimum of 3 hours of 600 Dissertation Research each semester and must complete 24 hours of dissertation credit. A final oral defense is given on the dissertation in its historical context. The program must be completed within eight years from admission as a potential candidate.

GRADUATE COURSES
415 Western Economic Thought Since the 18th Century (3) Methods of study of doctrinal history. Origins and evolution of major doctrines: classical and neoclassical economics, economics of Keynes and his followers, principal deviations of second half of 20th century. Major writing requirement. May not be used toward graduate degree in History. Prereq: Introductory Economics or consent of instructor. (Same as Economics 415.)

500 Thesis (1-15) P/NP only. E

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or for tuition before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

510 Foundations of Graduate Study in History (3) Assumptions and methods of historians. Required of all candidates for advanced degrees.

511 Teaching World Civilization (3) Methodology, conceptualization, historiography, text-book selection and syllabus construction to prepare students to teach courses in world civilization.

512 Teaching Western Civilization (3) Methodology, conceptualization, historiography, text-book selection and syllabus construction to prepare students to teach courses in western civilization.

513 Teaching United States History (3) Methodology, conceptualization, historiography, text-book selection and syllabus construction to prepare students to teach courses in U.S. history.

521 M.A. Readings (3) Directed readings in preparation for M.A. examinations. Open only to master's candidates in history. May be repeated. Maximum 6 hrs. S/NC only.

531 Topics in Premodern Europe (3) Reading seminar: secondary sources on premodern European movements and trends. Focus varies. May be repeated. Maximum 15 hrs.

532 Topics in Modern Europe (3) Reading seminar: secondary sources on movements and trends that are multinational in focus. Focus varies. May be repeated. Maximum 15 hrs.

533 Topics in European National History (3) Reading seminar: secondary sources on international topics, usually British, Russian, German or French. Focus varies. May be repeated. Maximum 15 hrs.

541 Topics in Early American History (3) Reading seminar: secondary sources on early North American history. Focus varies. May be repeated. Maximum 15 hrs.

542 Topics in 19th-Century United States (3) Reading seminar: secondary sources on 19th-century United States. Focus varies. May be repeated. Maximum 15 hrs.

543 Topics in 20th-Century United States (3) Reading seminar: secondary sources on 20th-century U.S. Focus varies. May be repeated. Maximum 15 hrs.

551 Topics in the History of Foreign Relations (3) Reading seminar: secondary sources on foreign relations. Focus varies. May be repeated. Maximum 15 hrs.

552 Topics in Military History (3) Reading seminar: secondary sources on military history; military operations, impact of war and naval strategy in foreign policy. Focus varies. May be repeated. Maximum 15 hrs.

555 Topics in United States Social and Economic History (3) Reading seminar: secondary sources on U.S. social and economic history. Focus varies. May be repeated. Maximum 15 hrs.

556 Topics in European Social and Economic History (3) Reading seminar: secondary sources on social or economic history of European nations. Focus varies. May be repeated. Maximum 15 hrs.

557 Topics in Cultural and Intellectual History (3) Reading seminar: secondary sources on cultural and intellectual history. Focus varies. May be repeated. Maximum 15 hrs.

558 Topics in United States Regional and Local History (3) Reading seminar: secondary sources on regions, states and cities of the United States. Focus varies. May be repeated. Maximum 15 hrs.

559 Topics in Latin American History (3) Reading seminar: secondary sources in Latin America. Focus varies. May be repeated. Maximum 15 hrs.

560 Topics in Asian History (3) Reading seminar: secondary sources on Asian history. Focus varies. May be repeated. Maximum 15 hrs.


562 Topics in World History (3) Reading seminar in transnational themes involving analysis of two or more world cultures. Focus varies. May be repeated. Maximum 9 hrs.

591 Foreign Study (1-15) See College of Arts and Sciences.

592 Off-Campus Study (1-15) See College of Arts and Sciences.

593 Independent Study (1-15) See College of Arts and Sciences.

600 Doctoral Research and Dissertation (3-15) P/NP only. E

621 Directed Readings (3) Directed readings to prepare candidates for doctoral comprehensive examinations. May be repeated. Maximum 1 per doctoral field. S/NC only.

632 Seminar in Modern European History (3) Research seminar in primary sources culminating in scholarly paper in modern European history. Focus varies. May be repeated. Maximum 15 hrs.


651 Seminar in Military and Foreign Relations History (3) Research seminar in primary sources culminating in scholarly paper in military or foreign relations history. Focus varies. Not restricted by national grouping. May be repeated. Maximum 15 hrs.


656 Seminar in United States Regional and Local History (3) Research seminar in primary sources culminating in scholarly paper in regional and local history. Focus varies. May be repeated. Maximum 15 hrs.

Holistic Teaching/Learning
(College of Education)

MAJORS

DEGREES

Education.........................M.S., Ed.S., Ed.D., Ph.D.
L. Knight, Leader

Professors:
Butterworth, Jennifer R., Ph.D...........Vanderbilt
Harris, Charles H. (Liaison), Ohio State
Huff, P. (Emeritus), Ph.D..................Michigan
Jost, Carl J., Ed.D....................Ohio State
Knight, Lester N., Ph.D..................Texas
Rowell, C. Glennon, Ed.D.............George Peabody
Schindler, W. Jean, Ph.D................Kent State
Turner, T. N., Ed.D..................Penn State

Associate Professors:
Chang, Charles A., Ph.D................Ohio State
Hamann, Michael C., Ed.D...........Northern Colorado

Assistant Professors:
Gilrane, Colleen P., Ph.D................Illinois
Hendricks, A. R., Ph.D...........Pennsylvania

Instructor:
Bartow, Jennifer R., Ph.D...........Vanderbilt

The Holistic Teaching/Learning unit participates in graduate programs leading to degrees, majors, and concentrations in: Master of Science

Education
Track 1-Elementary Education
Track 1-Modified and Comprehensive Special Education
Track 1-Reading Education
Track 1-Social Science Education
Track 2-Elementary Teaching
Track 2-Modified and Comprehensive Special Education
Track 2-Secondary Teaching

The Holistic Teaching/Learning program is designed to prepare educators to teach in a variety of educational settings, including elementary, secondary, and special education programs.
### Graduate Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>419</td>
<td>Psychology and Education of Students with Mild Disabilities</td>
<td>(6) Nature and characterization of persons with mild handicaps and educational strategies appropriate for these persons. Prereq: Special Education Principles, Special Education Strategies, and admission to teacher education program. Coreq: 420.</td>
<td>3</td>
</tr>
<tr>
<td>420</td>
<td>Field Experience in Modified Programs</td>
<td>(3) Practical work in teaching in special education classrooms: planning, implementing, and evaluating instruction. Prereq: Special Education Principles, Special Education Strategies, and admission to teacher education program. Coreq: 420.</td>
<td>3</td>
</tr>
<tr>
<td>421</td>
<td>Elementary and Middle School Science and Social Studies Instruction</td>
<td>(3) Methods and materials for teaching science and social studies; development of functional relationships and abilities of two fields. Not open to students with recent course or background in teaching science and/or social studies. Prereq: Admission to teacher education. F,Sp</td>
<td>3</td>
</tr>
<tr>
<td>429</td>
<td>Language Arts/Instruction in Elementary and Middle Schools</td>
<td>(3) Language and language development as applied to teaching of reading (listening-speaking) and aspects of literacy (reading process/readiness and writing). Not open to students with recent course in language arts methods. Prereq: Admission to teacher education. F,Sp</td>
<td>3</td>
</tr>
<tr>
<td>518</td>
<td>Educational Specialist Research and Thesis</td>
<td>May be repeated. P/NP only. E</td>
<td>2-3</td>
</tr>
<tr>
<td>521</td>
<td>Teaching Social Studies in Elementary and Middle Schools</td>
<td>(3) Planning and techniques. Trends in curriculum, development of concepts and generalizations, integration of social science and social studies. Prereq: Consent of instructor. SP</td>
<td>3</td>
</tr>
<tr>
<td>523</td>
<td>Diagnosis and Correction of Children's Difficulties in Learning Mathematics</td>
<td>(3) Children's difficulties in learning mathematics and procedures for helping children with special needs. Prereq: Elementary and Middle School Teaching Methods I and Coreq: 575. F</td>
<td>3</td>
</tr>
<tr>
<td>528</td>
<td>Teaching for Creative Thinking and Expression</td>
<td>(3) Creativity of teacher and development of student creativity. Development of creative potential across academic curricula. Prereq: Consent of instructor.</td>
<td>3</td>
</tr>
<tr>
<td>529</td>
<td>Teaching of Reading</td>
<td>(3) Methods and materials for teaching reading. Prereq: Consent of instructor. F,Sp</td>
<td>3</td>
</tr>
<tr>
<td>530</td>
<td>Elementary and Middle School Developmental Reading Instruction</td>
<td>(3) Word recognition (including phonics), comprehension, evaluation, and materials. Not open to students with recent course in reading methods. Prereq: Admission to teacher education. F,Sp</td>
<td>3</td>
</tr>
<tr>
<td>536</td>
<td>Psychology of Reading</td>
<td>(3) Reading act, relationship between words and reading, role of language and meaning, and role of language in reading behavior. Prereq: Consent of instructor.</td>
<td>3</td>
</tr>
<tr>
<td>538</td>
<td>Practicum in Diagnosis of Reading Problems</td>
<td>(3) Application of learning and teaching methodology in working with students. Prereq: Consent of instructor.</td>
<td>3</td>
</tr>
<tr>
<td>550</td>
<td>Assessment and Correction of Language Arts Difficulties</td>
<td>(3) Procedures and materials for diagnosing and correcting language arts difficulties; analysis of children's work. Prereq: Consent of instructor, SP</td>
<td>3</td>
</tr>
<tr>
<td>553</td>
<td>Assessment of Exceptional Students</td>
<td>(3) Current issues related to assessment; advanced study of evaluation methods and decision making. Prereq: Consent of instructor.</td>
<td>3</td>
</tr>
<tr>
<td>556</td>
<td>Instructional Systems for Affective/Motivational Education</td>
<td>(3) Educational strategies and materials of instruction in social studies, health, and physical education. Prereq: Consent of instructor.</td>
<td>3</td>
</tr>
<tr>
<td>557</td>
<td>Practicum in Remediation of Reading Problems</td>
<td>(3) Diagnosis and remediation of reading difficulties. Prereq: Consent of instructor.</td>
<td>3</td>
</tr>
<tr>
<td>560</td>
<td>Teaching of Reading</td>
<td>(3) Methods and materials for teaching of reading. Prereq: Consent of instructor.</td>
<td>3</td>
</tr>
<tr>
<td>567</td>
<td>Psychology of the Exceptional Child</td>
<td>(3) Varieties of exceptional children; general characteristics and educational needs; implications for remedial instruction. Prereq: Consent of instructor.</td>
<td>3</td>
</tr>
<tr>
<td>570</td>
<td>Seminar in Educational Psychology</td>
<td>(3) Theoretical and practical applications of psychology to education. Prereq: Consent of instructor.</td>
<td>3</td>
</tr>
<tr>
<td>573</td>
<td>Diagnosis and Correction of Classroom Reading Problems</td>
<td>(3) Procedures, methodologies, and techniques for diagnosing and correcting classroom reading problems. Prereq: Consent of instructor.</td>
<td>3</td>
</tr>
<tr>
<td>579</td>
<td>Reading and Language Arts</td>
<td>(3) Theoretical and practical applications of reading theory, research, and methodology to classroom instruction. Prereq: Consent of instructor.</td>
<td>3</td>
</tr>
<tr>
<td>585</td>
<td>Teaching of Reading</td>
<td>(3) Methods and materials for teaching of reading. Prereq: Consent of instructor.</td>
<td>3</td>
</tr>
<tr>
<td>587</td>
<td>Seminar in Research Techniques</td>
<td>(3) Evaluation of appropriate research methodologies and techniques. Prereq: Consent of instructor.</td>
<td>3</td>
</tr>
<tr>
<td>590</td>
<td>Application of Microcomputer Technology in Social Studies</td>
<td>(3) Application of microcomputer technology in teaching of social studies. Prereq: Consent of instructor.</td>
<td>3</td>
</tr>
<tr>
<td>600</td>
<td>Practicum in Remediation of Reading Problems</td>
<td>(3) Diagnosis and remediation of reading problems. Prereq: Consent of instructor.</td>
<td>3</td>
</tr>
</tbody>
</table>

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**Field Placements:**

- **Field Experience in Modified Programs (420)**
- **Elementary and Middle School Science and Social Studies Instruction (421)**
- **Language Arts/Instruction in Elementary and Middle Schools (429)**
- **Field Experience in Comprehensive Programs (431)**
- **Psychology and Education of Students with Moderate/Severe Disabilities (432)**
- **Teaching Strategies and Issues in Social Studies Education (454)**
- **Speech and Language Basis of Learning Disabilities in the Classroom (456)**
- **Psychology of the Exceptional Child (470)**
- **Teaching Strategies and Issues in Social Studies Education (526)**
- **Instructional Systems for Affective/Motivational Education (556)**
- **Psychology of the Exceptional Child (570)**
- **Seminar in Educational Psychology (573)**
- **Reading and Language Arts (579)**
- **Seminar in Research Techniques (587)**
- **Application of Microcomputer Technology in Social Studies (590)**

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- **Psychology of the Exceptional Child (570)**
- **Seminar in Educational Psychology (573)**
- **Reading and Language Arts (579)**
- **Seminar in Research Techniques (587)**
- **Application of Microcomputer Technology in Social Studies (590)**
Human Ecology

(College of Human Ecology)

MAJOR

Human Ecology .................................................. Ph.D.

The College of Human Ecology offers the Doctor of Philosophy degrees with a major in Human Ecology.

ADMISSION REQUIREMENTS

A completed file for review includes the Graduate School application file, departmental application, Graduate Record Examination (GRE) scores for the general section, and three Graduate School Rating Forms completed by individuals who can attest to the potential for graduate education. Forms may be obtained from the Dean's Office, College of Human Ecology.

THE DOCTORAL PROGRAM

Graduate study leading to the Doctor of Philosophy degree with a major in Human Ecology is available in the Departments of Child and Family Studies; Consumer and Industry Services Management; Health and Safety Sciences; Human Resource Development; Nutrition. Concentration areas are child and family studies, community health, human resource development, nutrition science, textile science, and retail and consumer sciences. A major challenge of the doctoral program in Human Ecology is to draw upon basic research generated from the natural sciences, social sciences, human sciences, and the arts, and to provide a holistic perspective that contributes to the improvement of individual and family well-being. Within the College of Human Ecology, research from one discipline is enhanced by encompassing and utilizing the findings of research from other disciplines.

The Ph.D. is a research degree granted only to individuals who demonstrate proficiency in conducting original research. Course requirements for the degree are determined by the student's faculty committee, based upon college and departmental requirements and student needs and interests. The Graduate School sets minimum requirements for the doctoral degree.

More specific information about the coursework of a given student is available under the individual academic departments that administer the Ph.D.

MINOR IN GERONTOLOGY

An interdepartmental/interdisciplinary minor in gerontology gives the graduate student an opportunity for combining the knowledge and experience about aging in American society with his/her own major concentration.

Core courses and a practicum are offered by the College of Social Work and selected departments within the colleges of Human Ecology, Education, and Arts and Sciences. A cross-listed seminar between contributing departments is designed to integrate experiences from different sources and to demonstrate the multi-faceted nature of working within an aging society.

Declaration of a Minor

Prior to earning more than one-half the total hours required for this minor, students must complete a "Declaration of a Minor in the College of Human Ecology" form. Copies of this form are available in the Dean's Office, Room 110, Jessie Harris Building.

Core Experience

Students must complete a core experience of 12 semester hours taken from at least three different departments including nine hours taken outside the major department. Coursework needs to comply with the following framework:

2. Applied practicum. 2 hours required. Students should register under practicum experiences in the "home" department of the supervising faculty.
4. Successful completion of a written comprehensive examination covering subject matter of the minor.

Graduate Committee

At least one faculty member from the Gerontology Policy Committee who is qualified to work with graduate students, must serve on the graduate committees of each student who declares a gerontology minor. Contact Dr. Jim Moran, Associate Dean in Human Ecology, for a current list.

Admission to Candidacy

When application is made for admission to candidacy, indication of the minor must be noted on the Admission to Candidacy form.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The Ph.D. program in Human Ecology is available to residents of Alabama, Kentucky, Mississippi, Virginia (concentration in health education only), or West Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE COURSES

500 Thesis (1-15) P/NP only. E

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or prior faculty time before degree is completed. May not be used toward degree requirements. May be repeated. P/NP only. E

510 Integrative Nature of Home Economics (3) History and philosophy of home economics. Analysis of current programs and future directions in field. Examination of research, integrative framework. F.A

520 Directed Study in Human Ecology (1-3) Integrative topics. Prerequisite: At least 9 hrs of graduate study in college including courses from at least two departments or consent of instructor. May be repeated. Maximum 6 hrs. E
THE MASTER'S PROGRAM

The Master of Science degree with a major in Human Resource Development provides a flexible graduate program for professionals wishing to pursue graduate study within and across subject areas of Human Resource Development; those who work with individuals to help them enter the workforce; those who train individuals already in the workforce; and those who help individuals in the workforce advance their positions.

The M.S. degree with a major in Human Resource Development offers two concentrations, each providing opportunities for specialized interests. The training and development concentration is designed to meet the needs of professionals who work in programs encompassing all areas of human resource development. Applicants without an undergraduate degree in an area related to human resource development may be required to take 501 as a prerequisite and to complete an internship as part of their program. The training licensure concentration is specifically for students who seek initial teaching licensure in family and consumer sciences education, business and marketing education, and technology education. This program requires admission to Teacher Education and has specific prerequisites. Thesis and non-thesis options are available for both tracks.

Admission Requirements

Training and Development Concentration applicants are to submit an application for admission to The Graduate School, three letters of reference from individuals familiar with their potential for success in academic work, and a statement describing personal career objectives directly to the Department of Human Resource Development. Applicants must meet the admission requirements of The Graduate School and present evidence of ability to do graduate work, including a GPA of at least 2.7 on a 4.0 scale for the last two years of undergraduate work. Any student below this level of academic quality must justify admission via an exceptional reason. If the applicant has prior work experience in human resource development, a reference letter should also be provided by the work supervisor. Recent Graduate Record Examination or Miller's Analog Test scores are required of all applicants except for those applying for the teacher licensure concentration. Students who have not taken an appropriate undergraduate statistics course will be required to take one as part of their program. All applicants are required to be interviewed by the department admissions board.

Teacher Licensure Concentration applicants are to submit an application for admission to The Graduate School, three letters of reference from persons familiar with their potential for success in doctoral work, and a statement describing personal career objectives directly to the Department of Human Resource.

Applicants must hold a master's degree from an accredited institution and present evidence of ability to do Ph.D. work, including having maintained a graduate GPA of 3.3 on a 4.0 scale or better. If the applicant has prior work experience in human resource development, a letter of reference should be provided by the work supervisor. Graduate Record Examination scores are required of all applicants. All applicants are required to be interviewed by the department admissions board.

Note: For students in the Nashville area, only the training and development concentration is available.

THE PH.D. CONCENTRATION

Admission Requirements

Applicants are to submit an application for admission to The Graduate School, five letters of reference from persons familiar with their potential for success in doctoral work, and a statement describing personal career objectives directly to the Department of Human Resource.

Applicants must hold a master's degree from an accredited institution and present evidence of ability to do Ph.D. work, including having maintained a graduate GPA of 3.3 on a 4.0 scale or better. If the applicant has prior work experience in human resource development, a letter of reference should be provided by the work supervisor. Graduate Record Examination scores are required of all applicants. All applicants are required to be interviewed by the department admissions board.

Any person whose native language is not English must submit results of the Test of English as a Foreign Language (TOEFL). A minimum score of 600 is required for admission consideration.

Degree Requirements

The Doctor of Philosophy degree with a major in Human Ecology and a concentration in human resource development is for graduate students who seek careers in higher education or as managers/administrators of HRD. The curriculum is designed to enable students to achieve professional objectives, develop...
needed competencies, and gain desirable experiences and understanding of human resource development. Students must possess a master's degree before acceptance to the program. A minimum of 95 hours beyond the baccalaureate is required.

Concentration (15 hours): Must include courses to support Human Resource Development and may be taken from the minor's degree.

Departmental Core (17 hours): Must include 510, 511, 512, 557, 559 or equivalents and 504.

Specialization (12 hours): Must support a career path of university faculty member or manager of education/training.

Cognate (6 hours): Must be obtained from an academic unit outside the department, support specialization, and be represented by a committee member.

Related Studies (6 hours): Research and theory in support of theoretical framework.

Research and Statistics (15 hours): Must include advanced statistics such as multivariate analysis and computer application, 9 hours minimum; research methodology must include 504 and 610 or equivalents, 6 hours minimum.

Internship (0-6 hours): Required for those changing career path.

Dissertation (24 hours): Must be original research project.

Detailed information regarding the Ph.D. concentration program of study may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

Note: For latest update, check the homepage of Department of Human Resource Development (http://hrd.he.uky.edu).

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S. program is available to residents of the state of Kentucky. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE COURSES

415 Coordination Techniques (3) Necessary procedures, duties and responsibilities to implement, maintain, and evaluate successful cooperative education program. Prereq: Senior standing and consent of instructor. Sp

430 Principles and Organization of Business and Marketing Education (3) Historical background and development needs. Principles of vocational education in business and marketing education: organizations, establishing, evaluating, and improving programs. Fall

455 Learner and Program Evaluation (3) Assessing effectiveness of training or educational programs; developing performance-based measures; evaluating job performance; and measuring learner progress. Prereq: Program Planning for Training, Development, and Education. Spring

476 Supervised Occupational Experience (3) Practical field experience in business/industry/community-based settings related to area of study. Prereq: Senior standing and consent of advisor. May be repeated. Maximum 9 hrs. E

500 Thesis (1-15) P/NP only. E

501 Survey of Human Resource Development (3) Training and development as practiced in organizations: needs assessment, transfer of workplace skills, evaluation, development of training program proposals, assessment of personal competencies, values, goals, and training program design and administration.

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or for faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

503 Problems in Lieu of Thesis (3) May be repeated. Maximum 6 hrs. S/NC only. E


506 Selection, Placement, and Follow-up Procedures in Human Resource Development (3) Measures and procedures used in selecting trainable and placing, training, and following-up individuals appropriate for making program improvements. Prereq: Consent of instructor. Sp, Su

506 Developing Organizational Resources (3) Strategies for developing human and organizational resources through community partnerships and learning. Effective utilization of human resources through active learning programs.

509 Internship in Human Resource Development (3) Practical field experiences in selected settings under supervision of practitioner and department representative. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E


512 Human Resource Management (3) Process-systems approach to human resource management: interdependent human resource activities (planning, work design, staff development, training and development, compensation, etc.) and organizational goals.

513 Special Topics in Human Resource Development (1-3) Specific objectives, activities, and evaluation. Prereq: Consent of instructor. May be repeated. Maximum 3 hrs. E

514 Individual Study in Human Resource Development (3) Prereq: Consent of supervising instructor. Approval form must be filed in office of department head. May be repeated. Maximum 6 hrs. E

515 Microcomputer Operations and Programming in Education (3) Operating procedures and computer application, 9 hours minimum; research methodology must include 504 and 610 or equivalents, 6 hours minimum.

516 Microcomputer Software Development (3) Advanced software design in BASIC; random access and binary files, search and sort algorithms, and bitmapped graphics for educational environments. Hands-on learning and programming development. Prereq: 515 or consent of instructor.

521 Design and Development of Instruction (3) Curriculum development and program planning; design of instruction; development of teaching materials for distance and educational purposes. Prereq: Consent of instructor.


531 Organization and Supervision of Vocation and Marketing Programs (3) Developing and operating marketing programs, guidelines for cooperative laboratory, and model office programs. Trends in office and cooperative education, physical facilities, state plans, instructor qualifications and advisory committees. Prereq: Consent of instructor. F, Su

550 Administration of Industrial Education Programs (3) Developing, staffing, administering and evaluating trade, industrial and technical education programs in secondary and post-secondary school settings. Prereq: Consent of instructor. Sp, Su

551 Supervision of Industrial Education Programs (3) Techniques used to improve industrial education programs. Prereq: 550 or equivalent. F, Su

552 History and Philosophy of Industrial Education (3) Social, political, and economic concepts and events that impact development of industrial education. Philosophical problems: justification, values, principles and concepts of induction education. Prereq: Consent of Instructor. F, Su

553 Planning Technical Education Facilities (3) Preparation of educational specifications, site selection, and working relationships with other professionals involved in process of planning technical-education facilities. Prereq: Consent of instructor. Sp, Su

554 Technical Program Planning (3) Instructional systems for analyzing, designing, development, implementation, and evaluation of trade, technical, and career education programs and related training. Prereq: Curriculum development course and consent of instructor. F, Su

555 Curriculum Planning for Industrial Education Programs (3) Developing, implementing, and evaluating related training programs. Prereq: Consent of instructor. Sp, Su

556 Organizational Development (3) Strategies and interventions for organizational development: training and development of staff, conflict resolution, organizational and communication change and consultants role. Prereq: 512 or consent of instructor. F

557 Methods of Teaching Conceptual Content (3) Select teaching methods for teaching and learning content. Prereq: Curriculum development course. Prereq: Consent of instructor. Fall

558 Seminar in Industrial Education (1-3) Current issues, problems associated with technical programs. Prereq: 12 hrs. of graduate courses. May be repeated. Maximum 6 hrs.

559 Program Evaluation (3) Concepts, principles, policies, theories, and trends related to program evaluation. Prereq: Planning, conducting, and evaluating comprehensive program evaluation in variety of settings. Prereq: Consent of instructor. Fall

560 International Perspective of Workforce Training (3) Examination and comparison of workforce systems in highly industrialized nations. In-school training programs, out-of-school training systems, transfer training of incumbent workers, retraining displaced workers, transfer of new technologies, and role and responsibilities of businesses, private sector organizations/agency and state and federal government agencies.

562 Grant Writing and Project Implementation (3) Writing process, negotiating with funding sources, implementing and maintaining funded programs, and closing out projects at end of funding support.

564 Self-Directed Work Teams (3) Theory and practice of implementing self-directed work teams, motivating employees, increasing employee productivity via teams and related issues.

600 Doctoral Research and Dissertation (3-15) P/NP only. E

601 Curriculum Planning in Human Resource Development (3) Curriculum theory, models, contents, planning evaluation and implementation of specialized program areas. Prereq: 555 or equivalent. F, Su


610 Research Development in Human Resource Development (3) Proposal development, theoretical base,
Inclusive Early Childhood Education (College of Education)

MAJORS DEGREES

Education ......................... M.S., Ph.D.

Susan Benner, Leader

Professors:

Benner, Susan M., Ed.D. .......... Columbia College
Laurence, John J., Ph.D. .... Kent State
J. Amos, Ph.D. Florida

Associate Professor:

Susan Benner, Leader

Assistant Professor:

Judge, Sharon L., Ph.D. California (Santa Barbara)

The inclusive Early Childhood Education unit participates in graduate programs leading to degrees, majors, and concentrations in:

- Master of Science
- Doctor of Education

Education

Track 1: special education: early childhood
Track 2: elementary education
Track 3: special education: early childhood
Track 4: elementary teaching

Doctor of Philosophy

Early childhood education

See Education under Fields of Instruction for full description of all degree requirements. Early childhood licensure and degree programs are also available through the College of Human Ecology.

The unit is focused on the preparation of teachers for the education of all children with and without disabilities in inclusive settings. All young children are defined as children from birth to age three, including children of poverty, those of color, with disabilities, with advanced development and "mainstreamed" children.

GRADUATE COURSES

465 Early Childhood Education: Program Development and Teaching in Kindergarten (3) Curriculum planning, classroom organization and management practices for teaching young children; leadership of kindergarten to grade elementary school. Prereq: Admission to teacher education.

454 Education of the Gifted and Talented Children (3) Orientation to psychometric and behavioral studies of giftedness. Analysis of past and present school practices in reference to curriculum and program implementation.

471 Early Childhood Special Education (6) Assessment, curriculum planning and development and teaching approaches used in early childhood special education. Prereq: Admission to teacher education.

500 Thesis (1-15) P/NP only. E

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E


504 Clinical Experience in Teaching and Supervision of Exceptional Children (3-9) Placement in educational settings. May be repeated. Maximum 9 hrs. S/NC or letter grade. (Same as Rehabilitation and Deafness 504.)

515 Seminar (1-3) Curriculum, instructional technology, early childhood education, secondary education, or social foundations as related to goals of student's programs. May be repeated. Maximum 6 hrs. S/NC only. E

516 Educational Specialist Research and Thesis (3) May be repeated. P/NP only. E

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 role. Prereq: Admission to graduate program.

554 Assessment in Early Childhood Special Education (3) Development of knowledge and skills in appropriate formal and informal assessment of handicapped infants and young children; screening, identification, diagnosis, placement and programming assessment issues. Prereq: 553 or consent of instructor.

558 Neuromuscular and Health Disorders: Educational Implications (3) Neurological impairments, physical disabilities and special health conditions. Investigation of instructional techniques and adaptations.

564 Psychosocial Development of Gifted and Talented Children (3) Phenomena of talent development in context of home, school and society. Identification of maladjustment. Practices for promoting social and emotional development. Prereq: 451 and 452 or equivalent or consent of instructor.

566 Instructional Systems for the Gifted and Talented (3) Instructional methods and systems evaluated in terms of effectiveness in various educational environments. Prereq: coreq. 564 or consent of instructor.


567 Application of Theory in Early Childhood Education (K-3) (3) Principles and practices from selected theoretical orientations. Prereq: Course in early childhood education or consent of instructor. May be repeated. Maximum 9 hrs. F. Su.

568 Early Childhood Special Education: Theories and Interventions (3) Theoretical perspectives of early childhood special education: exploration of programmatic models, family-focused concepts and curriculum development.

575 Creative Problem-Solving Strategies for Special Educators (3) Techniques for solving problems encountered by special educators in any setting.

579 Special Topics (1-3) Prereq: Admission to graduate program. May be repeated. Maximum 9 hrs. S/NC or letter grade.


591 Clinical Studies (4) Relationship between educational theory and application during internship; research project, development of portfolio, and capstone experience.

593 Independent Study (1-3) May be repeated. S/NC or letter grade. E

594 Supervised Readings (1-3) May be repeated. S/NC or letter grade. E

659 Special Topics (1-3) May be repeated. S/NC or letter grade. E

600 Doctoral Research and Dissertation (3-15) P/NP only. E

604 Seminar in Curriculum and Instruction (1) Required 2 consecutive semesters. S/NC only. E

610 Internship in College Teaching and Supervision (2-9) Supervised practice in college teaching and supervision. Prereq: Admission to doctoral program or consent of instructor. May be repeated. Maximum 9 hrs. S/NC only.

620 Internship in Research in Special Education and Rehabilitation (3-9) Placement with professional engaged in theoretically-based research; public school, institution, agencies or university settings. Prereq: 9 hrs in statistical and research methods. May be repeated. Maximum 9 hrs. S/NC only.

630 Internship in Institutional Leadership in Special Education and Rehabilitation (3-9) Advanced level field experiences under supervision of practitioner. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/NC only.


650 Advanced Studies in Early Childhood Education (3) Prereq: 2 graduate courses in early childhood education and consent of instructor. May be repeated. Maximum 6 hrs. S/NC only. E

679 Special Topics (1-3) Prereq: Admission to doctoral program. May be repeated. Maximum 9 hrs. S/NC or letter grade.

689 Internship (1-3) Experiences in application of principles and practices of the curriculum development and instructional improvement. Prereq: Program prerequisites and consent of instructor. May be repeated. Maximum 8 hrs. S/NC only. E

693 Independent Study (1-3) May be repeated. S/NC or letter grade. E

694 Supervised Reading (1-3) May be repeated. S/NC or letter grade. E

695 Special Topics (1-3) May be repeated. S/NC or letter grade. E

Industrial and Organizational Psychology (College of Business Administration)

MAJOR DEGREES

Industrial and Organizational Psychology ....................... Ph.D.

Robert T. Ladd (Liaison), Director

Committee:

Fowler, Oscar S., Management
James, Lawrence R., Management
Larsen, John M., Jr., (Emeritus), Management
Russell, Michael C., Management
Schumann, David W., Marketing, Logistics & Transportation

The doctoral program is designed to prepare students for personnel, management, and organizational research; for university teaching; and for consulting relationships with industry. The program emphasizes a scientist/practitioner model in applying and conducting...
research based on accepted theory, organizational behavior, psychology, management, and statistics. The degree program is administered by a committee appointed by the Associate Vice Chancellor and Dean of The Graduate School on recommendations from the Management Department head and the program director.

It is intended that students entering the I/O program will represent widely different undergraduate and graduate backgrounds including psychology, business administration, engineering, science, and liberal arts. The first-year program provides the opportunity to take courses that will assist the students in attaining a reasonable level of sophistication in areas of deficiency.

ADMISSION REQUIREMENTS

Applicants for admission should request information and application forms from both the Office of Graduate Admissions and Records (218 Student Services Building) and the Director, Industrial and Organizational Psychology Program (408 Stokely Management Center, The University of Tennessee, Knoxville, TN 37996-0545).

Two separate applications must be completed: one application for admission to The Graduate School (apply for major in Industrial and Organizational Psychology) and one application for admission to the Industrial and Organizational Psychology program.

Deadline: New students are admitted in fall semester only, and applications must be received by the Graduate Admissions and Records Office by February 1.

The master’s degree in Industrial and Organizational Psychology is generally not required of individuals pursuing a doctoral degree.

General Requirements

At least one year of college mathematics and one course in statistics are required. Ordinarily, an undergraduate grade-point average of 3.6 or above is required with no evidence of special weakness in mathematics and physical sciences.

Test scores on each section of the general portion (verbal and quantitative) of the Graduate Record Examination (GRE) are required. Customarily, those students admitted to the program have performed at or above the 69-78th percentile on the general tests. (This corresponds to a raw score of approximately 600 on each of the tests.)

THE DOCTORAL PROGRAM

The Ph.D. degree with a major in Industrial and Organizational Psychology can be completed with a minimum of 90 semester hours in the major. Students must be in residence full time for one year; must maintain an overall 3.0 grade-point average with no more than one grade below B in the I/O Psychology, General Psychology, and Statistics core; must complete an applied research project prior to beginning dissertation work; must pass a comprehensive examination; and must pass a final oral examination on their dissertation research.

Course Requirements: Hours

I/O Psychology Core 567, 568, 569 9

Research Core

Statistical Principles (Statistics 537 & 538 or equivalents) 12
Multivariate Statistics (Statistics 579, 679 or equivalent) 9
Advanced Research Methods (605 or equivalent) 9

General Psychology Core

One course in each of the following areas: biological bases of behavior, cognitive bases of behavior, history and systems of psychology. 9

I/O Psychology Seminars

600 level IOPSY courses, from a program committee approved list. 9

Approved Electives

Courses supporting the student’s course of study. 9

Supervised practicum, internship, or field training (860) 15

Ethics (635 or equivalent) 3

Dissertation (600) 24

TOTAL 90

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The Ph.D. program is available to residents of Alabama, Arkansas, Kentucky, Virginia, or West Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE COURSES

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is complete. May not be used toward degree requirements. May be repeated. S/NC only. E

525 Research in Industrial/Organizational Psychology (1-3) Available only to students admitted to program or by prearrangement with program director. May be repeated. Maximum 6 hrs. S/NC or letter grade.

567-68 Proseminar in Industrial/Organizational Psychology (3.3) Basic thought, concepts, and issues required for advanced graduate study in industrial and organizational psychology. Must be taken during first year of study in program. Consent of instructor required for non-program students.

599 Applied Measurement for Industrial/Organizational Psychology (3) Basic techniques for collection and evaluation of individual and organizational data using both classical and modern psychometric techniques. Relevant statistical models: reliability analysis, and exploratory and confirmatory factor analyses.

600 Doctoral Research and Dissertation (3-15) PNP only. E

605 Advanced Research Methods in Psychology (3) Critical analysis of new and evolving techniques for psychological research; new statistical and psychometric methods.

610 Individuals in Organizations Seminar (3) Bridging principles and processes which link individual attributes with more macro organization concepts: culture, climate, and group decision-making.

611 Seminar in Organizational Leadership (3) Current theories, concepts, and issues associated with psychology of organizational leadership. Prerequisite: 567-68 or consent of instructor.

612 Seminar in Work Motivation (3) Current theories, concepts, and issues associated with psychology of work motivation. Prerequisite: 567-68 or consent of instructor.

613 Seminar in Performance Appraisal (3) Current issues, problems, and research in performance appraisal and criterion development; applications in compensation. Prerequisite: 567-68 or consent of instructor.

614 Seminar in Employee Selection (3) Current issues, concerns, and methods used in employee selection. Prerequisite: 567-68 or consent of instructor.

615 Seminar in Organizational Training and Development (3) Current issues, problems, and research in training and development. Prerequisite: 567-68 or consent of instructor.

625 Topics in Industrial/Organizational Psychology (3) Topics vary.

626 Topics in Industrial Psychology (3) Topics vary.

527 Structural Equation Models in Organizational Research (3) Issues related to analysis of organizational data using structural equation and related techniques.

528 Personality Assessment (3) Review of key domains of social cognition: measurement systems which use individual differences in social-cognitive biases as bases for measuring personality.

635 Ethical and Professional Issues in Industrial/Organizational Psychology (3) Issues related to analysis of organizational data using structural equation and related techniques.

Industrial Engineering (College of Engineering)

MAJOR DEGREES

Industrial Engineering ............... M.S., M.S.-MBA

T. E. Shannon, Acting Head

Professors:
Bontadelli, J. A. (Liaison), Ph.D. .............. Ohio State
Claycombe, W. W., Ph.D. .............. Texas
Devine, Michael D., Ph.D. .............. Texas
Garrison, G. W. (UTSI), Ph.D. .............. North Carolina
Lovelace, Howard L. (Emeritus), PE, Ph.D. ...... Tennessee

Associate Professors:
Alkens, C. H., Ph.D. .............. Tennessee
Haidley, M. L. (UTSI), Ph.D. .............. Texas Tech
Hungerford, J. G., Ph.D. .............. Ohio State
Jackson, D. F., Ph.D. .............. Tennessee
Kirby, K. E., Ph.D. .............. Tennessee
Liggert, H. R., Ph.D. .............. North Carolina

Assistant Professors:
Coleman, G. D. (UTSI) PE, Ph.D. .............. VPI
Ford, R. E., Ph.D. .............. Tennessee
Kress, T. A., Ph.D. .............. Tennessee
Sawhney, Rupy S., Ph.D. .............. Tennessee

The Department of Industrial Engineering offers a graduate program leading to the Master of Science degree with a major in Industrial Engineering, concentrations in traditional industrial engineering, management, and manufacturing systems engineering. The Ph.D. with a major in Engineering Science is available through the Department of Mechanical and Aerospace Engineering and Engineering Science with a concentration in industrial engineering.
THE MASTER'S PROGRAM

Students who enroll in the Master of Science degree may select a concentration in industrial engineering, engineering management or manufacturing systems engineering. Admission is open to graduates of ABET-accredited undergraduate curricula in engineering, or to graduates of other technical curricula who satisfy prerequisites depending on their academic backgrounds. Policies concerning prerequisite requirements will be determined by the Industrial Engineering faculty.

Industrial Engineering

Under the industrial engineering concentration, students may select either the thesis or non-thesis option. The thesis option requires 27 hours of coursework and 6 hours thesis. The non-thesis option requires 30 hours of coursework plus a 3-hour design project.

Depending upon a student's background and career objectives, graduate work in industrial engineering enables the student to select an area of specialization from operations research, human factors engineering, information systems engineering, maintenance and reliability engineering, or general industrial engineering.

Engineering Management

The engineering management concentration has an additional admission requirement of two years' U.S. industrial experience as a practicing engineer or scientist, or current full-time employment in an appropriate engineering or applied science position. The program is non-thesis and requires 33 hours of coursework plus a 3-hour design project. This concentration is fully supported off-campus utilizing electronic media for video taping and interactive distance teaching methods.

Manufacturing Systems Engineering

Under the manufacturing systems engineering concentration, students may select either the thesis or non-thesis option when taking the M.S. degree program, or the non-thesis option only when taking the dual M.S.-MBA program. The thesis option requires 27 hours of coursework and 6 hours of thesis. The non-thesis option requires 30 hours of coursework (33 hours in the dual M.S.-MBA program) plus a 3-hour design or industrial problem project.

DUAL M.S.-MBA PROGRAM

The College of Engineering and the College of Business Administration offer a coordinated program leading to the Master of Science degree and the Master of Business Administration with a major in Industrial Engineering (concentration in manufacturing systems engineering) and the Master of Business Administration degree (concentration in manufacturing management). The dual program saves the student one or two semesters over the time that would be required to earn both degrees independently.

The establishment of the dual program addresses the critical need for personnel trained in both engineering and management who can integrate this increasingly complex body of knowledge into the efficient operation of manufacturing and production firms. The program is designed to accommodate the interests of students who desire a career leading to a leadership position in a manufacturing/production organization.

Admission Requirements

Applications are accepted for fall semester only. A minimum of 15 semester hours of graduate courses completed in the Department of Industrial Engineering must be counted toward the MBA degree program. The approval of courses is the responsibility of the Dual Program Committee and the student's assigned advisor.

Note: Any 400-level course required in the Bachelor of Science in Industrial Engineering program at UT Knoxville may not be used for graduate credit in the M.S. degree program.

Industrial Engineering

GRADUATE COURSES

401 Integrated Manufacturing Systems (NC) and CNC machine tools, robotics and related materials handling systems, hard automation, alternative integrated manufacturing systems, and manufacturing information/control systems. Prereq: 400.

402 Production System Planning and Control (Theory and application of forecasting systems, regression and time series models, development of safety stock, inventory models, and related techniques. Coverage of modules of Manufacturing Resource Planning (MRP) Systems: master production scheduling, resource requirements planning, bill of material and inventory life structures, material requirements planning, capacity planning, shop floor and purchasing control, overview of just-in-time inventory concepts and MRP's role in manufacturing automation. Prereq: 401.


421 Information Systems Analysis and Design (3) Systems engineering to approach analysis, design, development, and implementation of systems of information. Synthesis of elements of industrial engineering systems, utilization of relevant systems. Prerequisites: Simulation or consent of instructor. 2 hrs and 1 lab.

422 Senior Industrial Engineering Problems Analysis (3) Application of industrial engineering to field assignments in local organizations, problem definitions, analysis and presentation. Prereq: 402, 403, and 405.


440 Process Improvement Through Planned Experimentation (3) Fundamentals of continuous improvement, advanced statistical process control techniques, and statistical support for production runs. Use of experimental design techniques to improve processes: single and multiple-factor designs, blocking and confounding, and fractional designs. Full factorial designs compared to fractional designs to balance experimental efficiency with loss of information. Lab component utilizes statistical and simulation software to provide hands-on experience. Prereq: Engineering Data Analysis and Process Improvement, Simulation, Probability and Statistics for Scientists and Engineers or consent of instructor.

484 Introduction to Maintenance and Reliability Engineering (3) (Same as Nuclear Engineering 484, Materials
522 Optimization Methods in Industrial Engineering (3) Classication methods applied to constrained and unconstrained, non-linear, and linear problems; set-theoretic approaches; decision making under uncertainty; game theory; and dynamic programming. Prereq: Operations Research or Engineering Management 537.

523 Mathematical Programming (3) (Same as Management Science 531.)


526 Systems Modeling and Simulation (3) Modeling of continuous, discrete, and hybrid systems using current simulation software. Input data, output data analysis, model validation, variance-reduction techniques, and design of simulation experiments. (Same as Management Science 526.)

527 Lean Production Systems (3) Characteristics and performance of mass and lean production systems. Lean production concepts and principles. Planning, designing, and implementing lean production systems: total quality, throughput, and maintenance. Maintenance support and other selected topics. Application at enterprise level to achieve competitive goals. Prereq: 515 or consent of instructor.

591-92-93 Special Topics in Industrial Engineering (1-3,1-3,1-3) Individual or group research projects. Prereq: Graduate standing and consent of instructor. May be repeated.

533 Theory and Practice of Engineering Management (3) Manager's perspective; business definition; organizational, and financial strategies; external factors; and commercial feasibility of new ventures. Prereq: 539.

538 New Venture Formation (3) Factors other than mechanical or chemical which enter into establishment of manufacturing or service enterprises. Organizational and financial strategies: capital structure, cost and location studies. Prereq: 539 or consent of instructor. May be repeated.

539 Strategic Management in Technical Organizations (3) Strategic management in industry and technology, including in practice: corporate vision and mission; market, organizational, and financial strategies; external factors; corporate identification of new technologies, and competition and beyond. Prereq: 533 or 516.


541 Total Quality Management and Beyond (3) Continuous improvement in capabilities, competitiveness, and productivity of organizations. Principles of total quality management in systems, technology, and measurement; application of statistical techniques in continuous improvement. Team building and leadership issues, and case studies. Prereq: 516.


543 Legal and Ethical Aspects of Engineering Management (3) Legal aspects imposed by government and ethical considerations in engineering practice. Selected readings, lecture, discussion, and student presentations. Current topics from government and industry.
The mission of the School of Information Sciences is to educate people to live, work, and flourish in an information society through excellence in teaching, research, and public service in Information Sciences. The goals and objectives of the school are:

1. Knowledge of the generation, production, management, dissemination, and uses of information.
2. Knowledge of the roles of various organizations and institutions in the management of information resources, and the facilitation of information transfer. Students will demonstrate:
   - Knowledge of the generation, production, management, dissemination, and uses of information.
   - Knowledge of the roles of various organizations and institutions in the management of information resources, and the facilitation of information transfer.
   - Knowledge of the roles of various tools and technologies in facilitating access to information.
   - An understanding of the structure and content of information resources in various formats and subjects.
   - Knowledge of the theoretical and practical evolution of information sciences and technologies and their relationship with other disciplines.
   - Competence in creating, managing, and accessing information in a variety of formats.

Thesis Option: Students electing the thesis option will write a master's thesis under close supervision of a thesis committee. Six hours of Thesis (IS 500) must be taken within the 42 semester hours required for graduation. (Students may register for more than 6 hours of 500, but only 6 hours will count toward graduation.)

Non-Thesis Option: Upon completion of the program, all students who elect the non-thesis option must take and pass a written comprehensive examination. A cumulative experience is also required which must be completed in one of the student's last two terms with a grade of B or better (及以上). Students must be registered for IS 500 in the semester they complete and defend their thesis. The oral defense of the thesis (final comprehensive examination) substitutes for the written examination that is taken by non-thesis students. The writing of the master's thesis serves as the culminating experience.

Individualized Curriculum Approach
Students in consultation with their advisor, may wish to pursue a curricular focus to develop an individualized program of study. Graduates of the school have prepared themselves for a variety of careers, including positions as: corporate information specialist, public librarian, information manager, computer network designer, and law librarian. Students are encouraged to take advantage of the individualized curricular approach.

Whatever individualized curriculum is chosen, all students who complete the program receive an M.S. degree accredited by the American Library Association (ALA).

For those pursuing the Tennessee Department of Education license as a school library information specialist, stipulated requirements apply. See following section.

ADMISSION REQUIREMENTS
Applicants to the Information Sciences program must have a minimum undergraduate grade-point average of 3.0 or a satisfactory graduate degree grade-point average for admission as a potential candidate for the M.S. degree. The verbal, quantitative, and analytical aptitude portions of the Graduate Record Examination (GRE) are required of all applicants unless a graduate degree has been completed prior to application for admission. Applicants should take the GRE at least one semester in advance of application for admission and are expected to score 1500 points or better.

A personal data sheet and three recommendations (obtained from the School of Information Sciences) should be returned to the admissions office of the school. Foreign applicants are required to take the Test of English as a Foreign Language.

THE MASTER'S DEGREE
The program leading to the Master of Science involves a total of 42 semester hours of graduate courses, 15 hours of which form a core curriculum required of all students. Either a thesis or a non-thesis option is available, with 6 hours required for thesis credit. At least 36 hours must be taken in the School of Information Sciences, allowing up to 6 hours outside the school with a maximum of 6 from outside the University.

Core Curriculum
The core curriculum is a 15 semester hour sequence of five courses required of all students: 490, 520, 530, 550, 580. These courses address the evolving information environment; foundations of information sciences and technologies; information resources selection, acquisition, and evaluation; information content representation, information access, and retrieval. The 15-hour core is prerequisite to all elective courses for students enrolled in the MS degree program. Elective courses may begin in the final semester of core course work with permission of the advisor and the instructor of each elective course selected.

Additional Program Requirements
Thesis Option: Students electing the thesis option will write a master's thesis under close supervision of a thesis committee. Six hours of Thesis (IS 500) must be taken within the 42 semester hours required for graduation. (Students may register for more than 6 hours of 500, but only 6 hours will count toward graduation.)

Non-Thesis Option: Upon completion of the program, all students who elect the non-thesis option must take and pass a written comprehensive examination. A cumulative experience is also required which must be completed in one of the student's last two terms with a grade of B or better (及以上). Students must be registered for IS 500 in the semester they complete and defend their thesis. The oral defense of the thesis (final comprehensive examination) substitutes for the written examination that is taken by non-thesis students. The writing of the master's thesis serves as the culminating experience.

Individualized Curriculum Approach
Students in consultation with their advisor, may wish to pursue a curricular focus to develop an individualized program of study. Graduates of the school have prepared themselves for a variety of careers, including positions as: corporate information specialist, public librarian, information manager, computer network designer, and law librarian. Students are encouraged to take advantage of the individualized curricular approach.

Whatever individualized curriculum is chosen, all students who complete the program receive an M.S. degree accredited by the American Library Association (ALA).

For those pursuing the Tennessee Department of Education license as a school library information specialist, stipulated requirements apply. See following section.

DEGREE REQUIREMENTS
The requirements for the Tennessee State Department of Education School Library Information Specialist Initial Endorsement include the 15-hour core plus 551, 567, 571, 572, 585, 595 (9 hours), and 573. IS 595 and 573 must be taken concurrently in the student's final semester. Students pursuing the endorsement must follow the non-thesis option.

The Tennessee State Department of Education School Library Information Specialist Initial Endorsement is also available to candidates who have earned an ALA-accredited Master's degree. Students are required to take 24 hours consisting of 551, 571, 572, 587 or 593 (upon approval of the faculty advisor), 595 (9 hours), and 573, IS 595 and 573 must be taken concurrently in the student's final semester.

ADMISSION REQUIREMENTS
Applicants to the Information Sciences program must have a minimum undergraduate grade-point average of 3.0 or a satisfactory graduate degree grade-point average for admission as a potential candidate for the M.S. degree. The verbal, quantitative, and analytical aptitude portions of the Graduate Record Examination (GRE) are required of all applicants unless a graduate degree has been completed prior to application for admission. Applicants should take the GRE at least one semester in advance of application for admission and are expected to score 1500 points or better. A personal data sheet and three recommendations (obtained from the School of Information Sciences) should be returned to the admissions office of the school. Foreign applicants are required to take the Test of English as a Foreign Language.

THE MASTER'S DEGREE
The program leading to the Master of Science involves a total of 42 semester hours of graduate courses, 15 hours of which form a core curriculum required of all students. Either a thesis or a non-thesis option is available, with 6 hours required for thesis credit. At least 36 hours must be taken in the School of Information Sciences, allowing up to 6 hours outside the school with a maximum of 6 from outside the University.

Core Curriculum
The core curriculum is a 15 semester hour sequence of five courses required of all students: 490, 520, 530, 550, 580. These courses address the evolving information environment; foundations of information sciences and technologies; information resources selection, acquisition, and evaluation; information content representation, information access, and retrieval. The 15-hour core is prerequisite to all elective courses for students enrolled in the MS degree program. Elective courses may begin in the final semester of core course work with permission of the advisor and the instructor of each elective course selected.

Additional Program Requirements
Thesis Option: Students electing the thesis option will write a master's thesis under close supervision of a thesis committee. Six hours of Thesis (IS 500) must be taken within the 42 semester hours required for graduation. (Students may register for more than 6 hours of 500, but only 6 hours will count toward graduation.)

Non-Thesis Option: Upon completion of the program, all students who elect the non-thesis option must take and pass a written comprehensive examination. A cumulative experience is also required which must be completed in one of the student's last two terms with a grade of B or better (及以上). Students must be registered for IS 500 in the semester they complete and defend their thesis. The oral defense of the thesis (final comprehensive examination) substitutes for the written examination that is taken by non-thesis students. The writing of the master's thesis serves as the culminating experience.

Individualized Curriculum Approach
Students in consultation with their advisor, may wish to pursue a curricular focus to develop an individualized program of study. Graduates of the school have prepared themselves for a variety of careers, including positions as: corporate information specialist, public librarian, information manager, computer network designer, and law librarian. Students are encouraged to take advantage of the individualized curricular approach.

Whatever individualized curriculum is chosen, all students who complete the program receive an M.S. degree accredited by the American Library Association (ALA).

For those pursuing the Tennessee State Department of Education license as a school library information specialist, stipulated requirements apply. See following section.
FINANCIAL ASSISTANCE OPPORTUNITIES

Employment with the University of Tennessee Libraries may provide a work-study opportunity for selected students who wish to obtain experience in academic librarianship while pursuing the degree. Such students usually work at least 20 hours each week and thus may extend the period required for the degree. Similar opportunities exist with some other libraries and information agencies in the Knoxville area.

Work opportunities in a scientific-technical environment are available through subcontracts with Oak Ridge National Laboratory and the Department of Energy.

A limited number of graduate teaching assistantships are available through the school. Assistantships of this type carry a waiver of tuition and fees as well as a stipend and require that recipients work 10 hours per week in the school.

For application forms and information about financial aid and other information about the M.S. in Information Sciences, write to Admissions, School of Information Sciences, University of Tennessee, 804 Volunteer Blvd., Knoxville, TN 37996-4330.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S. program in Information Sciences is available to residents of the states of Arkansas, Georgia, Virginia, or West Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE COURSES

430 History of the Book (3) History of writing and various methods of bookmaking.
450 Writing About Science, Technology and Medicine (3) (Same as Journalism 450.)
475 Utilization of Instructional Media (3) (Same as Education in the Sciences, Mathematics, Research and Technology 475.)
488 Electronic Communications and Information Resources on Internet (3) Exploration of worldwide information and communication resources including e-mail, gopher, Archie, Veronica, WAIS, WWW, and newsgroups.
490 Information Environment (3) Generation, production, management, distribution, and use of information. Some of the major devices and systems employed in the management of information are described, including online public access catalogs, local area networks, and expert systems. The course includes laboratory exercises that require the use of information systems and simulations.
500 Thesis (1-15) S/NC only, 599 Practicum.
521 Cataloging and Classification (3) Basic library-oriented cataloging and classification techniques, tools, and supporting operations. Descriptive cataloging, choice and form of non-subject entries, subject heading work, general classification, authority control, bibliographic utilities, online library catalogs.
522 Advanced Cataloging and Classification (3) Cataloging and classification of more difficult materials, use of language classification systems, and subject heading work. Preparation of Library of Congress Classification, Library of Congress Subject Headings, and Introduction to Medical Subject Headings. Prerequisite: 521.
530 Information Access and Retrieval (3) Media for information storage, logical and physical information structures, query logic, relevant information retrieval, and heuristics. Interfaces, user interfaces, evaluation of retrieval system performance. Search techniques for various types of databases including multi-media, full-text, numeric, bibliographic.
531 Sources and Services for the Social Sciences (3) Information sources in political science, sociology, psychology, geography, history, anthropology, business, and education.
532 Sources and Services for Science and Engineering (3) Information sources in engineering, physical and life sciences.
533 Sources and Services for the Humanities (3) Information sources in philosophy, religion, fine arts, performing arts, literature, and language. Organization and management of regional collections.
534 Government Information Services (3) Selection, acquisition, organization, and delegation of government information in various formats from legislators, judicial and executive branches of state, local, and national government.
535 Advanced Information Retrieval (3) Bibliographic, non-bibliographic, full-text databases, e.g. non-bibliographic formulas and databases, contents page, full-text databases, patents, document delivery alternative evaluation, and testing.
537 Information Industry (3) Issues and trends concerning information industry; products and services. Standards, enabling technologies, choice of distribution media, entrepreneurial opportunities. Legal, ethical and quality concerns.
538 Economics of Information (3) Costing and pricing of information; value of information and value added services; cost-benefit analysis and tradeoffs; policies related to economic aspects of information exchange and transfer.
539 Information Policy (3) Role of government in creation and exchange of information; review of key national and international policies; research and development of information systems, production and distribution; development of information policy for organizations.
540 Research Methods (3) Research methods in information environments; primary and secondary research design; data collection and interpretation; analysis of published research; techniques for supporting research processes.
550 Management of Information Organizations (3) Supervision of information programs, strategies, and techniques for information organizations; role of technology in organizations; management of information collections and uses; use of information services; management of information projects; management of information organizations.
551 School Library Media Centers (3) Planning, implementing, and evaluating school library programs. Curriculum development, role of technology in instruction, and management, relationships with district and state education organizations.
552 Information Centers in Higher Education (3) Development, mission, functions, services, administration, and management of campus information centers including libraries and libraries and alternatives; learning resources center and library-computer center models.
553 Corporate Information Services (3) Development and present status, scope and objectives. Information resources external to organization.
554 Public Library Management and Services (3) Development, roles, political environment, governance, organization, fiscal management, services, marketing, and performance evaluations.
555 Scientific and Technical Communications (3) Evolution of scientific and technical communication; current trends; roles of formal and informal communications; major STI organizations and their roles.
557 User Instruction (3) Theory, strategy, design, and practice in providing instructional services and technology for e-use of information and information systems. Includes practical experience.
560 Information Resources Selection, Acquisition, and Evaluation (3) Principles of development and management of collections in information agencies; community analysis; users and use; policies and procedures; evaluation of items and collections; selecting items to meet particular needs.
561 Contemporary Book Publishing (3) Creation, design, production, marketing, and distribution; various types of publishers.
563 Graphic Design and Media (3) Principles and practice in visual aspects of communications. Graphic design, typography, production techniques and publication design, as these apply to electronic information delivery systems.
564 Corporate Information Systems (3) Objectives and function elements of record-keeping archival programs, management information systems and techniques within various types of organizations. Management of information internal to organizations.
566 Environmental Scanning for Information Professionals (3) Principles and practice in environmental scanning. Information evaluation and synthesis; role of strategic information in modern organization.
567 Information Network Applications (3) Scholarly and commercial electronic communications. National and international standards, tools, resources; identification, analysis, evaluation, and management of tools and resources; construction of local technologies as developed and applicable.
569 Advanced Production of Audiovisual Software (3) (Same as Education in the Sciences, Mathematics, Research and Technology 569.)
572 Resources for Young Adults (3) Critical survey of books and related materials for young adults, personal, vocational, and recreational needs and interests. Evaluation, selection, and utilization for school and public libraries.
573 Programming for Children and Young Adults (3) Philosophy and objectives of public and school library services for children and young adults. Reading, listening, and viewing guidance for individuals and groups; Program planning, implementation, and evaluation.
574 Adult Materials and Services (3) Popular information and professional materials and services for adult interests in variety of formats. Development of specialized collections.
580 Foundations of Information Sciences and Technologies (3) Development of information, information sciences, and technology. Information, information representation, retrieval, and transfer; standards and technologies for information processing and distribution; research and development, bibliometrics and information theory, relational databases and other databases.
581 Seminar in Radio and Television (3) (Same as Broadcasting 500.)
582 Library Automation (3) Computer-based applications and systems for libraries including MARC, bibliographic utilities, retrospective conversion, circulation systems, online catalogs, computer-based reference services.
Interdisciplinary Programs

(College of Arts and Sciences)

The College of Arts and Sciences offers a series of interdisciplinary undergraduate programs.

majors and minors through its interdisciplinary Programs. These programs include African and African-American Studies. American Studies, Ancient Mediterranean Civilizations, Asian Studies, Cinema Studies, Comparative Literature, Environmental Studies, Latin American Studies, Legal Studies, Judaic Studies, Linguistics, Medieval Studies, Urban Studies and Women's Studies. Certain courses within these programs are available for graduate credit as listed below. See the Undergraduate Catalog for program descriptions and directors.

African and African-American Studies

GRADUATE COURSES


450 Issues and Topics in African-American Studies (3) Problems, topics, issues, and individuals. May be repeated. Maximum 6 hrs.

452 Black American Politics (3) (Same as Political Science 452.)

473 Black Male in American Society (3) Development of historical images, myths and stereotypes. Impact of critical factors: Black feminism, violence, concepts of masculinity, family, white males, white females, homophobia, nationalism, and athletics.

489 African-American Women in American Society (3) Historical and contemporary socio-political factors in American society as related to Black women. (Same as Women's Studies 489.)

510 Special Topics (3) May be repeated. Maximum 6 hrs.

American Studies

GRADUATE COURSES

423 Geography of American Popular Culture (3) (Same as Geography 423.)

510 Special Topics (3) May be repeated. Maximum 6 hrs.

Ancient Mediterranean Civilizations

GRADUATE COURSES

510 Special Topics (3) May be repeated. Maximum 6 hrs.

Asian Studies

GRADUATE COURSES

471 Selected Topics in Asian Studies (3) Content varies. May be repeated. Maximum 9 hrs.

510 Special Topics (3) May be repeated. Maximum 6 hrs.

Cinema Studies

GRADUATE COURSES

400 Special Topics (3) May be repeated. Maximum 6 hrs.

420 French Cinema (3) (Same as French 420.)

421 Topics in Italian Literature and Cinema (3) (Same as Italian 421.)

433 Modern Art and Film (3) (Same as Art Media/Photography 433.)

489 Sexuality and Cinema (4) (Same as Women's Studies 489.)

510 Special Topics (3) May be repeated. Maximum 6 hrs.

Comparative Literature

GRADUATE COURSES

401-02 Special Topics In Comparative Literature (3,3) Content varies. May be repeated. Maximum 9 hrs.

402 Latin American Studies Seminar (3) Selected topics. May be repeated. Maximum 6 hrs.

510 Special Topics (3) May be repeated. Maximum 6 hrs.

Judaic Studies

405 Modern Jewish Thought (3) (Same as Religious Studies 405.)

425 Early Christian and Byzantine Art, to 1350 (3) (Same as Art History 425.)

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

Latin American Studies

GRADUATE COURSES

510 Special Topics (3) May be repeated. Maximum 6 hrs.

Linguistics

GRADUATE COURSES

400 Topics in Linguistics (3) Content varies. May be repeated. Maximum 6 hrs.

411 Linguistic Anthropology (3) (Same as Anthropology 411.)

423 The Development of Diachronic and Synchronic Linguistics (3) Development of Western linguistic thought from Hebrews and Greeks through modern times. Readings from Boas, Sapir, Bloomfield, and others. Prereq: 9 hrs of courses required for Linguistics major (300-level or above) or consent of instructor.

425 Introduction to Descriptive Linguistics (3) (Same as French 425, German 425, Russian 425, and Spanish 425.)

426 Methods of Historical Linguistics (3) (Same as German 426, French 426, Russian 426, and Spanish 426.)

429 Romance Linguistics (3) (Same as French 429 and Spanish 429.)

435 Structure of the German Language (3) (Same as German 435.)

436 History of the German Language (3) (Same as German 436.)

471 Sociolinguistics (3) (Same as English 471 and Sociology 471.)

472 American English (3) (Same as English 472.)

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

475 Teaching English as a Second or Foreign Language II (3) (Same as English 475.)
### Medieval Studies

**GRADUATE COURSES**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>510</td>
<td>Special Topics (3) May be repeated. Maximum 6 hrs.</td>
</tr>
</tbody>
</table>

### Urban Studies

**GRADUATE COURSES**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>401</td>
<td>The City in the U.S. (3) (Same as Planning 401.)</td>
</tr>
<tr>
<td>441</td>
<td>Urban Geography of the United States (3) (Same as Geography 441.)</td>
</tr>
<tr>
<td>464</td>
<td>Urban Ecology (3) (Same as Sociology 464.)</td>
</tr>
</tbody>
</table>

### Women's Studies

**GRADUATE COURSES**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>400</td>
<td>Topics in Women's Studies (3) Content varies. May be repeated.</td>
</tr>
<tr>
<td>410</td>
<td>Gender Role Development: Implications for Education and Counseling (3) (Same as Counselor Education and Counseling Psychology 410)</td>
</tr>
<tr>
<td>422</td>
<td>Women Writers in Britain (3) (Same as English 422.)</td>
</tr>
<tr>
<td>425</td>
<td>Women's Health (3) (Same as Health 425.)</td>
</tr>
<tr>
<td>434</td>
<td>Psychology of Gender (3) (Same as Psychology 434.)</td>
</tr>
<tr>
<td>466</td>
<td>Rhetoric of the Woman's Rights Movement to 1930 (3) (Same as Speech Communication 466)</td>
</tr>
<tr>
<td>469</td>
<td>Sexuality and Cinema (4) Exploration of issues surrounding sexuality, gender and cinema from points of view of feminist film criticism. (Same as Cinema Studies 469)</td>
</tr>
<tr>
<td>476</td>
<td>Rhetoric of the Contemporary Feminist Movement (3) (Same as Speech Communication 476)</td>
</tr>
<tr>
<td>483</td>
<td>African-American Women in American Society (3) (Same as African-American Studies 483)</td>
</tr>
<tr>
<td>510</td>
<td>Special Topics (3) May be repeated. Maximum 6 hrs.</td>
</tr>
<tr>
<td>593</td>
<td>Independent Study (1-6) Prereq: Consent of Chair of Women's Studies.</td>
</tr>
</tbody>
</table>

### Journalism

**GRADUATE COURSES**

<table>
<thead>
<tr>
<th>Course Code</th>
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</tr>
</thead>
<tbody>
<tr>
<td>403</td>
<td>International Communications (3) Development and operations of world mass communications channels and agencies. Comparative analysis of media, media practices, and flow of news throughout world. Print and broadcast systems in terms of relevant social, political, economic, and cultural factors. Relation of communication practices to international affairs and understanding.</td>
</tr>
<tr>
<td>412</td>
<td>Opinion Writing (3) Analysis of editorial positions, practices, and pages. Writing of editorials and columns for newspapers, magazines, and company publications: study and use of rhetorical devices and logic. Prereq: Writing for Mass Communication or consent of instructor. (Same as Public Relations 412)</td>
</tr>
<tr>
<td>420</td>
<td>Print Media Management (3) Current business practice among print and media managers and production and layout for new technologies: 6 hrs mathematics and accounting and senior standing. Sp</td>
</tr>
<tr>
<td>433</td>
<td>Advanced Editing (3) Sensitivity to language and editing skills. Headline writing, layout, and production. Prereq: Editing. Sp</td>
</tr>
<tr>
<td>444</td>
<td>Journalism as Literature (3) Study of writers from 17th century to modern era whose works have endured as both journalism and literature. Emerging genre called literary journalism; means of cultural reporting with personal narrative style. Prereq: Consent of instructor.</td>
</tr>
<tr>
<td>450</td>
<td>Writing About Science, Technology, and Medicine (3) Writing workshop to analyze examples of successful science writing and write series of articles for general public based on scientific journals, news conferences, technical meetings, and interviews. Prereq: Consent of instructor. (Same as Information Sciences 450)</td>
</tr>
<tr>
<td>451</td>
<td>Environmental Reporting (3) Writing for news media on such environmental issues as strip-mining, water pollution, air pollution, allergies, nuclear power, fossil fuel power, and solid wastes. Presentations from experts in environmental science and reporting. Exemplars of popular literature in environmental reporting. Prereq: Editing for majors; consent of instructor for non-majors.</td>
</tr>
<tr>
<td>455</td>
<td>Issues in Science Communications (3) Topics vary. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.</td>
</tr>
<tr>
<td>456</td>
<td>Science Writing as Literature (3) Survey of important science writing for general public across spectrum of science, engineering, and medicine. Works by authors such as Arthur C. Clarke, Stephen J. Gould, and Richard Selzer. Analysis of literary qualities in quest to understand why some science writing succeeds. Prereq: Consent of instructor.</td>
</tr>
<tr>
<td>490</td>
<td>Language and Law (3) (Same as English 490.)</td>
</tr>
<tr>
<td>485</td>
<td>Special Topics in Language (3) (Same as English 485.)</td>
</tr>
<tr>
<td>476</td>
<td>Second Language Acquisition (3) (Same as English 476.)</td>
</tr>
<tr>
<td>488</td>
<td>Special Topics in Language (3) (Same as English 488.)</td>
</tr>
<tr>
<td>490</td>
<td>Language and Law (3) (Same as English 490.)</td>
</tr>
<tr>
<td>510</td>
<td>Special Topics (3) May be repeated. Maximum 6 hrs.</td>
</tr>
</tbody>
</table>

### Public Relations

**GRADUATE COURSES**

<table>
<thead>
<tr>
<th>Course Code</th>
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</tr>
</thead>
<tbody>
<tr>
<td>412</td>
<td>Opinion Writing (3) (Same as Journalism 412.)</td>
</tr>
<tr>
<td>416</td>
<td>Issues in Public Relations (3) Topics vary. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.</td>
</tr>
<tr>
<td>470</td>
<td>Public Relations Campaigns (3) Research, planning and communication and evaluation of major public relations campaigns. Oral and written presentation of public relations project from inception to completion. Extensive out-of-class work. Prereq: Public Relations Principles or equivalent. F, Sp</td>
</tr>
<tr>
<td>516</td>
<td>Seminar in Public Relations Issues (3) Topics vary. May be repeated. Maximum of 6 hrs.</td>
</tr>
<tr>
<td>520</td>
<td>Press-Government Relations (3) (Same as Journalism 520.)</td>
</tr>
<tr>
<td>525</td>
<td>Public Opinion (3) Role of press in developing and influencing public consensus. Social theories of public opinion and analysis of mass media's response. (Same as Public Relations 525.)</td>
</tr>
</tbody>
</table>

### Journalism

**College of Communications**

**MAJOR**

**DEGREES**

Communications .................................. M.S., Ph.D.

James A. Crook, Director

Professors:
- Adamsorn, June N. (Emeritus), M.S., Tennessee
- Ashdown, Paul G., Ph.D. .................. Bowling Green
- Bowley, Ph.D. .................. Wisconsin
- Cade, Dozier C. (Emeritus), Ph.D. .......... Iowa
- Caudill, C. Edward, Ph.D. .......... North Carolina
- Crook, James A., Ph.D. .......... Iowa State
- Everett, George A. (Emeritus), Ph.D. .. Iowa

Haskins, Jack B. (Emeritus), Ph.D. .......... Minnesota
- Leiter, B. Kelly (Emeritus), Ph.D. ........ Southern Illinois
- Littmann, Mark (Chair of Excellence), Ph.D. ........ Northwestern
- Miller, M. Mark, Ph.D. ........... Michigan State
- Singletary, Michael W., Ph.D. .......... Southern Illinois
- Teeter, Dwight L., Jr., Ph.D. .......... Wisconsin
- Tucker, Willis C. (Emeritus), M.S. .... Kentucky

Assistant Professors:
- Dimmick, Susan L. (Emeritus), Tennessee
- Foley, Daniel, M.S.J. ............ Northwestern
- Heller, Robert B., M.A. ............ Syracuse
- Morrow, Jerry L., Ph.D. ........... Toledo

The School of Journalism offers a concentration area for the master's with a major in Communications and participates in the interdisciplinary doctoral program. See Communications for additional information.
Art Education

GRADUATE COURSES

510 History and Philosophy of Art Education (3) United States from 1860's to present. Prereq: Consent of instructor.

520 Studies in Art Education (3) Issues and topics current to the field of art education. Prereq: Consent of instructor.

530 Production and Critical Analysis of Art (3) Relationship of production and critical analysis of works of art to discipline-based art education.

540 Instructional Materials and Production Related to the Teaching of Art (3) Development and use of instructional aids concerned with all aspects of teaching art: videotapes, audiotapes, slides, charts, and learning media.

590 Special Topics in Art Education (3-6) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

593 Independent Study (1-3) May be repeated. S/NC or letter grade.

Language, Communication, and Humanities Education

GRADUATE COURSES

445 Teaching of Foreign Languages, Grades 7-12 (3) Instructional methods, lesson planning, peer-teaching, materials for teaching foreign language and culture, evaluation techniques. Required for certification in modern foreign languages and Latin. Prereq: Completion or near completion of foreign language hours for certification and Admission to Teacher Education Program.

459 Teaching English in the Secondary School (3) Techniques of teaching composition, language, and literature. Prereq: Admission to Teacher Education Program.

460 Teaching Reading and Literature in the Secondary School (3) Approaches for teaching basic reading skills and ways of teaching literature.

461 Developing Reading Skills in Content Areas (3) Techniques for teaching reading and study skills in content areas of school program. Extensive assessment of textbooks. Middle school and high school.

500 Thesis (1-15) P/NP only. E

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and for which work is completed. May not be used toward degree requirements. May be repeated. S/NC only. E


507 Teaching Poetry Grades 7-12 (3) Research and theory in application to teaching of poetry. Design of strategies and materials for teaching and writing and reading of poetry. Review of texts and materials. E

508 Teaching Composition in the Secondary School (3) Teaching of composition, description, exposition, and argumentation; writing process and marking of student papers. Sp

509 Teaching Fiction in the Secondary School (3) Teaching of novels and short stories. F

510 Educational Specialist Research and Thesis (3) May be repeated. P/NP only. E

511 Interdisciplinary Aesthetics (3) Discussions, visual and audio presentations concerned with aesthetic considerations of areas of study: geography, history, physica, literature, languages, music, visual arts and drama.

533 Reading in Community College: Research and Theory (3) Analysis of components of effective community college reading programs. Attention to research and theoretical bases. Prereq: Course in reading education or consent of instructor. Su

555 Foreign Language in the Elementary Schools Practicum (3) Experiences designing, implementing and assessing second language instruction in elementary school setting. Prereq: 587 or consent of instructor.

566 English as a Second Language Practicum (3) Experiences designing, implementing and assessing English instruction to non-native English speakers. Required course for ESL certification. Prereq: 579 or consent of instructor.

579 Teaching English as a Second Language (3) Instructional methods: utilization of assessment procedures to diagnose English linguistic proficiency; materials for non-native speakers of English. Prereq: Consent of instructor.


590 Seminar in Teaching English in Secondary Schools (3) Content varies. Theoretical and practical approaches to teaching English in secondary school. May be repeated.

592 Linguistics and the Teaching of English (3) Grammar, usage, semantics, dialectology, history of language, and lexicography. Su

593 Independent Study (1-3) May be repeated. S/NC or letter grade.

594 Supervised Readings (1-3) May be repeated. S/NC or letter grade.

596 Special Topics (1-3) May be repeated. S/NC or letter grade.

597 Teaching Drama Grades 7-13 (3) Strategies and materials for teaching drama, ensemble acting and writing of plays, reading of scripts.

598 Developing Speaking and Listening Skills, Grades 7-12 (3) Approaches to nonverbal communication, interpersonal and group communication, public address and listening. Review of tests and materials.

599 Doctoral Research and Dissertation (3-15) P/NP only.

601 Studies in English Education (3) Issues and research in teaching of English. Su

604 Seminar in Curriculum and Instruction (1) Required 2 consecutive semesters. S/NC only.

606 Organizing and Administering Reading Programs (3) Analyzing and synthesizing instructional, learning, and materials components into classroom; school and system programs. Prereq: 2,500-level courses in reading education or consent of instructor.

678 Advanced Studies in English as a Second Language (3) Research, curricula, assessment, trends and issues in English as a second language. Prereq: 579 or consent of instructor.

687 Advanced Studies in Foreign Language Education (3) Research, curricula, assessment, trends and issues in foreign language education. Prereq: 587 or consent of instructor.

689 Internship (1-3) Experiences in application of principles and practices of curriculum development and instructional improvement. Prereq: Program prerequisites and consent of instructor. May be repeated. Maximum 9 hrs. S/NC only. E

693 Independent Study (1-3) May be repeated. S/NC or letter grade.

694 Supervised Reading (1-3) May be repeated. S/NC or letter grade.

696 Special Topics (1-3) May be repeated. S/NC or letter grade.

Large Animal Clinical Sciences

See College of Veterinary Medicine and Comparative and Experimental Medicine
The College of Law offers the Doctor of Jurisprudence degree program; a dual degree program with the College of Business Administration leading to the J.D. and the Master of Business Administration degree; and a dual degree program with the Department of Political Science, College of Arts and Sciences, leading to the J.D. and Master of Public Administration. In addition, graduate students may be eligible to take a limited number of law courses to count toward a graduate degree.

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Current information regarding admission, financial aid, course requirements, academic policies, extracurricular activities, and student services is available from the Admissions Office, The University of Tennessee, College of Law, 1505 W. Cumberland Ave., Knoxville, Tennessee 37996-1810. Completed application should be received before February 1 of the year of requested admission.

DEGREE OF DOCTOR OF JURISPRUDENCE

The degree of Doctor of Jurisprudence will be conferred upon candidates who complete, with the required average, six semesters of resident law study and who have 88 semester hours of credit, including all required courses. The required average is 2.0 and that average must be maintained on the work of all six semesters and also for the combined work of the grading periods in which the last 28 credit hours taken in residence were earned. Averages are computed on weighted grades. Grades are on an alphabetical scale from A+ to F. No credit toward the J.D. degree is awarded for grades of D- or F.

Eligible law students may receive up to six (6) semester hours of credit toward the J.D. degree for acceptable performance in upper-level courses that materially contribute to the study of law and which are taken in other departments at The University of Tennessee. Course selection and registration are subject to guidelines approved by the law faculty which include the requirement that any such course be acceptable for credit toward a graduate degree in the department offering the course. Refer to the Law Catalog and Student Handbook for current degree requirements.

Concentration in Business Transactions

Students interested in a concentration in business transactions must complete all of the following law courses:

818 Fundamental Concepts of Income Taxation
826 Introduction to Business Transactions
827 Business Associations
972 Income Taxation of Business Organizations
940 Land Finance Law
840 Commercial Law
642 Contract Drafting Seminar
832 \*
None of the above courses may be taken on an S/NC basis (with the exception of 826).

*This course is not required for students who have an undergraduate major in accounting, finance, or business administration, who hold the MBA degree, or who are enrolled in the dual J.D.-MBA program.

Waivers may also be granted to students who have acquired the requisite business knowledge through other coursework or through practical experience.

Concentration in Advocacy and Dispute Resolution

Students interested in a concentration in advocacy and dispute resolution must complete all of the following courses:

813 Evidence
815 Introduction to Advocacy and Professional Responsibility
905 Advocacy Clinic
920 Trial Practice
921 Pretrial Litigation

DUAL J.D.-MBA DEGREE PROGRAM

The College of Business Administration and the College of Law offer a coordinated dual degree program leading to the conferral of both the Doctor of Jurisprudence and the Master of Business Administration degrees. A student pursuing the dual program is required to take fewer hours of coursework than would be required if the two degrees were to be earned separately.

Admissions

Applicants for the J.D.-MBA program must make separate application to, and be competitively and independently accepted by, the College of Law for the J.D. degree and The Graduates School and College of Business Administration for the MBA degree, and by the Dual Degree Committee. Students who have been accepted by both colleges may commence studies in the dual program at the beginning of any term subsequent to matriculation in both colleges provided, however, that dual program studies must be started prior to or within the last 28 hours required for the J.D. degree and the last 16 hours required for the MBA degree.

Curriculum

A dual degree candidate must satisfy the graduation requirements of each college. Dual degree students withdrawing from the dual degree program before completion of both degrees will not receive credit toward graduation from either college for courses in the other college, except as such courses qualify for credit without regard to the dual degree program. For students continuing in the dual degree program, the J.D. and MBA degrees will be awarded upon completion of requirements of the dual degree program.

The College of Law will award a maximum of nine (9) semester hours toward the J.D. degree for acceptable performance in approved graduate-level courses offered by the College of Business Administration. Three of the 9 semester hours must be earned in Accounting 501, 503, or a more advanced accounting course.

The College of Business Administration will award credit toward the MBA for acceptable performance in a maximum of 9 semester hours of approved courses offered by the College of Law.

Exempt while completing the first year courses in the College of Law, students are encouraged to maximize the integrative facets of the dual program by taking courses in both colleges each year.

Awarding of Grades

For grade recording purposes in the College of Law for graduate business courses and in the College of Business Administration for law school courses, grades awarded will be converted to either Satisfactory or No Credit and will not be included in the computation of the student's grade average or class standing in the college where such grades are so converted. The College of Law will award a grade of Satisfactory for a graduate business
course in which the student has earned a B grade or higher and a No Credit for any lower grade. The College of Business Administration will award a grade of Satisfactory for a College of Law course in which the student has earned a C grade or higher and a No Credit for any lower grade. Grades earned in courses of either college may be used on a regular graded basis for any appropriate purpose in the college offering the course. The official academic record of the student maintained by the Registrar of the University shall show the actual grade assigned by the instructor without conversion.

Non-Law Elective Course Credit

Students enrolled in the J.D.-MBA degree program may not receive credit towards the J.D. degree for courses taken in other departments of the University except for those taken in conjunction with the dual program. Note: Students are advised to consult The Graduate School's degree requirements as stated in the front section of this catalog as well as the requirements for this college.

DUAL J.D.-M.P.A. PROGRAM

The College of Law and the Department of Political Science in the College of Arts and Sciences offer a coordinated dual degree program leading to the conferral of both the Doctor of Jurisprudence and Master of Public Administration degrees. In this program, a student may earn the M.P.A. and J.D. degrees in about four years rather than the five years that otherwise would be required. Students pursuing the dual degree program should plan to be enrolled in coursework or an internship for one summer term in addition to taking normal course loads for four academic years.

Admission

Applicants for the J.D.-M.P.A. program must make separate application to, and be independently accepted by, the College of Law for the J.D. degree and the Department of Political Science and the Graduate School for the M.P.A. degree. Applicants must also be accepted by the Dual Degree Committee. All applicants must submit a Law School Admission Test (LSAT) score. An applicant's LSAT score may be substituted for the Graduate Record Examination (GRE) score, which is normally required for admission to the M.P.A. program. Application may be made prior to or after matriculation in either the J.D. or the M.P.A. program, but application to the dual program must be made prior to entry into the last 29 semester hours required for the J.D. degree and prior to entry into the last 15 hours required for the M.P.A. degree.

Curriculum

A dual degree candidate must satisfy the requirements for both the J.D. and the M.P.A. degrees, as well as the requirements for the dual program. The College of Law will award a maximum of 9 semester hours of credit toward the J.D. degree for successful completion of approved graduate level courses (500 or 600 level) offered in the Department of Political Science. The M.P.A. program will award a maximum of 9 semester hours of credit toward the M.P.A. degree for successful completion of approved courses offered in the College of Law. All courses for which such cross-credit is awarded must be approved by the J.D.-M.P.A. coordinators in the College of Law and the Department of Political Science. All candidates for the dual degree must successfully complete Administrative Law (Law 821) and are encouraged to take Local Government (Law 824). An internship is strongly recommended for students in the dual degree program, as it is for all M.P.A. candidates, but an internship is not required.

During the first two years in the dual program, students will spend one academic year completing the required first year of the College of Law curriculum and one academic year taking courses solely in the M.P.A. program. During those first two years, students may not take courses in the opposite area without the approval of the J.D.-M.P.A. coordinators in both academic units. In the third and fourth years, students are strongly encouraged to take both law and political science courses each semester.

Dual degree students who withdraw from the program before completion of the requirements for both degrees will not receive credit toward either the J.D. or the M.P.A. degree for courses taken in the other program except as such courses qualify for credit without regard to the dual program.

Awarding of Grades

For grade recording purposes in both the College of Law and the Department of Political Science, grades awarded in courses in the other unit will be converted to either Satisfactory or No Credit and will not be computed in determining a student's GPA or class standing. The College of Law will award a grade of Satisfactory for a dual program course in which the student earns a grade of B or higher. The College of Law will award a grade of No Credit for any lower grade. The Political Science Department will award a grade of Satisfactory for an approved law course in which the student earns a grade of C or higher. The College of Law and the Department of Political Science will not receive credit for such courses.

POLICY FOR GRADUATE STUDENTS TAKING LAW COURSES

Students pursuing a graduate degree in another college may, upon approval of the College of Law and the major chairperson, take up to 6 semester hours of law courses and receive credit toward the graduate degree. The graduate student must register for the law course during regular registration at the College of Law requesting an S/N grade only. If a C or above is earned in a law course, an S will be recorded on the transcript. If a student earns below a C, an NC will be recorded, and the course cannot be used toward meeting degree requirements. Grades for law courses will not be reflected in the cumulative average. Law courses may be taken for credit only by students enrolled in a graduate degree program.

Different rules apply to the student enrolled in the Dual J.D.-MBA or J.D.-M.P.A. Programs. Grades must be earned according to the grading system of the respective college, e.g., numerical grades for law courses, letter grades for graduate courses. Refer to section on Grades for the grading scale acceptable toward degree requirements. Cumulative GPA for law courses only will be carried until graduation, at which time both the J.D. and the M.P.A. cumulative will be shown on the permanent record.

PROFESSIONAL COURSES

801 Civil Procedure I (6) Binding effect of judgments, selecting proper forum, jurisdiction and venue, forecasting applicable law, and federal and state practice.


803 Contracts I (3) Basic agreement process and legal protections afforded by the Contract Act; offer and acceptance; consideration and other bases for enforcing promises; The Statute of Frauds; unconscionability and other controls of promissory estoppel. Introduction to important portions of Article 2 of the Uniform Commercial Code.

804 Contracts II (3) Continuation of Contracts I. Issues arising after contract formation: interpretation, duty of good faith; conditions, impracticability and frustration of purposes; remedies; third party beneficiaries; assignment and delegation. Considerable coverage of Article 2 of the Uniform Commercial Code with respect to remedies, anticipatory repudiation, impracticability and good faith.

805 Legal Process I (3) Lawyer-like use of cases and statutes in prediction and persuasion. Analysis and synthesis of common law decisions; statutory interpretation; fundamentals of expository legal writing and legal research.

806 Legal Process II (3) Continuation of Legal Process I. Formal legal writing, appellate procedure, and oral advocacy.

807 Torts I (3) Intentional torts, defenses and privileges related to intentional torts: negligence; standard of care, professional malpractice, and liability of owners and occupants of land; defenses based on plaintiff's conduct; contributory and comparative negligence, assumption of risk, failure to take precautions, and avoid obvious consequences; causation, proximate cause; duty rules; and questions of joint and several liability.

808 Torts II (3) Vicarious liability and related concepts; strict liability for dangerous animals and abnormally dangerous activities; products liability; nuisance, defamation, and invasion of privacy; economic torts; misrepresentation and interference with contract and prospective opportunities; immunity: those of government, governmental employees, charities and family members, and damages.

809 Criminal Law (3) Substantive aspects of criminal law; general principles applicable to all criminal conduct; specific analysis of particular crimes; defenses to crimes.

810 Property (4) Introductory course treating issues of ownership, possession, and security in the areas of landlord-tenant relations; estates in land and future interests; ownership and marital property; real estate sales agreements; leases, liens; transfers; and rights of nonowners in such property.

811 Property II (3) Title; exclusive possession under the concept of “adverse possession”; contract terms; easements and servitudes; and escheat.

812 Constitutional Law (4) Fundamental principles of American constitutional law: federalism, separation of powers, equal protection of law, and constitutional protection of other fundamental individual rights.

813 Evidence (4) Rules regulating introduction and exclusion of oral and demonstrative evidence at trials and other proceedings, including relevancy, competency, impeachment, hearsay, privileges, expert testimony, authentication, and judicial notice. Coreq: 920 for students electing concentration in advocacy.

814 Legal Profession (3) Legal, professional, and ethical standards applicable to lawyers. Not open to students who have taken 815.

815 Introduction to Advocacy and Professional Responsibility (3) Theory and morality of advocacy in adversarial system, and legal, ethical, and professional standards applicable to lawyers and especially lawyers as advocates.

816 Fundamental Concepts of Income Taxation (3) Introduction to basic statutory analysis, fundamental principles of federal individual income tax, and pervasive income taxation concerns that arise in practice. Federal concept of gross income, pattern of exclusions, exemptions and deductions from gross income used to arrive at
tax base; special treatment of capital gains and losses; and structure.


821 Administrative Law (3) Administrative agency decision-making processes and judicial review of administrative decisions: procedural standards for informal and formal administrative adjudication and rule-making (attention to federal Administrative Procedure Act); constitutional due process standards in administrative settings; and availability, scope and timing of judicial review of agency actions.

822 Legislation (3) Interpretation and drafting of statutes. Legislative process, constitutional and statutory power; comparison of judicial views on legislative process; both realities of legislative process and applicable constitutional principles.


827 Business Associations (4) Legal problems associated with formation, operation, and dissolution of unincorporated and incorporated business firms; legal rights of duties of firm owners, partners, and corporate directors and officers, with whom members interact in connection with firm's business.

828 Corporate Finance (3) Legal issues arising in connection with corporate financial transactions: issuance of debt and various types of equity securities, distributions to shareholders, mergers and other corporate acquisitions. Legal valuation of corporate securities.

830 Securities Regulation (3) Basic structure of federal securities law. Legal problems associated with raising of capital by new and growing enterprises; securities transactions by promoters, officers, directors and other insiders; regulation of public-held companies; litigation under Rule 10b-5 and other enforcement provisions; and provision of legal and other professional services in connection with securities transactions. Recommended prereq or coreq: 827.

833 Representing Enterprises (3-5) Capstone course for concentration in business transactions. Simulated business transactions, including drafting and planning project. Transactions vary: formation of new business, acquisition of existing business, development of real estate projects, various financing transactions, and corporate reorganization. Prereq: Completion of all courses for concentration in business transactions.

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) Prerequisites: Required for students who have taken 904 or 906.

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.

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 the federal government; 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. Prereq: 812. May be repeated under different topic.

848 Civil Rights Actions (3) Litigation to vindicate constitutional rights in private actions against the government and officials with respect to rights protected by other civil rights legislation: elements of suit; case involving rights under 42 U.S.C. § 1983; actions against federal government officials under the Bivens doctrine; institutional and individual liability; immunity provisions; and jurisdiction in federal courts in civil rights actions; and remedies for violations of constitutional and other civil rights.

849 Discrimination and the Law (3) Comparison of race, sex and age discrimination in two forms of discrimination with respect to education, employment, promotion, compensation, and other social and economic activities; historical land-marks and current issues in discrimination law.

850 Supreme Court (3) History of Supreme Court and of procedures by which Court arrives at decisions; influential justices and their role in making law. Required for students selecting concentration in advocacy. Prereq: 834.

852 Family Law (3) Taxation of legal relationships between families, children and the state; marital status; divorce; adoption; mediations; and the law of corporations, partnerships and other business dealings. Recommended prereq or coreq: 827.

856 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; selected regulatory issues. Environmental Law Seminar (2) Selected topics in environmental law.

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 theories; 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 personal understanding 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 (3) Legal status of parties and operations involving disposition of property to a foreign country; doing business abroad as a foreign corporation; engaging in business within a foreign country; exportation or importation of contracts or concessions.

889 International Law Seminar (2) Current international law problems. Prereq: 886 or 887.

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

896 Employment Law (3) Legal regulation of employment relationships between employers and employees; social security; and impact of employer-employee relationship upon employer discrimination; legally prescribed minimum standards of compensation and safety; restrictions on termination of employment regulation of retirement systems.

905 Advocacy Clinic (6) Supervised fieldwork requiring students to assume substantial responsibility for representing clients with various litigation problems. Exploration and development of fundamental professional skills involved in practicing advocacy; interviewing and counseling clients, negotiation, drafting, planning for trial and trial advocacy, writing, planning for transactions and dispute resolution, initiating and defending claims, conducting legal investigations, and presenting evidence. Prereq: 850.

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

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

918 Remedies (4) Remedies: damages, resiliation, 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; discovery and presentation of evidence; selection and instruction of jurors; opening and closing arguments; selected trial venue planning, jury selection, and preparation of closing arguments; written arguments to courts or memoranda. Coreq: 813 for students electing concentration in advocacy. Prereq: 813 for all other students.

921 Pre-Trial Litigation (3) Civil pre-trial process. Drafting of initial pleadings; formal and informal case management; discovery; motions for preliminary injunction, class certification papers, motions to dismiss or for summary judgment, and various discovery papers.

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.

925 Appellate Practice Seminar (2) Federal and Tennessee Rules of Appellate Procedure; review of complete records of several United States Supreme Court cases and preparation of an appellate brief based on record of actual case.

926 Interviewing, Counseling and Negotiation (3) Mediation process, theory, strategy, tactics and skills through readings, simulations, and role as mediator in general sessions court and other settings; development of professional skills related to dispute resolution, ethical responsibilities, and mediation and negotiation.

927 Business Transactions (3) Legal problems associated with formation, operation, and dissolution of unincorporated and incorporated business firms; legal rights of duties of firm owners, partners, and corporate shareholders; directors, officers, and others with whom members interact in connection with a firm's business.

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. Not open to students who have taken 927.
929 Teaching Clients the Law (3) Communication of law as basis for decision by persons other than lawyers. Development of skills in drafting a practical law course to high school or adult students and by writing research papers that synthesize Tennessee or federal law in plain language.

935 Gratuitous Transfers (4) Nature, creation, termination, and modification of trusts; fiduciary administration; inter vivos trusts; statutory trusts; charitable trust; testamentary trusts; status of beneficiaries; calculations; assignment of interest; construction of trust agreements; shifting of trust assets; the rule against perpetuities.


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


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.

950 Computers and Law (3) Impact of computers on law and practice of law: expert systems; legal skills required in building expert systems; common law uses of computers; and computer research. Preparation of lawyers to think effectively concerning use of computers. Prior computer experience not necessary.

956 Entertainment Law (3) Role of law and lawyer in entertainment industry. Course content varies. Must industry; music copyright laws; artist/manager relationships; record contracts; negotiations; industry 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 publicity; 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 accreditation; hospital staff privileges; medical malpractice liability: standard of care, proof, causation, defenses, and damages; protection of patients; recovered consent; informed consent; abortion; choice of treatment; and death and dying; control of communicable diseases; organ transplantation and medical resource allocation.

970 Income Tax II (3) Corporate reorganizations and distributions; transactions among corporations and shareholders. Prereq: 918.

972 Income Taxation of Business Organizations (3) Survey and comparative analysis of federal patterns of income taxation of partnerships, 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. Prereq: 918.

973 Wealth Transfer Taxation (3) Taxation of gratuitous transfers of wealth during lifetime (gift tax) and at death (estate tax) and of generation-skipping transfers. Prereq or coreq: 935.

975 Tax Court (1) Participation as member of faculty-supervised interscholastic moot court competition. May be repeated. S/N only. (Not does count toward total number of elective upper division courses taken S/N only.)

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

980 Insurance (3) Insurance: types of insurance; life, property, health, and liability insurance; construction of insurance contracts; insurance policies requiring condition, 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; causes of action; and defenses.

985 Social Legislation (3) Systems other than traditional tort remedies for compensating victims of work-related accidents and diseases, and for compensating disabled persons. Workers’ compensation: requirements for covered employer-employee relationship; accidental injuries or occupational diseases arising out of and in course of employment; causation; nature of medical disability and death benefits; exclusiveness of compensation remedy against employer and co-employees, and rights and liabilities of non-employees; administration and procedural aspects of Workers’ Compensation practices; and various labor law measures. Brief introduction to and sampling of cases involving Social Security disability claims.

989 Issues in the Law (3) Selected topics. May be repeated.

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

993 Directed Research (1-2) Independent research and writing under direct supervision of faculty member. Proposals must be approved by supervising faculty member and by the Dean of the Dean’s designee. Maximum of one credit each semester the last two years of study. Prereq: Second-year standing.

994 Independent Study (1-4) Independent study under direct supervision of faculty member. Proposals must be approved by supervising faculty member and by the Dean or the Dean’s designee. Maximum of one credit each semester during last three semesters of study.

996 Law Review (1) Performance of duties as staff member on the Tennessee Law Review. Responsibilities vary each semester as specified in Tennessee Law Review Policy Manual: writing of casenotes; comment or article, and/or performance of other assigned duties related to operation of Tennessee Law Review. Completion of potentially publishable casenote or article for Tennessee Law Review satisies expository writing requirement. May be repeated. S/N only. (Does not count toward total number of elective upper division courses taken S/N only.)

997 Moot Court (1) Participation as member of faculty-supervised interscholastic moot court competition. May be repeated. S/N only. (Will not count toward total number of elective upper division courses taken S/N only.)

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. May be repeated.

Leadership Studies in Education

(131)

MAJORS

DEGREES

College Student Personnel M.S. Education

College Student Personnel Ed.S., Ed.D., Ph.D. Leadership Studies in Education M.S.

Jeff Aper, Leader

Professors:

Bogue, Grady, Ed.D. Memphs State McInnis, Malcolm, Ph.D. Florida State

Mertz, Norma T., Ed.D. Columbia Wheeler, Gerald C., Ph.D. Minnesota

Associate Professor:

Aper, Jeffery P. (Lietel), Ph.D. VPI Norris, Cynthia (Visiting), Ed.D. Tennessee

The Leadership Studies in Education unit participates in graduate programs leading to degrees, majors, and concentrations in:

Master of Science

Leadership Studies in Education Educational administration and supervision

College Student Personnel Specialist in Education

Education Educational administration and supervision Doctor of Education

Education Leadership studies (educational administration and supervision; higher education)

Doctor of Philosophy

Education Educational administration and supervision/higer education

See Education under Fields of Instruction for full description of all degree requirements. The Leadership Studies Unit focuses on the preparation and development of administrative and instructional leaders who will serve in diverse settings of schools and colleges, community and human service agencies, adult and continuing education organizations, and educational units of government and corporate organizations.

The unit offers an alternative approach to the Doctor of Education degree program. This alternative residence involves, among other requirements, a two-year, on-campus, continuous enrollment in Leadership Studies 606, Leadership Forum. Interested students should contact the unit for further information.

The annual admission deadline is March 15 for the Ed.S. and doctoral programs, and November 1 for the master’s program.

ADMISSION REQUIREMENTS

General test of the Graduate Record Examination; writing sample if GRE verbal is below 50th percentile; leadership potential judged by activities in organizations; and rating forms or letters of recommendation. The Ed.D.
Educational Administration and Supervision

GRADUATE COURSES

513 Administrative and Organizational Theory in Education (3) Introduction to theoretical administrative and organizational foundations of management and leadership of educational programs and institutions. F, Su

515 Human Relations and Communication in Administration (3) Development and use of effective interpersonal communication skills and channels, group relations, support drive climates, personality motivation, conflict management skills, and role of values, attitudes, and expectations in administration. F, Su

516 Research for School Administrators (3) Descriptive, experimental, and quasi-experimental designs to help students without qualitative research backgrounds to read and understand technical professional literature. Introduction to inferential statistics, needs assessments, and evaluation procedures. Sp, Su

529 Politics of Education and Educational Environments (3) School/community relations in political context of modern, complex society. Administrator and supervisory competencies: political, social, ethical, cultural, and racial environments in which school districts operate. Prereq: M.S. introductory core or consent of instructor. F, Su

535 Administrative Applications of Micro Computers (3) DOS, word processing, database management, spreadsheet programs, and computer communications. Review and development of specific administrative applications: scheduling, attendance, student record systems, and accounting. F, Su

544 School Finance and Business Management (3) For prospective building level administrators. Financial and logical management tasks and procedures in individual school setting. Prereq: M.S. Introductory core or consent of instructor. F, Su

547 Educational Facility Planning (3) Concepts and skills for development, evaluation, construction, renovation, maintenance, and operations of educational environments and facilities. Prereq: M.S. Introductory core or consent of instructor. Sp, Su

548 Interdisciplinary Supervision and Personnel (3) Basic supervisory and microcomputer concepts and related competencies: building (micro-computer)(interpersonal)(level) interviewing, personnel planning, collecting and maintaining employee information, supervision of instructional and non-instructional personnel, personnel administration, student evaluation, and staff development. Prereq: Introductory M.S. core or consent of instructor. Sp, Su

553 Strategies of Educational Planning (3) Processes for improving decision-making function through use of both quantitative and qualitative planning techniques. Policy analysis, CPM, PERT, Delphi. Prereq: Introductory M.S. core or consent of instructor. F, Su

554 School Law (3) Legal arrangement of case and statutory materials for public school administrators and teachers; problems concerning law and public education. Prereq: M.S. Introductory core or consent of instructor. Sp, Su

560 Internship in Educational Administration (3) Field experience in appropriate educational setting working directly with administrator. At end of planned program of study, placement by department assignment. Some on-campus classes in conjunction with 583 or 582. Prereq: 21 hrs in educational administration and supervision or consent of instructor. E

583 Educational Leadership—Principals (3) Knowledge, skills, and relationships for principal to be effective educational leader. Informational materials and field-based experiences. Culminating comprehensive plan and portfolio. Prereq: 21 hrs in educational administration and supervision or consent of instructor. F

590 Special Topics (1-3) May be repeated. E

592 Field Problems in Educational Administration and Supervision (3) Topic to be assigned. May be repeated. S/N or letter grade. E

595 Elementary Principals Seminar (1-3) For in-service training of elementary school administrators. Development, problems, programs, and trends of elementary schools and management skills of elementary school administrators. Prereq: Presently elementary school administrator or consent of instructor. May be repeated. S/N or letter grade. F, Sp

604 Seminar in Educational Administration and Supervision (1) Current educational issues, problems, and research. Required two consecutive semesters during doctoral residency. May be repeated. S/N only. E

605 Advanced Seminar in Administrative Theory (3) Interdisciplinary seminar. Readings selected by faculty for research and scholarly value from current classic theoretical studies and current periodical literature in administrative and organizational theory. Required of Ph.D. students in education. Prereq: Doctoral student in education.

610 Internship in Educational Administration (3) Opportunity for doctoral students and advanced graduate students to gain experience in performance of critical tasks of educational administration under supervision of practitioner and University representative. May be repeated at discretion of student's committee. Maximum 12 hrs. S/N only. E

614 Statistical Methods for School Administrators (3) Descriptive and experimental research methods, parametric and nonparametric statistical techniques used in research in educational settings. F, Su

615 Research Designs (3) Statistical methods through multivariate techniques and applications to various research designs. Prereq: 614 or consent of instructor. Sp

616 Research Methods (3) Overview of descriptive and experimental research designs: data collection, analysis, and interpretation; surveys and school surveys. Conduct of survey. Prereq: Basic statistics and computer skills or consent of instructor. E

629 Seminar in Politics of Education (3) Political theories and practices as they affect operation of public school systems and higher education institutions. Interdisciplinary inquiry of community power structure and special interest groups, based on literature and research from education, sociology, and political science. Field inquiry. Prereq: 529, 615 or equivalent or consent of instructor. F

646 School Personnel Administration (3) Personnel administration functions for professional and supporting staff in educational organization. Recruitment, selection, placement, personnel policies, employee wage and salary administration, fringe benefits, collective negotiations, human relations, staff development, and staff evaluation. Prereq: 548 or consent of instructor. F

655 State-Federal Relations in Education (3) Interrelationships of federal, state, and local responsibilities and organization for education by analysis of traditional, legal, fiscal and functional aspects of educational partnership. Funding partnerships: discussion of grant proposal development processes. Sp, Su

656 Legal Foundations of Public Education (3) School law: constitutional foundations as they relate to public education at state and local levels. F, Su

658 Conflict Management (3) Conflict and its management. Causes of interpersonal, intergroup, and organizational conflict, skills and strategies used to manage conflict, conflict management models associated with different sectors of human activity, and current organizational practices for managing destructive conflict. F

660 Fiscal Problems in Higher Education (3) Revenue sources, appropriation process, budgetary procedures, cost analysis, and fiscal management in public and independent colleges and universities. Sp

670 Values and Ethics in Educational Leadership (3) Same as Educational Administration and Supervision 670.

689 Seminar in Higher Education (3) Capstone experience for doctoral students. Exploration of contemporary policy issues, evaluation of recent reforms in higher education. Travel to state, regional, and national policy agencies for higher education.

690 Special Topics (1-3) May be repeated. E

Higher Education

GRADUATE COURSES

530 Special Topics (1-3) May be repeated. E

534 Program Evaluation in Education (3) Same as Education in the Sciences, Mathematics, Research, and Technology 533.

536 Seminar on Policy Issues in Quality Assurance (3) Exploration of contemporary policy issues, evaluation of recent reforms in higher education and examination of contemporary policy issues, evaluation of recent reforms in higher education. Examine the role of student government, and quality assurance in colleges and universities.


547 The College Student and the Court (3) Legal precedent affecting student personnel services in public higher education. Student discipline, housing, dress, organization, activities fees, tuition, and related federal regulations. F

543 American Higher Education in Transition (3) History, philosophy, purposes, functions, organizations and programs in American higher education. F

570 Introduction to Student Personnel Work in Higher Education (3) Historical, philosophical and organizational perspective. Functional areas comprising student personnel services. F

572 Theory and Practice in Student Personnel Services (3) Theoretical framework of college student personnel services and practical application of theory in student services environment: Applicable administrative theory, human development theory and evaluation assessment techniques. Sp

590 Practicum in College Student Personnel (1-6) Prerequisite: Consent of instructor. May be repeated. S/N only. E

619 Administration and Governance of Higher Education (3) Trends, structure and process of collegiate governance. Development of understanding of administrative theory and practice in higher education. Prereq: 543 or consent of instructor. F

630 Special Topics (1-3) May be repeated. E

640 College and University Law (3) Legal precedent affecting organizations, administration, and finance of higher education. Academic freedom, faculty tenure, religious tests, liability, academic legal due process and affirmative action in employment. Sp

645 Curriculum and Instruction in Undergraduate Higher Education (3) Content and organization of instructional institutions and curricular structure in higher education. F

650 Fiscal Problems in Higher Education (3) Revenue sources, appropriation process, budgetary procedures, cost analysis, and fiscal management in public and independent colleges and universities. Sp

670 Values and Ethics in Educational Leadership (3) Same as Educational Administration and Supervision 670.

689 Practicum in Higher Education (1-9) Supervised practicum in selected areas of higher education administration. Prereq: Consent of instructor. May be repeated. S/N only. E

699 Seminar in Higher Education (3) Capstone experience for doctoral students. Examination of major philosophical concepts and policy principles distinguishing American higher education, review of significant and current policy-related issues and policies, exploration of contemporary policy issues, and evaluation of recent reforms in higher education. Travel to state, regional, and national policy agencies for higher education.
Leadership Studies

GRADUATE COURSES

500 Thesis (1-15) P/NP only. E

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and for faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E


518 Educational Specialist Research and Thesis (0.5-3) May be repeated. P/NP only. E

593 Independent Study (1-3) May be repeated. S/NC or letter grade. E

600 Doctoral Research and Dissertation (3-15) P/NP only. E

606 Leadership Forum (2) Development of research, evaluation, policy analysis skills and critical analysis and evaluation of philosophical principles underlying American education. Continuous enrollment for 2 years, on campus, for students in Ed.D. alternative residence program. May be repeated. Maximum 12 hrs. S/NC only.

612 Modes of Inquiry in Educational Research (3) Various inquiry approaches to research in education: related philosophical, methodological and ethical considerations in research design and in use of research findings. (Same as Psycheoeducational Studies 612.)

693 Independent Study (1-3) May be repeated. S/NC or letter grade. E

Management

ADMISSION REQUIREMENTS

1. A Bachelor's degree with a major in a biological, behavioral, or physical science.
2. GRE (general) scores.
3. Three letters of recommendation.
4. Coursework including a year of calculus (differential and integral), one year of chemistry, and a year of physics. Specific course deficiencies may be corrected during the first year.

DEGREE REQUIREMENTS

The master's degree requires a minimum of 30 semester hours of study approved by the student's committee, a thesis, and an oral examination. Within the biotechnology program only, a non-thesis M.S. option is available. Students choosing the option must complete: (1) two summers' co-op experience in an appropriate industry. An evaluation by supervisor and a written report are required

Life Sciences

(College of Arts and Sciences)

MAJOR DEGREES

Life Sciences.......................... M.S., Ph.D.

W.F. Harris, Chair

The programs leading to the M.S. and Ph.D. degrees in Life Sciences are interdepartmental and intercollegiate and are designed to augment offerings of individual departments in the following concentrations: biotechnology, (M.S. only), and plant physiology and genetics. Students interested in these areas should contact either the Life Sciences chairperson or the director of the area of interest. Each program is overseen by a committee and may have unique admission requirements.

ADMISSION REQUIREMENTS

1. A Bachelor's degree with a major in a biological, behavioral, or physical science. GRE (general) scores. Three letters of recommendation. Coursework including a year of calculus (differential and integral), one year of chemistry, and a year of physics. Specific course deficiencies may be corrected during the first year.

DEGREE REQUIREMENTS

The master's degree requires a minimum of 30 semester hours of study approved by the student's committee, a thesis, and an oral examination. Within the biotechnology program only, a non-thesis M.S. option is available. Students choosing the option must complete: (1) two summers' co-op experience in an appropriate industry. An evaluation by supervisor and a written report are required.
Management Science

MAJORS

Management Science .......................... M.S., Ph.D.
M. M. Srinivasan, Chairperson

Committee Members:
Sowers, Melissa R., Management; Bozdag, Hamarsama, Statistics; Edirisinghe, Chanaka F., Management; Fowler, Oscar S., Management; Gilbert, Kenneth C., Management; Lieftinck, Mary G., Statistics; Noon, Charles E., Management; Rafton, Bruce A., Geography.

THE MASTER'S PROGRAM

The M.S. program in Management Science is designed as preparation for a career in the application of quantitative techniques for the solution of complex problems. The program's flexibility also makes it appropriate as preparation for doctoral study in Management Science.

Management Science coursework will expose students to both the theoretical development of quantitative techniques and their application to managerial decision making. In addition to the development of sufficient mathematical maturity for creative use of quantitative skills, the program requires concentrated study in a supporting area.

Supporting areas are available in other departments of the College of Business Administration as well as in computer science, public administration, geography, health, and other areas, subject to approval by the Management Science Committee.

Admission Requirements

The master's program requires three applicant recommendation forms and the GRE or GMAT. Applications are encouraged from all majors, but a mathematics background equivalent to the completion of at least two years of college calculus and proficiency in a computer language is required. The program is designed to be completed in four semesters by full-time students. However, students may start the program in any semester and may pursue an M.S. degree program in Management Science on a part-time basis.

Course Requirements

Hours

Core Requirements 16
Management Science 531, 532, 533, 534, and 691 or 692
Statistics 563

Applied specialization area (approved by advisor) 9
Technical elective: 6
Statistics (500 level or above as approved by advisor) 5
Mathematics (400 level or above as approved by advisor) 5
Industrial Engineering (400 level or above as approved by advisor) 5
Other elective (as approved by advisor) 5
Electives selected from mathematics, statistics, computer science, business, management science, industrial engineering, or other approved area 9

Total 40

A thesis option is available to qualified students. The Management Science Committee will work closely with the student in tailoring a program to his/her needs. The committee must approve a tentative overall program during the student's first semester and must approve all courses on a semester-by-semester basis.

Recognizing the diverse backgrounds and needs of Management Science M.S. students, the Management Science Committee is prepared to waive some of the above requirements on an individual basis. The total course load will remain 40 hours for all students.

THE DOCTORAL PROGRAM

The Ph.D. program in Management Science is designed to prepare students for research related to the application of mathematical tools to complex decision making. Three primary objectives of the program are:

1. to provide, through management science coursework, a thorough knowledge of common Management Science/Operations Research mathematical models and their uses;
2. to provide sufficient advanced study in a supporting area to qualify the student for a joint faculty position in the supporting area and
Management science. The candidate may choose from the business functional areas (accounting, finance, marketing, management, and transportation and logistics) or other disciplines, (e.g., computer science, forestry, ecology, and public administration); 3. to develop in the student, through coursework in mathematics, statistics and computer science, a high degree of mathematical maturity to enhance a potential career in management, research, or teaching. 

Admission Requirements

The doctoral program requires three applicant recommendation forms and the GRE or GMAT, in addition to The Graduate School's requirements. 

Coursework

A minimum of 48 semester hours of coursework taken for graduate credit (exclusive of thesis or dissertation) is required. Some of this may be the coursework from a master's program although a master's is not a prerequisite for the doctorate. The candidate must complete a minimum of 24 semester hours at The University of Tennessee, Knoxville, at least 8 of which must be at the 600 level. Both of these requirements are also exclusive of theses or dissertation credits. Entering students who have completed graduate studies in applicable fields will be granted course credits for work which is equivalent to required courses in the program. The program includes approximately 16 to 20 semester hours of coursework in the applied area.

Qualifying Examinations

The student must demonstrate mastery of probability theory and statistical inference, Statistics 563, 564, by passing a written qualifying examination. Mastery of 12 to 14 semester hours in mathematics coursework must be demonstrated by passing a written qualifying examination. Topics normally include numerical analysis, either Mathematics 471, 472, 453, and 571, or 571-572, and real analysis, Mathematics 445-446. Other options may be approved. In exceptional circumstances, the faculty will consider waiving the mathematics and/or statistics qualifying examinations. These requirements generally are completed by the end of the first year of the program. There is no foreign language requirement.

Comprehensive Examination

Prior to admission to candidacy for the degree, and normally after completion of the second year of the program, the student must pass a written comprehensive examination covering the theory of deterministic and stochastic management science models. Topics included in this examination are determined on an individual basis. Students will be expected to demonstrate an integrative ability that goes beyond simple mastery of course content.

Research and Dissertation

The student must complete 24 semester hours of Management Science 600: Doctoral Research and Dissertation, through which he/she is expected to make a significant contribution to the science. A final oral examination is conducted over the dissertation and such other segments of the program that the faculty committee deems appropriate. This effort, which is beyond the minimum 48 hours of coursework, normally is completed in the third year of the program.

ACADEMIC STANDARDS

A graduate student in the College of Business Administration whose grade-point average falls below 3.0 will be placed on probation. A student on probation will be dropped from the program unless his/her cumulative grade-point average is 3.0 or higher at the end of the probationary period. The probationary period is defined as the next semester's coursework as established by the degree program for full-time students and the next two semester's coursework as established by the degree program for part-time students.

PREREQUISITES FOR MANAGEMENT SCIENCE COURSES

The Management Science Program is interdisciplinary and students in other degree programs are encouraged to enroll in management science courses. Course prerequisites are designed to indicate the level at which courses are taught. Interested students whose prior coursework does not match the prerequisites are encouraged to seek the instructor's guidance and consent to enroll.

GRADUATE COURSES

500 Thesis (1-15)
P/NP only. Ed

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when the student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N only. Ed

526 Systems Modeling and Simulation (3) (Same as Industrial Engineering 523.)

531 Mathematical Programming (3) Linear programming solution procedures, duality, sensitivity, and parametric analysis, linear fractional, piecewise-linear, separable and discrete mathematical programming, transportation linear programming. Prereq: Fundamentals of matrix algebra. (Same as Industrial Engineering 523.)

532 Stochastic Models In Management Science (3) Discrete-time Markov chains, Poisson processes, continuous-time Markov chains, renewal theory, and queuing theory. Prereq: Statistics 533 and Mathematical Analysis or consent of instructor. Sp

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

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

593 Management Science Problems (1-6) Directed study on subject of mutual interest. Ed

600 Doctoral Research and Dissertation (3-15) P/NP only. Ed

621 Network Flows (3) Treatment of network optimization algorithms, transportation and transshipment models and primal-dual and primal-basis tree methods. Prereq: 531 or equivalent.

631 Integer Programming (3) Theoretical and computational aspects of integer programming, branch and bound, cutting plane, and group theoretic algorithms. Prereq: 531 or equivalent.

651 Nonlinear Optimization (3) Kuhn-Tucker theory in nonlinear programming, solution procedures for constrained and unconstrained nonlinear problems, search techniques, quadratic programming, duality and sensitiv-ity analysis. Prereq: 531 or equivalent, proficiency in computer language. (Same as Industrial Engineering 622.)

681 Special Topics (3) Prereq: 531, 532 and consent of instructor. May be repeated. Maximum 9 hrs.

691-92 Management Science Seminar (1,1) Subjects selected from current literature. S/N only.

Marketing, Logistics and Transportation

(College of Business Administration)

MAJOR 

DEGREES

Business Administration ................. MBA, Ph.D.

Richard C. Reizenstein, Acting Head

Professors:

Bernaby, D. J., Ph.D. ................. Purdue
Cadotte, E. R., Ph.D. ................. Ohio State
Davis, F. W., Jr., Ph.D. ............... Michigan State
Dier, G. N., DBA ..................... Indiana
Hendrix, F. L. (Emeritus), Ph.D. ........ North Carolina
Langley, C. J. (Dove Prof.), Jr., Ph.D. ...... Penn State

Mentzer, J. T. (Harry J. Bruce Chair of Excellence), Ph.D. ................. Michigan State
Mundy, R. A. (Taylor Prof.), Ph.D. , Penn State
Schumann, D. W., Ph.D. ................ Missouri
Woodruff, R. B. (Profit’s Prof.), DBA .... Indiana

Associate Professors:

Dabholkar, P. A. (Liaison), Ph.D. Georgia State
Foggin, J. H. (Liaison), DBA .............. Indiana
Gardial, S. F., Ph.D. ................. Houston
Holcomb, M. C., Ph.D. ............... Tennessee
Reizenstein, R. C., Ph.D. .............. Cornell
Rentz, J. O., Ph.D. .................... Georgia

Assistant Professors:

Moon, M. A., Ph.D. ........ North Carolina
Norek, C. D., Ph.D. .................... Ohio State

BUSINESS ADMINISTRATION CONCENTRATIONS

For complete listing of MBA and Ph.D. program requirements, see Business Administration.

MBA Concentration: Logistics and Transportation, Marketing. Minimum course requirements for logistics and transportation—501, 508, and one course from the following: 504, 506, 507, 593, and 599. For marketing—511 and 512.

Ph.D. Concentration: Logistics and Transportation, Marketing. Minimum course requirements for logistics and transportation—12 hours to include 612, 614, 615. For marketing—12 hours from among the following courses: 601, 612, 614, 615, 617.

Marketing, Logistics and Transportation

(College of Business Administration)

MAJOR

DEGREES

Business Administration ................ MBA, Ph.D.

Richard C. Reizenstein, Acting Head

Professors:

Bernaby, D. J., Ph.D. .................. Purdue
Cadotte, E. R., Ph.D. .................. Ohio State
Davis, F. W., Jr., Ph.D. ............... Michigan State
Dier, G. N., DBA ..................... Indiana
Hendrix, F. L. (Emeritus), Ph.D. ....... North Carolina
Langley, C. J. (Dove Prof.), Jr., Ph.D. ...... Penn State

Mentzer, J. T. (Harry J. Bruce Chair of Excellence), Ph.D. ................. Michigan State
Mundy, R. A. (Taylor Prof.), Ph.D. , Penn State
Schumann, D. W., Ph.D. ................ Missouri
Woodruff, R. B. (Profit’s Prof.), DBA .... Indiana

Associate Professors:

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Foggin, J. H. (Liaison), DBA .............. Indiana
Gardial, S. F., Ph.D. ................. Houston
Holcomb, M. C., Ph.D. ............... Tennessee
Reizenstein, R. C., Ph.D. .............. Cornell
Rentz, J. O., Ph.D. .................... Georgia

Assistant Professors:

Moon, M. A., Ph.D. .................. North Carolina
Norek, C. D., Ph.D. .................... Ohio State

BUSINESS ADMINISTRATION CONCENTRATIONS

For complete listing of MBA and Ph.D. program requirements, see Business Administration.

MBA Concentration: Logistics and Transportation, Marketing. Minimum course requirements for logistics and transportation—501, 508, and one course from the following: 504, 506, 507, 593, and 599. For marketing—511 and 512.

Ph.D. Concentration: Logistics and Transportation, Marketing. Minimum course requirements for logistics and transportation—12 hours to include 612, 614, 615. For marketing—12 hours from among the following courses: 601, 612, 614, 615, 617.
Logistics and Transportation

GRADUATE COURSES

501 Survey of Logistics and Transportation (3) U.S. logistics and transportation: physical, economic, social, and political environment; financing, managing, maintaining, and enhancing U.S. transport infrastructure.

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N/C only. E

504 Freight Carrier Systems and Management (3) Analysis of freight carrier management's efforts to provide services demanded by consumers in logistics and transportation marketplace.

506 Logistics Systems Management (3) Developmental strategy for management of logistics systems. Executive level integration of logistics operations with marketing, production, and other decision areas. Practical applications through case approach and simulation game.

507 International Logistics and Transportation (3) Logistics strategy in the international firm: materials management, international sources and distribution, and importing/exporting. Issues: international carrier management and operations and comparative national transport systems analysis.

508 Executive-in-Residence Seminar in Logistics and Transportation Strategy (3) Capstone, integrative case course in logistics and transportation strategy: participation in Executive-in-Residence program that provides student interaction with top-level logistics and transportation executives.

593 Independent Study (3-6) Directed research and study. Prereq: Consent of instructor. May be repeated. May be repeated. Maximum 6 hrs.

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

600 Doctoral Research and Dissertation (3-15) P/NP only. E

611 Seminar in Theoretical Foundations (3) (Same as Logistics and Transportation 611.)

612 Research Methods I (3) (Same as Marketing 612.)

614 Seminar in Evolution of Logistics Thought (3) Traces evolution of logistics and transportation thought; development of principles and tools developed as organizational missions and environmental change. Economic and policy issues peculiar to transportation and other service organizations.

615 Seminar in Logistics and Transportation Models (3) Analysis of contemporary models and methodologies in logistics and transportation research, topical coverage at discretion of instructor.

693 Independent Study (1-4) Directed research on subject of mutual interest to student and faculty. May be repeated. Prereq: Consent of instructor. May be repeated.

511 MBA Marketing Concentration II (6) Determination of customer value, principles of consumer behavior, marketing research, and building customer value. Prereq: Business Administration 504 or consent of instructor.

512 MBA Marketing Concentration II (3) Delivery of customer value. Communication of customer value, marketing strategy, and providing customer responsive organizations marketing. Prereq: Business Administration 504 or 505 or consent of instructor.

593 Independent Study (3) Directed research and study. Prereq: MBA Core and consent of instructor. May be repeated. Maximum 6 hrs.

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

601 Marketing Theory (3) Nature and scope of marketing, role of theory development and theory testing important to marketing research.

611 Seminar in Theoretical Foundations (3) Theoretical foundations and frameworks common to business research. Historical and philosophy of science perspectives. (Same as Logistics and Transportation 611.)

612 Research Methods I (3) Research process: philosophical foundations, problem formulation, grounded theory, qualitative methods and analysis, measurement, sources of error, experimental design and analysis, and survey design and analysis. (Same as Logistics and Transportation 612.)

613 Research Methods II (3) Practical application of data analysis techniques, using real marketing databases.

614 Marketing Thought (3) Marketing literature across number of research areas. Evaluate individual works, determine state of research in each area, and identify areas that merit further study.

615 Seminar in Buyer Behavior Research (3) Theoretical perspective and research processes describing people in their roles as buyers, users, and evaluators of goods and services. Important research issues and practical applications related to buyer behavior.


617 Special Topics (3) Topics vary: market forecasting, market segmentation, services marketing, marketing channels, and related issues. Prereq: Consent of instructor. May be repeated.

693 Independent Study (1-4) Directed research on subject of mutual interest to student and staff member. May be repeated.

612 MBA Marketing Concentration II (6) Determination of customer value, principles of consumer behavior, marketing research, and building customer value. Prereq: Business Administration 504 or consent of instructor.

511 MBA Marketing Concentration II (3) Delivery of customer value. Communication of customer value, marketing strategy, and providing customer responsive organizations marketing. Prereq: Business Administration 504 or 505 or consent of instructor.

593 Independent Study (3) Directed research and study. Prereq: MBA Core and consent of instructor. May be repeated. Maximum 6 hrs.

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

600 Doctoral Research and Dissertation (3-15) P/NP only. E

601 Marketing Theory (3) Nature and scope of marketing, role of theory development and theory testing important to marketing research.

611 Seminar in Theoretical Foundations (3) Theoretical foundations and frameworks common to business research. Historical and philosophy of science perspectives. (Same as Logistics and Transportation 611.)

612 Research Methods I (3) Research process: philosophical foundations, problem formulation, grounded theory, qualitative methods and analysis, measurement, sources of error, experimental design and analysis, and survey design and analysis. (Same as Logistics and Transportation 612.)

613 Research Methods II (3) Practical application of data analysis techniques, using real marketing databases.

614 Marketing Thought (3) Marketing literature across number of research areas. Evaluate individual works, determine state of research in each area, and identify areas that merit further study.

615 Seminar in Buyer Behavior Research (3) Theoretical perspective and research processes describing people in their roles as buyers, users, and evaluators of goods and services. Important research issues and practical applications related to buyer behavior.


617 Special Topics (3) Topics vary: market forecasting, market segmentation, services marketing, marketing channels, and related issues. Prereq: Consent of instructor. May be repeated.

693 Independent Study (1-4) Directed research on subject of mutual interest to student and staff member. May be repeated.

Materials Science and Engineering

Graduate programs are offered leading to the degrees of Master of Science and Doctor of Philosophy in Metallurgical Engineering or Polymer Engineering. Both the metallurgical and polymer programs are flexible and interdisciplinary in nature. Students may be admitted from a wide range of disciplines; these include physics, chemistry, chemical engineering, mechanical engineering, electrical engineering, materials engineering, and engineering science programs. Prospective students should consult materials science and engineering faculty concerning development of individual concentrations or special programs compatible with their backgrounds and goals.

Areas of concentration within the metallurgical engineering program include physical metallurgy; materials processing; welding metallurgy and materials joining; corrosion behavior; failure analysis; and physical and mechanical behavior of materials. Specializations in electronic, ceramic, and composite materials are available.

Areas of concentration within the polymer engineering program include rheology and polymer processing; polymer morphology; mechanical, physical, and chemical behavior of polymers; and composite materials.

THE MASTER'S PROGRAM

Thesis Option

A total of 30 semester hours is required for the M.S. degree in either Metallurgical Engineering or Polymer Engineering. Additional requirements include:

1. A major consisting of at least 12 semester hours of graduate courses in metallurgical engineering or polymer engineering. The polymer engineering major must include 540, 541, 543, 546, 549, 550 and 572 unless similar material has been covered in prior coursework.

2. Additional courses up to 12 hours total in related areas.


4. Satisfactory performance on a comprehensive oral examination administered by the faculty committee.

Non-Thesis Option

Any candidate may apply for a non-thesis option. Upon acceptance, a supervisory committee of three will be appointed. At least two members of the committee will be from the materials science and engineering faculty.

Any candidate may apply for a non-thesis option. Upon acceptance, a supervisory committee of three will be appointed. At least two members of the committee will be from the materials science and engineering faculty.

Any candidate may apply for a non-thesis option. Upon acceptance, a supervisory committee of three will be appointed. At least two members of the committee will be from the materials science and engineering faculty.
faculty in the major area, either metallurgical engineering or polymer engineering. The requirements for completion of the non-thesis option are as follows:

1. Completion of a total of 30 hours of graduate coursework. At least 18 of those hours must be in the department, and up to 12 hours may be in related areas. Three hours of MSE 503 or 504, Seminar, graded Satisfactory/No Credit, may be counted toward degree requirements. The polymer engineering major must include the same coursework required for the thesis option. The candidate's degree program must be approved by the faculty committee.

2. Satisfactory completion of a culminating experience such as MSE 560 (Critical Review).

3. Satisfactory performance on a comprehensive examination administered by the faculty committee.

THE DOCTORAL PROGRAM

After one year in residence and with the approval of the doctoral committee, a student may proceed directly to the doctoral program without completion of a master's degree. Departmental requirements for completion of the doctoral degree are:

1. a. For students proceeding directly to the Ph.D. from the baccalaureate degree: 48 graduate course credit hours with at least six hours of 600-level courses. Six hours of MSE 503 or 504, Seminar, graded Satisfactory/No Credit, may be counted toward degree requirements. At least 30 credit hours must be courses taught in the department. The polymer engineering major must include the same courses required for the master's thesis option.

b. For students having a master's degree in Metallurgical Engineering, Polymer Engineering, or Materials Science and Engineering: 18 additional graduate course credits with at least six hours of 600-level courses. Three hours of MSE 503 or 504, Seminar, graded Satisfactory/No Credit, may be counted toward degree requirements. At least 12 credit hours must be courses in the department.

2. Students must complete at least 24 hours of dissertation credits.

3. Satisfactory performance on a comprehensive examination, usually given in two parts, and covering such topics as materials science and engineering, metallurgical or polymer engineeringscience and engineering operations and processes, thermodynamics, technology, mathematics, physics, chemistry, and other related fields.

4. Active participation in graduate seminars conducted by the department. Resident students must register for the appropriate 503 or 504 every semester offered.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows local residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S. and Ph.D. programs in Polymer Engineering are available to residents of Kentucky, West Virginia, and Mississippi. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE COURSES

405 Structure/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. Prereq: Mechanical Behavior of Materials, Mechanics of Materials sophistication, or Materials Science and Engineering:18 courses taught in the department. The polymer in polymer processing operations: screw extrusion, fiber spinning, injection molding. (Same as Chemical Engineering 541.)

422 Chemical Process Metallurgy (3) Application of chemical thermodynamics to metallurgical processing. Ferrous and nonferrous pyrometallurgical refining, slag-metal equilibria, solidification, gas-metal processing. Prereq: 203.

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. Prereq: Introduction to Materials Science and Engineering and Mechanics of Materials or equivalent and consent of instructor. (Same as Engineering Science 429.)

443 Polymer Processing (3) Rheological measurements: flow through tubes and slits, end effects and extrudate swell, illustrated application, screw extrusion, injection molding; synthesis fibers, spinning methods, structure development, properties.

444 Plastics Fabrication and Design (3) Lectures, laboratories and field trips; unit operations of plastics fabrication; plastics classification; design and selection criteria; processing techniques; characterization laboratory. Sp


472 Fundamental Principles of Composite Materials (3) Establishment of physical principles basic to design, manufacture and application of fiber reinforced polymers, metals and ceramics. Prereq: 300 or equivalent. (Same as Engineering Science 429.)

474 Biomaterials (3) Metals, polymers and ceramics used in orthopedic, cardiovascular, and dental surgical implant devices; corrosion and degradation problems; material properties of polymers and ceramics response to synthetic materials. Prereq: 201. Recommended for engineering science and mechanics majors.

475 Fracture-Size Effect (3) (Same as Engineering Science and Mechanics 429.)

484 Introduction to Maintenance and Reliability Engineering (3) (Same as Nuclear Engineering 486, Industrial Engineering 484, and Mechanical Engineering 484.)

500 Thesis (1-15) P/NP only. E

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses university facilities and for faculty time before degree is completed. May not be used toward degree requirements. May be repeated. SNC only. E

503 Graduate Seminar in Metallurgical Engineering (1) Prereq: Admission to graduate program. May be repeated. SNC only. E

504 Graduate Seminar in Polymer Engineering (1) Prereq: Admission to graduate program. May be repeated. SNC only. E

505 Engineering Analysis (3) (Same as Chemical Engineering 505.)

522 Defects in Crystals (3) Analytical and experimental analysis of defect interactions in solids. Prereq: 421 or consent of instructor.

523 Plastic Deformation of Metals (3) Geometry and mechanisms of single crystal plastic deformation; slip, twinning, and cleavage; work hardening and recovery; texture, loading rate effects; effect of ordering and solid solution alloying; polycrystalline behavior in terms of single crystal deformation mechanisms; texture formation. Prereq: 301, 320 or consent of instructor.

524 Metallurgical Thermodynamics (3) Applications of chemical thermodynamics to metallurgical problems: refining, oxidation, surface treatment, alloy systems. Prereq: 570 or equivalent.

525-26 Welding Metallurgy (3-3) 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.

528 Ceramic Matrix Composites: Material and Mechanisms (3) (Same as Engineering Science 528.)

529 Diffusion in Solids (3) Phenomenology and atomic mechanisms of diffusion in solid state. Solution and applications of diffusion equations; random walk problem and mechanisms of diffusion; diffusion in dilute and concentrated alloys, Kirkendall effect; high diffusivity paths.

530 Phase Transformations in Metallic Materials (3) Thermodynamics of phase equilibrium, theory of nucleation in solids; kinetics and morphology of diffusion controlled growth; kinetics of interface controlled phase transformations; crystallography and kinetics of martensitic transformations.

531 Advanced Corrosion (3) Analyses of corrosion processes in terms of poisoning mechanisms and Pourbaix diagram. Influence of environmental and mechanical factors contributing to pitting, crevice, fretting, wear, fatigue and stress corrosion. Prereq: 470 or consent of instructor.


540 Basic Polymer Chemistry (3) Synthesis, reactions and degradation of polymers. Molecular characterization: solution methods and spectroscopy. Prereq: Semester of organic chemistry and thermodynamics or equivalent.

541 Fluid Mechanics and Polymer Processing (3) Navier-Stokes equations and illustrative problems; applications in chemical engineering and polymer engineering, packed and fluidized beds, multiphase systems. Basic concepts in mechanics; applications in polymer processing: screw extrusion, fiber spinning, injection molding. (Same as Chemical Engineering 541.)

542 Further Topics in Polymer Processing (3) Description and analysis of selected polymer processing operations. Prereq: 541.


544 Polymer Solution Thermodynamics and Characterization (3) Theories of solutions, statistical thermodynamics, characterization, treatment of chromatography, viscosity, light scattering and osmotic pressure. Prereq: Undergraduate physical chemistry.

546 Mechanical Properties of Solid Polymers (3) Types of mechanical behavior: Hookian and rubber elasticity; plastic deformation; fracture; linear viscoelasticity; dynamic mechanical behavior and testing; loss tangent; experimental methods. Introduction to mechanical properties of polymeric composites.

549-50 Laboratory Methods in Polymer Engineering (1,2) Basic experimental techniques and instrumentation associated with characterization, x-ray and light scattering, calorimetry, rheometry, mechanical properties of solid polymers, polymer processing operations. Coreq: 540 or consent of instructor. 549-S/NC only.

560 Principles of Ceramic Processing (3) Treatment of ceramic processing; raw materials preparation and characterization, powder synthesis, sol-gel reactions, sintering techniques, mechanisms and kinetics. Prereq: 360 or equivalent.

561 Inorganic Glass Forming Systems (3) Physical and chemical structure of inorganic glasses, structural theories of glass formation; major glass forming systems: silica, other oxide glasses, nitrate glasses, water glasses, and chalcogenide glasses. Prereq: 360, Chemistry 371.
Mathematics

(College of Arts and Sciences)

MAJOR DEGREES

Mathematics .............................. M.M., M.S., Ph.D.

John B. Conway, Head

Professors:

Alexiadis, V., Ph.D. ......................... Delaware
Altakos, N., Ph.D. ......................... Brown
Anderson, D. F., Ph.D. ..................... Chicago
Baker, G. A., Ph.D. ......................... Cornell
Bradley, John S. (Emeritus), Ph.D. .... Oregon State
Carruth, J. H. (Emeritus), Ph.D. ........ Louisiana State
Clark, C. E., Ph.D. .......................... Louisiana State
Conway, J. B., Ph.D. ........................ Louisiana State
Daverman, Robert J., Ph.D. .............. Wisconsin
Dobbs, D. E., Ph.D. ........................ Cornell

Dydk, J., Ph.D. .............................. Warsaw
Frandsen, Henry (Emeritus), Ph.D. .... Illinoi
Gross, L. J., Ph.D. ........................... Cornell
Hinton, D. B., Ph.D. ........................ Tennessee
Husch, L. S., Ph.D. ........................... Florida State
Johannson, K., Ph.D. ........................ Bielefeld
Jordan, G. Samuel, Ph.D. ............... Wisconsin
Karekenas, O., Ph.D. ....................... Harvard
Kupershmidt, B. (UTSI), Ph.D. ........ MIT
Lenhart, S., Ph.D. ............................ Kentucky
McConnel, R. M., Ph.D. ................. Duke
Mathews, H. T. (Emeritus), Ph.D. ...... Tulane
Miller, K. D. (Emeritus), Ph.D. ....... Michigan
Mulay, S., Ph.D. ............................. Purdue
Rajput, B. S., Ph.D. ........................... Illinois
Reddy, K. C. (UTSI), Ph.D. ............. Indian IT
Rosinski, J., Ph.D. ........................... Wroclaw
Schafer, P. W., Ph.D. ...................... Maryland
Serbin, Steve, Ph.D. ....................... Cornell
Simpson, H., Ph.D. ........................... Cal Tech
Son, K. (Emeritus), Ph.D. ............... Oregon State
Soni, R. P., Ph.D. ............................ Oregon State
Stallman, F. W. (Emeritus), Ph.D. ...... Giessen
Stephenson, K. R., Ph.D. ............... Wisconsin
Sundberg, C., Ph.D. ........................... Montana
Thistlethwaite, M., B. F., Ph.D. ....... Manchester
Wade, W. R., Ph.D. ......................... California (Riverside)
Weisner, C. G., Ph.D. ...................... Duke

Associate Professors:

Collins, Charles R., Ph.D. .............. Minnesota
Freire, A., Ph.D. ........................... Princeton
Kimble, K. R. (UTSI), Ph.D. ............ Ohio State
Kot, Mark, Ph.D. ........................... Arizona
Kuo, Y., Ph.D. ............................... Cincinnati
Pault, Conrad, Ph.D. ..................... Maryland
Richter, Stefan (Liaison), Ph.D. ...... Michigan
Row, J. R., Ph.D. ............................. Wisconsin
Smith, J., Ph.D. ............................. Iowa

Assistant Professors:

Feng, Xiaobing, Ph.D. ..................... Purdue
Gavriloje, Sergey, Ph.D. ................. Moscow State
Guan, Bo, Ph.D. ............................ Massachusetts
Portny, N., Ph.D. ........................... New Hampshire
Qian, Deb, Ph.D. ........................... Virginia
Xiong, Jie, Ph.D. .......................... North Carolina

The Mathematics Department has three graduate degrees: (1) the Master of Mathematics degree, intended primarily for teachers, (2) the Master of Science degree, designed to prepare students for industrial employment and for teaching, and (3) the Doctor of Philosophy degree, designed to prepare students for industrial employment and for college and university teaching and research. Contact the department office for additional information. A student offering mathematics as a minor for the master's degree is required to obtain at least 6 hours of resident graduate credit in courses numbered above 400 and approved by both the major department and the Department of Mathematics.

For additional information, please visit the graduate website on the Department of Mathematics' homepage at www.math.uky.edu.

THE MASTER OF MATHEMATICS PROGRAM

Before admission to the Master of Mathematics program, the applicant must have either (a) certification for teaching secondary mathematics in at least one state, or (b) three years of elementary school, secondary school, or community college teaching experience. Applicants must have successfully completed one year of calculus (141-42 or equivalent) and a course in matrix algebra (251 or equivalent).

The following requirements must be met:
1. Complete 30 hours of coursework of which 21 must be at the 500 level. The coursework must include 504, 505, 506, 507, and 6 hours in 509. At most, 6 hours may be taken outside the Department of Mathematics (selected in consultation with the advisor).
2. Pass a final examination upon completion of all coursework.

In exceptional circumstances, part of admission requirement (b) might be satisfied concurrently with coursework. Normally Master of Mathematics degree students will start the program by taking 504 during the summer.

THE MASTER OF SCIENCE PROGRAM

The department offers two options for the Master of Science degree. The first option requires a thesis for which 6 hours must be earned along with 24 additional hours of work in acceptable courses numbered above 400. Of the additional hours, 6 may be in an area outside the department and 15 must be in courses in mathematics numbered above 500. After one semester of graduate study, a student whose advisory committee gives its approval may choose the non-thesis option, for which 30 hours in courses numbered above 400 are required. Of these, 21 hours (at least 15 of which must be in mathematics) must be in courses numbered above 500. Of the 30 hours, 9 in courses approved by the advisory committee may be taken in fields other than mathematics. For this option it is required that a written final examination be passed and that credit be received for a reading course (598) in which a term paper or project is required.

Concentration in Applied Mathematics

For this concentration, available under the thesis or the non-thesis option, the student must complete the following:
2. One hour of Seminar in Applied Mathematics
THE DOCTORAL PROGRAM

For the Ph.D. program in Mathematics, the student must meet the following four requirements in addition to those of The Graduate School:

1. Satisfy either the standard program or the interdisciplinary mathematical ecology concentration. A student intending to work in mathematical ecology may complete either but is strongly encouraged to complete the interdisciplinary mathematical ecology concentration. A student may elect to switch from one to the other provided the constraints of the latter option have not been violated. A student's status after electing such transfer is determined by the complete history of the student's earlier mathematics examinations from the standard program and the interdisciplinary mathematical ecology concentration. Descriptions of both programs are given below.

2. Demonstrate proficiency in one foreign language, normally French, German or Russian. This requirement must be met prior to the examination in the area of specialization. A student's doctoral committee may require the student to pass a second language examination.

3. Pass an examination in the field of specialization. After the requirements in 1. and 2. have been met, this examination will be given by a committee appointed by the department head. A student may take this examination only twice.

4. Pass a one-year, 600-level sequence in mathematics outside the student's area of specialization. The sequence selected to fulfill this requirement must be approved by the department head and the student's doctoral committee. (Such approval may occur after completion of the sequence.)

Requirements 1-4 must be completed no later than the start of a student's seventh year (as a mathematics graduate student at UT Knoxville).

Mathematical Ecology Concentration

The student must pass written examinations in the following three subjects:

2. A subject from Groups I, II, and III of the standard program.
3. A subject representing a year-long graduate-level sequence from outside the Department of Mathematics. The sequence must be approved in advance by the student's advisor, the Graduate Committee, and the department head. At least one member of the mathematical ecology faculty must be involved in grading the examination. The examination in this subject may be taken only twice.

The student also must earn grades of B+ or better each semester in the courses associated with two additional subjects from the groups listed in the standard program. This requirement may not be satisfied with courses outside the department. At least one of the subjects used to meet this requirement or the written examination subject in 2. must be from Groups I and II.

Exempt for the privilege of utilizing as a Group IV course a course from outside the department, this concentration is subject to the constraints and privileges specified in the standard program, including the restrictions on related subjects, the conditions a. through d. placed on the taking of written examinations, and the option to pass a written examination in lieu of earning a grade of B+ or better each semester in a sequence from Group I, II or III.

GRADUATE COURSES

400 History of Mathematics (3) Development of major ideas in mathematics from ancient to modem times and influence of ideas in science, technology, philosophy, art, and other fields. Writing requirement. Prereq: 4 years of high school mathematics or consent of instructor. 300 students will be admitted to the course. Required for each of the following: 300, 305, 310.

401 Mathematics and Microcomputers (3) Primarily for students seeking certification as teachers of mathematics at secondary level. Use of microcomputers to study concepts and problems in mathematics. Does not satisfy the major requirements for a B.S. or M.S. in mathematics. Prereqs: Calculus I.

404 Applied Vector Calculus (3) Topics from multivariable and vector calculus; line and surface integrals, divergence theorem and theorems of Gauss and Stokes. Prereq: Calculus III.

405 Models in Biology (3) Difference and differential equation models of biological systems. May not be counted toward graduate degree. Prereq: Calculus II or Bioclassics II.


421 Combinatorics (3) Introduction to problems of construction and enumeration for discrete structures: sequences, partitions, graphs, finite fields and geometries, experimental designs. Prereqs: Probability and Statistics, or consent of instructor.

423 Probability I (3) Axiomatic probability, multivariate distributions, conditional probability and expectations, methods of moment generating/characteristic functions, Laws of large numbers and central limit theorem. Prereq: 300-level probability or consent of instructor.

424 Probability II (3) Elements of stochastic processes: Random walk, Markov chains and Poisson processes. Other topics as selected by instructor. Prereq: 423.

425 Statistics (3) Derivation of standard statistical distributions: t, F and x^2; independence of sample mean and variance; basic limit theorems; point and interval estimation, Bayesian estimates; statistical hypotheses, Neyman-Pearson theorem; likelihood ratio and other parametric and non-parametric tests. Prereqs: Probability I or consent of instructor.


443 Complex Variables I (3) Theory of functions of complex variables: residue theorem, contour integrals. Prereq: Calculus III. Recommended prereq: 300- or 400-level mathematics course.

444 Complex Variables II (3) Applications of complex variables to steady-state temperatures, electrostatics, and fluid flow. Prereqs: 443.

445-46 Advanced Calculus II (3) Theory of sequences, series, differentiation, and Riemann integration of functions of one or more variables. Prereqs: Calculus III and Introduction to Abstract Mathematics, or consent of instructor.


453 Matrix Algebra II (3) Matrix theory including Jordan canonical form. Prereq: Matrix Algebra I.
501 Applied Mathematics Laboratory (3) Computer applications in applied mathematics: software packages for matrix analysis, optimization, numerical solutions of differential equations, contour, 501 or 512. May be repeated.

511-12 Methods in Applied Mathematics (3) Fundamentals and techniques associated with discrete and continuous models of physical, engineering, and biological systems; difference equations, networks, graphs, optimization, time series analysis, qualitative analysis of differential and difference equations, and other topics. Coreq: 510. Prereq: 445 or 447, and 443.

513-14 Mathematical Principles of Continuum Mechanics (3) Equations of motion, incompressible and compressible potential flow, shock waves, viscous flows. Navier-Stokes equations, Prereq: 431, 435, and 445-446 or 404, or consent of instructor.

515-16 Analytical Applied Mathematics (3) Analysis of advanced techniques in applied mathematics in 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. Prereq: 446 or 448, 453, and either 511-12 or both 431 and 435.

517-18 Mathematical Methods in Physics (3) (Same as Physics 571-72.)

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

521-22 Enumerative Combinatorics (3) Steepest descents, recursion, and permutation groups applied to enumeration of discrete structures. Incidence algebras and combinatorics of partially ordered sets. Prereq: 431.

522-24 Probability (3) Pertinent facts from measure theory, definition of abstract probability spaces, Kolmogorov's extension theorem; series of independent random variables and laws of large numbers; general theory of distributions of random vectors and their characteristic functions; weak convergence concepts, weak compactness and Levy's continuity theorem in Euclidean spaces; infinitely divisible distributions and central limit theorems; limit theorems and properties of conditional expectation, martingales, Doob's martingale conditional sampling theorems. Prereq: 445-446. Recommended prereq: 423.

527 Stochastic Modeling (3) Models in probability applied to real world situations; queueing theory; branching processes, Monte Carlo simulation. Prereq: 445-446 or consent of instructor.


534 Calculus of Variations (3) Necessary conditions for extrema, Eulor's equation, broken extremals, Weierstrass-Erdmann conditions, Legendre's and Jacobi's conditions, conjugate points. Multiple integrals. Prereq: 431.

535-36 Partial Differential Equations (3) First order equations, classification of equations and properties of elliptic, hyperbolic, and parabolic equations, characteristics, variational methods. Prereq: 445-446 and 231 or consent of instructor.

537-38 Mathematical Principles of Continuum Mechanics (3) Conservation principles, equations of equilibrium and motion for fluids and elastic solids, constitutive relations and stress, convexity properties, bifurcation, phenomena, existence theory. Prereq: 431, 435, 445 or 448, or consent of instructor.

539 Seminar in Differential Equations (1-3) Prereq: Consent of Instructor. May be repeated. Maximum 12 hrs.

540 Finite Difference Methods (3) Finite difference techniques for solution of boundary and initial-boundary value problems, finite difference methods, group velocities, Galerkin's method, Green's functions, similarity properties, structured grids, and applications. Prereq: 445-446, 453, 471-72. (Same as Computer Science 571-72.)


549 Seminar in Analysis (1-3) May be repeated. Maximum 12 hrs.

551-52 Modern Algebra (3) Groups, rings, modules and linear algebra, fields and Galois theory. Must be taken in sequence. Prereq: 455-456 or consent of instructor.

553 Linear Programming (3) Theory and applications. Prereq: Consent of instructor or 535 and programming ability.

555-56 Number Theory (3) Introduction to algebraic number theory. Prereq: 455-456 or consent of instructor.

556 Seminars in Algebra (1-3) Prereq: Consent of Instructor. May be repeated. Maximum 12 hrs.

561-82 Topology (3) Topological spaces, Hausdorff spaces, metrization, homeomorphic invariants of point sets, compactness and connectedness, homotopy, Covering spaces and fundamental group.

567-68 Differential Geometry (3) Classical differential geometry in two and higher dimensions: curves and surfaces in Euclidean spaces, Gauss map, curvature, Gauss-Bonnet theorem, hyperbolic geometry, minimal surfaces, and Riemannian metrics; connections, geodesics, Jacobi fields, and curvature tensors. Differential forms and moving frames. Prereq: 445-446 or consent of instructor.

569 Seminar in Topology (1-3) May be repeated. Maximum 12 hrs.


577 Optimization (3) Major topics in optimization with applications developed from real-world problems, constrained and unconstrained optimization with analysis of major algorithms and utilization of appropriate software. Prereq: Numerical Analysis, 453, 445-446.

569 Seminar in Algebra (1-3) Prereq: Consent of Instructor. May be repeated with consent of department. Maximum 12 hrs.


667-68 Advanced Differential Geometry (3,3) Selected topics from Riemannian geometry and analysis on manifolds. Lie groups, metric geometry, spectrum of Laplacian, Hodge Theory, variational problems, curvature and topology of manifolds. Prereq: 567-68 or consent of instructor. May be repeated with consent of department. Maximum 12 hrs.

669 Seminar in Topology (3) May be repeated with consent of department. Maximum 12 hrs.


679 Seminar in Numerical Mathematics (1-3) May be repeated with consent of department. Maximum 12 hrs.

681-82 Advanced Mathematical Ecology (3,3) 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. Prereq: 581-82. May be repeated. (Same as Ecology and Evolutionary Biology 681-82.)

684 Mathematical Systems Theory (3) Analytic approach to discrete and continuous dynamical control systems: optimal control, Applications to topology. Prereq: 413, 451, 445-446 or consent of instructor.

585 Optimal Control Theory (3) Deterministic optimal control. Examples involving calculus of variations, optimal trajectories, and engineering control problems. Introduction to stochastic control. Prereq: 413, 445-446 or consent of instructor.

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

593 Independent Study (1-15) See College of Arts and Sciences.

598 Graduate Reading in Mathematics (1-3) Independent study with faculty guidance. Prereq: Graduate standing and consent of instructor. May be repeated. Maximum 6 hrs.

600 Doctoral Research and Dissertation (3-15) P/NP only.


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

623-24 Advanced Probability (3,3) Selected topics in modern theory of probability and stochastic processes: Itô's calculus and stochastic differential equations, integration prediction theory, ergodic theory, probability on manifolds, limit theorems, probability and geometry in Banach spaces, probability methods in analysis. Prereq: 523-24 or consent of instructor. May be repeated with consent of department. Maximum 12 hrs.

629 Seminar in Combinatorics (1-3) May be repeated with consent of department. Maximum 12 hrs.

631-32 Advanced Ordinary Differential Equations (3,3) Theory of ordinary differential equations from advanced viewpoint. Topics from current literature. Subject matter varies according to interests and preparations of students. Prereq: 531-32 or consent of instructor. May be repeated with consent of department. Maximum 12 hrs.

635-36 Advanced Partial Differential Equations (3,3) Selected topics in classical and modern theoretical partial differential equations. Prereq: 541-42 or 547-48 or consent of instructor. May be repeated with consent of department. Maximum 12 hrs.


643-44 Harmonic Analysis (3,3) Fourier series and Fourier transforms on Euclidean spaces or topological groups; convergence, summability, uniqueness, inversion, duality, Plancherel transform, Hilbert transform, Hardy-Littlewood maximal function, interpolation of operators, or Fefferman-Stein duality. Prereq: 541-42 and 543. May be repeated with consent of department. Maximum 12 hrs.

649 Seminar in Analysis (1-3) May be repeated with consent of department. Maximum 12 hrs.

651-32 Advanced Modern Algebra (3,3) Selected topics in modern algebra or number theory. Prereq: 551-32 or consent of instructor. May be repeated with consent of department. Maximum 12 hrs.

659 Seminar in Algebra (1-3) Prereq: Consent of Instructor. May be repeated with consent of department. Maximum 12 hrs.

710-12 Analytic Geometry (3,3) Analytic geometry and calculus of several variables. Prereq: 511-52 or 516, 515, or consent of instructor.

711-12 Modern Analysis (3,3) Advanced calculus and topology. Prereq: 511-52 or 516, 515, or consent of instructor.

715-16 Modern Algebra (3,3) Advanced topics in algebra. Prereq: 515-16 or consent of instructor.

717-18 Topology (3,3) Advanced topics in topology. Prereq: 517-18 or consent of instructor.

719 Seminar in Analysis (1-3) May be repeated with consent of department. Maximum 12 hrs.

721-22 Modern Analysis II (3,3) Advanced topics in analysis. Prereq: 711-12 or consent of instructor.

723-24 Modern Algebra II (3,3) Advanced topics in algebra. Prereq: 715-16 or consent of instructor.

725-26 Topology II (3,3) Advanced topics in topology. Prereq: 717-18 or consent of instructor.
mechanical approval. Each applicant is advised as to any prerequisite courses before entering a program.

In Mechanical Engineering, program concentrations include energy conversion and utilization; propulsion; heat transfer and fluid mechanics; thermodynamics; space engineering; gas dynamics; machine design; dynamics, control, and robotics; power generation; and stress analysis.

In Aerospace Engineering, program concentrations include energy conversion and utilization; propulsion; heat transfer and fluid mechanics; thermodynamics; space engineering; aerodynamics and performance; gas dynamics; flight and aerospace mechanics; aeroacoustics; and structures and stress analysis.

In Engineering Science, program concentrations include solid mechanics, fluid mechanics, computational mechanics, mechanics of composite materials, applied artificial intelligence, biomedical engineering, industrial engineering, and optical engineering (UTSI only). In each of these concentrations, interdisciplinary programs are arranged to meet individual needs or interests. The flexibility and interdisciplinary aspect of the program concentrations are intended to be of particular interest to prospective students currently employed in research, development, or design activities and whose interests in continuing education (either full-time or part-time) lie at one of the interfaces between science and engineering or can best be met by interdisciplinary study in engineering. The program's course offerings and research activities are also intended to meet the needs of students who seek preparation for employment in engineering areas requiring specialization in mechanics or in related interdisciplinary studies such as biomechanics.

In Mechanical Engineering or Aerospace Engineering, entrance into the Master of Science program is available to qualified graduates of recognized undergraduate curricula in mechanical or aerospace engineering and to qualified graduates of other curricula who satisfy the necessary prerequisites. A program application is required in addition to the Graduate School application. Admission into the doctoral program will be granted to those applicants who have demonstrated superior achievement in their engineering backgrounds. The general GRE is required of all international applicants for admission.

In Engineering Science, entrance into the graduate program is available to graduates of recognized curricula in engineering, mathematics, or one of the physical or biological sciences. A program application is required in addition to the Graduate School application. The names and addresses of four references must be included with the program application. The general GRE is required of all international applicants for admission.

Each student must satisfactorily complete a program of study that has been approved by his/her advisory committee and complies with the requirements of the Graduate School. In Engineering Science, the student's major professor may be selected from a department other than the Department of Mechanical and Aerospace Engineering and Engineering Science; however, at least one member of the student's graduate advisory committee must be on the faculty of the Department of Mechanical and Aerospace Engineering and Engineering Science.

THE MASTER'S PROGRAM

In both Mechanical Engineering and Aerospace Engineering, three M.S. options are offered. Option I requires a thesis, while options II and III do not. Option I is the normal program for recent graduates. Options II and III provide (a) graduate students with significant professional work experience and (b) graduate co-op students the opportunity to focus their programs in special areas through either greater coursework or selected engineering problems.

Graduate credit requirements for these three options are summarized below.

<table>
<thead>
<tr>
<th>Course Areas</th>
<th>Hours Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option I</td>
<td></td>
</tr>
<tr>
<td>Coursework</td>
<td>24</td>
</tr>
<tr>
<td>Courses in department</td>
<td>500 or above</td>
</tr>
<tr>
<td>Mathematics</td>
<td>6</td>
</tr>
<tr>
<td>Engineering courses below</td>
<td>6</td>
</tr>
<tr>
<td>500 (maximum)</td>
<td>3</td>
</tr>
<tr>
<td>Thesis credit</td>
<td>n/a</td>
</tr>
<tr>
<td>Problems credit (590)</td>
<td>n/a</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
</tr>
</tbody>
</table>

All three program options require participation in the departmental graduate seminars program and passing a final examination on all work submitted for the degree. Option II final examination will cover all course work. Option III final examination will cover all the selected engineering problems.

The thesis option, Option I, requires submission and defense of a written thesis that demonstrates the ability to conduct and report an independent investigation. The problems option, Option III, requires a formal report to be written for each selected engineering problem.

In Engineering Science, two M.S. options are offered: Option I requires a thesis, while Option II does not. The Option II is restricted to those students who have had significant engineering professional work experience. In Option I, a minimum of 30 semester hours including the thesis is required. In Option II, a minimum of 30 hours is required. Credit requirements for these two options are summarized below.

<table>
<thead>
<tr>
<th>Course Areas</th>
<th>Hours Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option II</td>
<td></td>
</tr>
<tr>
<td>Coursework</td>
<td>24</td>
</tr>
<tr>
<td>Mathematics</td>
<td>6</td>
</tr>
<tr>
<td>Engineering courses* (Major</td>
<td></td>
</tr>
<tr>
<td>concentration may include but is</td>
<td></td>
</tr>
<tr>
<td>not restricted to courses</td>
<td></td>
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<tr>
<td>offered by the Department.)</td>
<td>12</td>
</tr>
<tr>
<td>Related courses (May include</td>
<td>15</td>
</tr>
<tr>
<td>additional courses in mathematics,</td>
<td></td>
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<tr>
<td>computer science, or the physical</td>
<td></td>
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<tr>
<td>and life sciences as well as</td>
<td></td>
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<tr>
<td>engineering courses)</td>
<td></td>
</tr>
<tr>
<td>Thesis</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
</tr>
</tbody>
</table>

*Engineering courses under Option II may include advanced laboratory work or special problem work, for example, MAES 581 or analogous courses in other departments.

Both program options require participation in the departmental graduate seminar program, and passing a final examination on all work submitted for the degree.

THE DOCTORAL PROGRAM

All students must complete a minimum of 72 semester hours beyond the Bachelor's degree, exclusive of credit for the master's thesis. These shall include a minimum of 24 semester hours in Doctoral Research and Dissertation and a minimum of 48 semester hours in other courses.

In Mechanical Engineering or Aerospace Engineering, the courses must include:
1. A minimum of 12 semester hours of graduate credit in mathematics in courses numbered 400 or above with a minimum of 6 semester hours numbered 500 or above.
2. A minimum of 24 semester hours in the department in courses numbered 500 and above, with at least 12 of these semester hours in the major. A minimum of 3 semester hours of courses is required at the 600 level. These are exclusive of thesis, problems, or dissertation credit. The student's advisory committee can approve a student's petition to replace one 600-level course with one or more 500-level courses that are more appropriate.

In Engineering Science, the courses must include:
1. A minimum of 24 semester hours in engineering graduate courses, exclusive of thesis and dissertation credit. These courses will normally be numbered 500 and above, with at least 9 semester hours of 600-level courses, which constitute one or two areas of concentration selected by the student. The number of courses in this group to be taken will depend on the program selected by the student and the approval of his/her advisory committee.
2. A minimum of 12 semester hours in mathematics or computer science in courses numbered 400 and above, exclusive of a first course in ordinary differential equations.

Additional requirements for all students include:
3. Participation in the departmental seminar program.
4. Meet all departmental examination requirements, which include passing a written and oral comprehensive examination.
5. Presentation of a dissertation proposal to the student's advisory committee and approval of that proposal by the committee.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The Ph.D. program in Aerospace Engineering is available to residents of the states of Arkansas or Kentucky. The M.S. in Aerospace Engineering is available to residents of Kentucky. The Ph.D. program in Engineering Science is available to residents of the state of Florida (concentration in biomedical engineering only). Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.
Aerospace Engineering

NOTE: Not all the courses listed below are available at both the UT Knoxville and the UT Chattanooga campuses.

GRADUATE COURSES

422 Aerodynamics (3) Theory and design of aerodynamic bodies for desired characteristics. Potential flow theory, viscous effects, compressibility effects, Subsonic, transonic, and supersonic flight. Prereq: 570. F

424 Astrodynamics (3) Propulsion, trajectories, guidance, control, and atmospheric reentry of space systems. Prereq: Compressible Flow or consent of instructor. Sp

425 Propulsion (3) Principles of propulsion devices: turbojet, ramjet and rocket engines. Prereq: 351. F

426 Introduction to Aerospace Design (2) Design process, synthesis, safety, reliability, patents, product liability, economic analysis, optimization, design standards, design studies. Individual design reports. Prereq: 351, 370, 383. Coreq: Mechanical Engineering 344. F

429 Aerospace System Design (4) Design and synthesis of complete aerospace system, economic and technical aspects. Participation in team design effort, formal presentations and design report. Prereq: 425, 428. Sp

449 Aerospace Engineering Laboratory (3) Designing, conducting, and reporting results of experimental exercises. Test station techniques, instrumentation, data analysis. Prereq: 355, 361. 3 labs. F

511 Inviscid Flow (3) Kinematics and dynamics of inviscid fluids; potential flow about body, conformal mapping. Prereq: 422 or Mechanical Engineering 531, Mathematics 425 or equivalent. F

513 Experimental Methods in Fluid Mechanics (3) Experimental techniques with laboratory experiments: representative experiments: hot wire anemometry and turbulence measurements, flow visualization, wind tunnel and oscillating boundary flow experiments, boundary layer measurements, laser-optical measurements. Prereq: 423 or Mechanical Engineering 531. Sp

515-16 Air Vehicle Aerodynamics and Performance (3,3) Application of aerodynamic principles to aircraft configurations. Stability and control theory; effects of airspeed, altitude, and flight conditions. Prereq: 511 for 515; 512 for 516. F

521-22 Aerodynamics of Compressible Flows (3,3) One-dimensional internal and external flow; waves, small perturbation theory, slender body theory; similarity rules; method of characteristics. Prereq: 422 for 521; 521 for 522. F

525 Hypersonic Flow (3) slender body flow; similarity: Newtonian theory, blunt body flow, viscous interactions, free molecule and rarefied gas flow. Prereq: 512.

527-28 Aerospace Ground Test Facilities (3,3) Atmospheric models and similarity considerations; aerodynamic test facilities; continuing and intermittent wind tunnels and ballistic ranges, propulsion test facilities or air breathing and rocket engines; space environment and space vehicle test facilities. Prereq: 512 and 521, Mechanical Engineering 512 and 522.

529 Rarefied Gas Dynamics (3) Binary elastic collisions; kinetic theory; flow regimes; Boltzmann and Navier-Stokes equations; transfer equation, gas-surface interactions; slip boundary conditions, free molecule, slip and transition flow; Monte Carlo simulation, experimental techniques; introduction to hyper sonic real gas flows. Prereq: 522, Mechanical Engineering 522.

531 Magnetohydrodynamics (3) Electromagnetic field theory; ohmic and collisionless; solution to the Fermi-Dirac distribution function; applications. Prereq: 422 and Mathematics 471.

532 Introduction to Turbulence (3) Macroscopic effects, analogies, statistical treatment, correlation functions, energy spectra, diffusion, application of turbulent jets and pipe flow. Prereq: 511-12.

534 Atmospheric Entry (3) Reentry trajectories; lift and drag during reentry; vehicle motion and stability during reentry; aerodynamic heating and heat protection systems. Prereq: 522. Recommended prereq: 512.

535 Transonic Flow (3) Nature of flow at transonic speeds; small disturbance theory; shock wave properties; shock-free flows; strong viscous interaction phenomena; solution techniques. Prereq: 522.


552 Aerospace Vehicle Stability and Control (3) Static and dynamic longitudinal, directional and lateral stability and control. Coupled modes. Motion with free and fixed flight control surfaces. Automatic control systems. Prereq: 423, 551.

555 Vertical or Short Take Off and Landing Aircraft (3) Performance, stability, control, of rotary wing, tilt wing, vectored jet and vertical take off aircraft. Vertical and transition flight modes. High lift airfoils, Automatic controls, simulation facility types and flight testing. Prereq: 555.


564 Spacecraft Attitude Dynamics and Control (3) Rotational attitude dynamics of space vehicles. Gyroscopic instruments, passive and active attitude control devices. Linear control theory and attitude stabilization. Prereq: 551, Mathematics 471.

574 Space Engineering: Satellite Technology (3) Satellites and rockets (orbit, launch vehicles and launching), spacecraft structure, power systems, attitude control systems, communication systems, spacecraft testing, reliability, and application of satellites (communication, weather, Earth observation, and future applications). Prereq: 425, Mathematics 471, 404.

591 Selected Engineering Problems (2-6) Enrollment limited to students in programs program. Prereq: Consent of advisor.

599 Special Topics in Aerospace Engineering (1-3) May be repeated. Maximum 8 hrs.

632 Magnetohydrodynamics II (3) Alfven and shock waves, exact solution for magnetohydrodynamic channel flow, one-dimensional model of channel flow, engineering applications of magnetohydrodynamics, propulsion and power generation. Prereq: 631 and Mathematics 562.


656 Theory of Turbulence (3) Same as Engineering Science and Mechanics 645.

651-52 Advanced Aerodynamics (3,3) Subsonic, transonic, supersonic, and hypersonic flight mechanics in generalized and unified manner with combined viscous/ideal effects. Relationships among various regimes of fluid flows. Fundamental assumptions, limitations of approximations and consequences. Foundations of gas dynamics, applications to airplane, rocket, ground testing and jet propulsion. Discussion of special topics according to interest of students. Prereq: 511, 522.


690 Advanced Topics in Aerospace Engineering (3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

Engineering Science

GRADUATE COURSES

423 Fracture-Safe Design (3) Review of variables controlling fracture toughness: part and flaw geometry, temperature, loading rate, section size, material; characterization of fracture toughness by stress intensity factors, strain energy release rates, J integral, COD data, transition temperature tests; use of fracture toughness data in design. Prereq: 521 and Materials Science and Engineering 201; (Same as Materials Science and Engineering 475.) 3 hrs or 2 hrs and 1 lab.

426 Fundamental Principles of Composite Materials (3) Same as Materials Science and Engineering 472.

429 Introduction to Ceramic Matrix Composites (3) Same as Materials Science and Engineering 429.

433 Dynamic Systems (3) Time and dynamic systems of particles and rigid bodies; gyroscopes; variable mass systems; central force motion; Lagrange's equations; stability; transfer functions. Prereq: Dynamics.

435 Engineering Acoustics (3) Concepts of acoustics, measures of sound and their units; noise generation and transmission, noise control principles and application, materials and procedures for noise abatement. Prereq: Senior standing or consent of instructor.

442 Fluid Mechanics II (3) Integral forms of linear and angular momentum equations and applications to pumps and turbines; performance; conservation equations; internal one-dimensional incompressible and compressible flows; potential flow; methods of flow measurement; laboratory. Prereq: Fluid Mechanics I, Differential Equations I, Calculus III. Sp

461 Experimental Stress Analysis (3) Theory, techniques, and instrumentation of resistance strain gauges; theory and techniques of brittle coating method; introduction to other strain measuring devices. Prereq: 204, Electrical and Computer Engineering 301. 2 hrs and 1 lab.

465 Dynamic Data Acquisition (3) Use and calibration of instrumentation for measuring and recording dynamic events; Fourier analysis, transfer function analysis, digital signal processing, transduction, experimental parameter estimation with applications to modal vibration analysis. Prereq: Circuits and Electrical Engineering 204, Mechanical Components. Mechanical Vibrations. 2 hrs and 1 lab.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>539</td>
<td>Continuum Mechanics (3) Cartesiantensors, transformation laws, basic continuum mechanics concepts, stress, strain, deformation, constitutive equations. Conservation laws for mass, momentum, energy. Applications in solid and fluid mechanics.</td>
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<tr>
<td>624</td>
<td>Viscoelasticity (3) Viscoelastic constitutive relations; isothermal boundary value problems; wave propagation in viscoelastic materials; stress-stain relations; determination of viscoelastic properties.</td>
<td>Prepar: 523 and 539 or Polymer Engineering 541.</td>
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<tr>
<td>625</td>
<td>Computational Fluid Mechanics and Creep (3) Theory and numerical algorithms used to describe plastic and creep behavior in finite element models. Prediction of plasticity, kinematic and isotropic hardening.</td>
<td>Prepar: 523 and 539 or Polymer Engineering 541.</td>
<td></td>
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<tr>
<td>641</td>
<td>Advanced Topics in Fluid Mechanics and Convective Heat Transfer (3) Convective momentum, heat and mass transfer, boundary layer analysis, stability, transition, turbulence, closure models; Navier-Stokes equations, closure procedures; time- and ensemble-averaging, large scale structures; high speed flow, reacting, nonreacting, excitation, ionization. Applications in propulsion, lasers, aerodynamics.</td>
<td>Prepar: Mechanical and Aerospace Engineering and Science 542.</td>
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<tr>
<td>645</td>
<td>Theory of Turbulence (3) Mathematical descriptions of turbulence; isotropic turbulence, energy spectra, Kolmogorov's hypothesis, large and small eddy structure for turbulent diffusion by continuous movement; applications to turbulence, wakes, pipe flow, and boundary layers.</td>
<td>Prepar: Mechanical and Aerospace Engineering and Science 542.</td>
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<tr>
<td>657</td>
<td>Computational Mechanics Seminar (1) Current developments in computational fluid and structural mechanics. For departmental thesis students only. May be repeated.</td>
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<tr>
<td>681</td>
<td>Advanced Topics in Engineering Mechanics (3) Advanced problems in mechanics, group or individually.</td>
<td>Prepar: Consent of instructor. May be repeated with consent of department.</td>
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<tr>
<td>475</td>
<td>Thermal Engineering (3) Thermodynamic properties of materials, heat exchangers, combustion and system analysis, design, and optimization.</td>
<td>Prepar: Materials Science and Engineering 541.</td>
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<tr>
<td>471</td>
<td>Refrigeration and Air Conditioning (3) Vapor compression and absorption cycles; heat pump systems; psychrometric processes; air washers; cooling towers; ion exchanger; building heat transmission.</td>
<td>Prepar: 332, 344.</td>
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</tr>
<tr>
<td>494-95</td>
<td>Special Engineering Science Topics (1-3, 1-3) Problems related to recent developments and practice.</td>
<td>Open to juniors or seniors. Prepar: Consent of instructor. May be repeated. Maximum 8 hrs.</td>
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<tr>
<td>475</td>
<td>Design of Artificial Internal Organs (3) Design, development and mechanical design of prosthetic organs; analysis of transport processes in therapeutic devices for design optimization; review of currently available devices; federal regulations; ethical considerations.</td>
<td>Prepar: 341, Mathematics 231.</td>
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<tr>
<td>529</td>
<td>Ceramic Matrix Composites: Material and Mechanics (3) Micromechanics and microstructural design; fabrication of ceramic matrix composites.</td>
<td>Micromechanics and microstructural design; fabrication of ceramic matrix composites.</td>
<td>Prepar: Consent of instructor.</td>
</tr>
<tr>
<td>528</td>
<td>Advanced Fracture Mechanics (3) Advanced topics in nonlinear fracture mechanics, elastic-plastic fracture, time-dependent fracture. Applications of advanced fracture mechanics: time- and ensemble-averaging, large scale structures; high speed flow, reacting, nonreacting, excitation, ionization. Applications in propulsion, lasers, aerodynamics.</td>
<td>Prepar: Consent of instructor. May be repeated with consent of department.</td>
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<tr>
<td>541</td>
<td>Advanced Topics in Fluid Mechanics and Convective Heat Transfer (3) Convective momentum, heat and mass transfer, boundary layer analysis, stability, transition, turbulence, closure models; Navier-Stokes equations, closure procedures; time- and ensemble-averaging, large scale structures; high speed flow, reacting, nonreacting, excitation, ionization. Applications in propulsion, lasers, aerodynamics.</td>
<td>Mechanical and Aerospace Engineering and Science 542.</td>
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</table>

**Mechanical Engineering**

**NOTE:** Not all the courses listed below are available at both the UT Knoxville and the UT Martin campuses.

### Graduate Courses

- **568 Industrial Pollution Prevention (3)** Same as Chemical Engineering 581 and Environmental Engineering 581.
- **624 Viscoelasticity (3)** Viscoelastic constitutive relations; isothermal boundary value problems; wave propagation in viscoelastic materials; stress-stain relations; determination of viscoelastic properties. Prereq: 523 and 539 or Polymer Engineering 541.
- **625 Computational Fluid Mechanics and Creep (3)** Theory and numerical algorithms used to describe plastic and creep behavior in finite element models. Prediction of plasticity, kinematic and isotropic hardening. Mroz, mechanical sublayer, and two-surface models; volumetric plasticity models; traditional creep models and unified crystal plasticity models; error maps, including error maps, and plane stress plasticity algorithms in parallel. Prereq: 523 or 525, Mechanical and Aerospace Engineering and Science 543.
- **627 Advanced Fracture Mechanics (3)** Advanced topics in nonlinear fracture mechanics, elastic-plastic fracture, time-dependent fracture. Parameters of advanced fracture mechanics: time- and ensemble-averaging, large scale structures; high speed flow, reacting, nonreacting, excitation, ionization. Applications in propulsion, lasers, aerodynamics. Prereq: Consent of instructor.
- **628 Advanced Dynamics of Composite Materials (3)** Mechanics analysis of fiber-reinforced composite materials. Micromechanics and microstructural design; fabrication of composite materials. |
582 Rocket Propulsion II (3) Solid propellant rocket performance, homogeneous and heterogeneous propellant chemistry and combustion system performance, analytical methods. May be repeated. Maximum 6 hrs.

584-56 Turbomachinery Systems I, II (3, 3) Ideal cycle analysis of turbine engines, real cycle analysis, component performance analysis, component design and systems integration (integrated engine, compressor, turbines), flowthrough theory, turbine engine component matching, transient operation, surge and rotating stall, engine control systems, structural considerations. Prereq: Consent of instructor.


590 Selected Engineering Problems (2-6) Enrollment limited to students in problems program. Prereq: Consent of advisor. May be repeated. S/NC only.

595 Seminar (1) All phases of mechanical and aerospace engineering and engineering science, reports on current research at UTK and UTSI. Maybe repeated. S/NC only.

599 Special Topics in Mechanical Engineering (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

500 Thesis (1-15) P/NP only. E

502 Registration for Use of Facilities (3-15) Required for student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.


521 Advanced Materials (3) Advanced materials: metals, ceramics, composites, nanomaterials. Prereq: Consent of instructor.

581 Rocket Propulsion I (3) Rocket propulsion fundamentals: thermodynamics of nonequilibrium 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. Prereq: Consent of instructor.

585 Advanced Topics in Fluid Mechanics and Heat Transfer (3) Advanced theory and application of fluid mechanics and heat transfer: natural convection, multiphase flow, high speed reaction and nonreacting flows, advanced boundary layer techniques, combustion, turbulence, transition, stability, boundary layer theory. Prereq: Consent of instructor. May be repeated. Maximum 20 hrs.


programs. For a departmental brochure, contact the department head.

ADMISSION REQUIREMENTS

Students are expected to have completed an undergraduate program with a 3.0 or better GPA on a 4.0 system. Included in the undergraduate course credits should be (1) a full year of general biological science, (2) one year of calculus, (3) two years of chemistry, including one year of organic, (4) one year of physics, and (5) an introductory course in microbiology. In many cases, deficiencies in requirements may be removed by taking appropriate courses during the first year of graduate study. The department also requires the general portion of the Graduate Record Examination. A satisfactory score on each part is 550 or higher with rare exceptions. Three letters of recommendation should be submitted by current or former faculty members.

Each new graduate student meets with an advisory committee chaired by the departmental Director of Graduate Studies to plan a program of study for the first one or two semesters until a research advisor is selected. All first-year students participate in a laboratory rotation program during the first semester of study. This program allows students to adjust smoothly to the research programs of the department, to develop a background of research procedures and concepts, and to facilitate the selection of a research professor. Usually the student selects a research professor toward the end of the laboratory rotation period. The major professor assists in the selection of and carrying out of a suitable research program and in the naming of a thesis or dissertation committee.

THE MASTER'S PROGRAM

The program leading to the M.S. is designed to provide the student with broad basic knowledge, to permit the acquisition of technical competence in the fundamentals of research, and to encourage creative and independent thinking. Two to three calendar years are usually needed for the course of study that has the following requirements: (1) 30 hours including 6 thesis credits; (2) a 3.0 GPA in all courses taken for graduate credit after 12 hours of credit have been earned in courses graded on the A-F system; (3) a 3.0 GPA in courses taken in the department; (4) satisfactory performance in at least one seminar, a teaching assistant; (5) one semester of physical chemistry; (6) one course in statistics; (7) two semesters of biochemistry or molecular biology; (8) satisfactory performance in a comprehensive examination that must be attempted before the end of the fifth semester, and passed before admission to candidacy; and (9) the presentation of a research dissertation and its oral defense.

GRADUATE COURSES

410 Bacterial Physiology (3) Modern concepts of structure and function of bacterial cell. Prereq: Introduction to Microbiology.


420 Medical Microbiology (3) Disease-producing microorganisms, including bacteria, rickettsia, chlamydia and fungi. Prereq: Introduction to Microbiology.

429 Medical Microbiology Laboratory (3) Laboratory exercises in medically important areas of microbiology: microorganisms, pathogenesis and Immunology. Prereq: Introduction to Microbiology Lab, 430. Coreq: 420. Sp

430 Immunology (3) Principles of inflammation and immunity; immunoglobulin structure and theories of formation and diversity; concepts in cell cooperation and recognition in immune mechanisms; soluble factors. Prereq: General Genetics.


470 Microbial Ecology (3) Physiological diversity and taxonomic classification of natural ecosystems. Functional role of microorganisms in natural and simulated ecosystems. Prereq: 310, F

500 Thesis (1-15) P/NP only. E

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N only. E

575 Applied Microbiology and Bioengineering (3) Same as Chemical Engineering 575, Environmental Engineering 576, and Agricultural Engineering 578.

591 Foreign Study (1-15) See College of Arts and Sciences.

592 Off-Campus Study (1-15) See College of Arts and Sciences.

593 Independent Study (1-15) See College of Arts and Sciences.

595 General Seminar (1) Lectures and seminars by invited speakers, faculty, and graduate students. May be repeated. Maximum 18 hrs. S/N only. E

596 Laboratory Rotation (1) Familiarization with research areas in department through series of rotations in laboratoires of individual faculty members. May be repeated. Maximum 3 hrs. S/N only.

600 Doctoral Research and Dissertation (3-15) P/NP only. E

601 Journal Club in Microbial Physiology (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/N only. E

602 Journal Club in Microbial Pathogenesis (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/N only. E

603 Journal Club in Immunology (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/N only. E

604 Journal Club in Virology (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/N only. E

605 Journal Club in Microbial Genetics (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/N only. E
Microbiology-Veterinary Medicine

See College of Veterinary Medicine and Comparative and Experimental Medicine

Modern Foreign Languages and Literatures

(College of Arts and Sciences)

MAJORS DEGREES

French .................................................. M.A.

German .................................................. M.A.

Spanish .................................................. M.A.

Modern Foreign Languages ................................ Ph.D.

Susan Martin, Head

Professors:

Barrette, Paul E., Ph.D.......... California

Brady, Patrick (Shumway Chair of Excellence), D.U.P........ Sorbonne

Campion, Edmund J., Ph.D..... Yale

Cobb, Carl W. (Emeritus), Ph.D....... Tulane

DiPuccio, Denise M., Ph.D....... Kansas

Elliot, Jacqueline C. (Emeritus), M.A........ Illinois

Falen, James E. (Emeritus), Ph.D....... Pennsylvania

Fiene, Donald M. (Emeritus), Ph.D........ Indiana

Handelman, Michael H., Ph.D....... Florida

Heftin, William H., Ph.D....... Florida State

Hodges, Carolyn R., Ph.D........ Chicago

Irving, Thomas B. (Emeritus), Ph.D....... Princeton

Kratz, Henry (Emeritus), Ph.D....... Ohio State

Levy, Karen D., Ph.D....... Kentucky

Maurino, Ferdinando D. (Emeritus), Ph.D....... Columbia

Meier, C. J., Ph.D....... Chicago

Osborne, J. C. (Emeritus), Ph.D....... Northwestern

Pinsky, Clara (Emeritus), Ph.D....... California

Rizizenhoff, Ursula C. (Emeritus), Ph.D....... Connecticut

Rivera-Rodas, Oscar, Ph.D....... California

Romeiser, John B., (Liaison), Ph.D....... Vandebilt

Vazquez-Bilgo, A. M. (Emeritus), Ph.D....... Minnesota

Washburn, Yulan M., Ph.D....... North Carolina

Associate Professors:

Beauvois, Margaret, Ph.D........ Texas

Brizlo, Flavia, Ph.D............... Washington

Cree, Bryant, Ph.D............... California

DiMarla, Salvatore, Ph.D........ Wisconsin

Duncan, Cynthia K. (Liaison), Ph.D...... Illinois

Holmstead, Christine (Liaison), Ph.D....... Wisconsin

Lauckner, Nancy A. (Liaison), Ph.D....... Wisconsin

Lee, David E., Ph.D............... Stanford

Nakupa, Constancio, Ph.D....... Sorbonne

Pervukhina, Natalia K., Ph.D........ Bryn Mawr

Young, Dolly, Ph.D............... Texas

Assistant Professors:

Blackwell, Stephen H., Ph.D......... Indiana

Essl, Les, Ph.D............... Brown

Hoeving, Peter, Ph.D............... Wisconsin

Kaplan, Gregory, Ph.D........ Pennsylvania

LaCure, Jon, Ph.D......... Indiana

McAulay, Mary K., Ph.D....... Columbia

Ohnesorg, Stefan, Ph.D........ New York

Silvaflo, Eudice, Ph.D................ North Carolina

Williams, Jinping, Ph.D....... Ohio State

The Department of Modern Foreign Languages and Literatures offers graduate programs leading to the Master of Arts degree with majors in French, German and Spanish, and the Doctor of Philosophy degree with a major in Modern Foreign Languages. Inquiries should be addressed to the head of the department.

The MASTER'S PROGRAMS

French

Thesis Option:

1. Completion of a minimum of 24 semester hours in coursework plus at least 6 hours in course 500 Thesis. French 501 is required. A maximum of 6 hours may be taken at the 400 level, the rest at the 500 level, and under certain conditions the student may take 500-level seminars. If the student chooses to have a minor (such as Italian or Portuguese), at least 24 hours (including 6 hours of thesis) must be taken in the major, 6 in the minor.

2. A thesis, with a minimum of 6 semester hours in course 500.

3. A written examination covering the coursework and selected items from a master reading list.

4. A final oral examination covering the thesis.

Non-Thesis Option:

1. Completion of a minimum of 30 semester hours, with a maximum of 9 at the 400 level, the rest at the 500 level, including French 501. Under certain conditions, the student may take 600-level seminars. If the student chooses to have a minor (such as Italian or Portuguese), at least 24 hours must be taken in the major, 6 in the minor.

2. Three term papers that have been accepted by the student's advisory committee.

3. A written examination covering the coursework and selected items from a master reading list.

4. A final oral examination to discuss the papers.

German

Thesis Option: The minimum requirements are 24 semester hours of coursework and 6 hours of Thesis 500. German 510 and 519-20 are required, as are three courses on German literature or culture nol one of which may be at the 400 level. In addition, students must take three further courses, one of which may be at the 400 level. All graduate teaching assistants should take 512, and any other course above 500. A maximum of three 400-level courses may be counted toward the 24 semester hours of course credit. All M.A. candidates must sit for a standardized language examination, such as the Zentrale Mittelstufenprüfung. Students who are interested in future Ph.D. level study are strongly advised to choose the thesis option.

Non-Thesis Option: The minimum requirements are 30 semester hours of coursework, including at least one 600-level course, for which a seminar paper is required. German 510 and 519-20 are required, as are three courses on German literature or culture, one of which may be at the 400 level. In addition, students must take three further courses, only one of which may be chosen from 411-12, 455. All graduate teaching assistants should take 512, and other candidates may take 512 or any other 500-level course. A maximum of three 400-level courses may be counted toward the 24 semester hours of coursework. A common written exam over the designated reading list is required, as is a standardized language exam, such as the Zentrale Mittelstufenprüfung. Each non-thesis M.A. candidate will have a committee of at least three faculty members in German to whom the student will submit a dossier consisting of the seminar paper and one paper previously submitted in a graduate course. The length and type of the papers is described in greater detail in the Manual for Graduate Students in German.

Spanish

Thesis Option:

1. Completion of a minimum of 24 semester hours in coursework plus at least 6 hours in course 500 Thesis. Spanish 550 is required. A maximum of 6 hours may be taken at the 400 level, the rest at the 500 level, and under certain conditions the student may take 600-level seminars. If the student chooses to have a minor (such as Italian or Portuguese), at least 24 hours must be taken in the major, 6 in the minor.

2. A thesis, with a minimum of 6 semester hours in course 500.

3. A written examination covering the coursework and selected items from a master reading list.

4. A final oral examination covering the thesis.

Non-Thesis Option:

1. Completion of at least 30 semester hours, with a maximum of 9 at the 400 level, the rest at the 500 level, including Spanish 550. Under certain conditions, the student may take 600-level seminars. If the student chooses to have a minor (such as Italian or Portuguese), at least 24 hours must be taken in the major, 6 in the minor.

2. Three term papers that have been accepted by the student’s advisory committee.

3. A written examination covering the coursework and selected items from a master reading list.

4. A final oral examination covering the thesis.

Non-Thesis Option:

1. Completion of at least 30 semester hours, with a maximum of 9 at the 400 level, the rest at the 500 level, including Spanish 550. Under certain conditions, the student may take 600-level seminars. If the student chooses to have a minor (such as Italian or Portuguese), at least 24 hours must be taken in the major, 6 in the minor.

2. Three term papers that have been accepted by the student’s advisory committee.
3. A written examination covering the coursework and selected items from a master reading list.

THE DOCTORAL PROGRAM

The Ph.D. in Modern Foreign Languages requires advanced training in a major language and either a second language or applied linguistics.

Admission Requirements

Applicants must have completed a B.A. in either French, German, or Spanish to be accepted into this program. Both graduates of institutions in the United States and those with undergraduate degrees from institutions outside the United States must have a grade point average of at least 3.0. Consideration will also be given to applicants who do not have an undergraduate degree in one of the three foreign languages but do have the equivalent of an undergraduate major in one of them.

Degree Requirements

Candidates must complete a minimum of 63 semester hours of coursework beyond the bachelor's degree in addition to 24 hours of doctoral research and dissertation.

For candidates with French or Spanish as a first concentration, two tracks are available.

The coursework for Track I must be distributed as follows: at least 39 hours in the first concentration; at least 18 hours in the second concentration; and at least 6 hours in a cognate field.

The coursework for Track II must be distributed in this way: at least 45 hours in the first concentration; at least 12 hours in the second concentration; and at least 6 hours in a cognate field. Because Track II students will have taken 12 graduate hours instead of 18 hours in the second concentration, they will normally not be eligible to teach that field at institutions which follow SACS guidelines for college foreign language teaching.

The coursework for all concentrations must be distributed as follows:

1. First Concentration: German. A minimum of 39 hours of German courses beyond the bachelor's degree, distributed as follows:
   - 400 level: A maximum of 6 hours of 400-level classes taken for the M.A. may be applied.
   - 500 level: A minimum of 21 hours must be taken. These must include German 512, 519, 540, and 560. These hours are excluded. If 512 is used as part of a second concentration in applied linguistics, another course must be substituted in the first concentration.
   - 600 level: A minimum of 12 hours must be taken, exclusive of dissertation hours.

   First Concentration: French or Spanish. A minimum of either 39 (Track I) or 45 (Track II) hours of French or Spanish courses beyond the bachelor's degree, distributed as follows:
   - 400 level: A maximum of 6 hours of 400-level classes taken for the M.A. may be applied.
   - 500 level: A minimum of 21 (Track I) or 27 (Track II) hours must be taken. These must include French 512, 516, 584 or Spanish 512 and 550. These hours are excluded. If 512 is used as part of a second concentration in applied linguistics, another course must be substituted in the first concentration.
   - 600 level: A minimum of 12 hours must be taken, exclusive of dissertation hours.

2. Second Concentration. A minimum of 18 (German or Track I) or 12 (Track II) hours beyond the bachelor's degree, taken in the field of applied linguistics or in a second language, either French, German, Italian, Portuguese (Track II only), Russian, or Spanish. For Track I and German, 12 of these must be at the 500 level or above. For Track II, 3 of these must be at the 500 level or above.

   French students choosing applied linguistics must take French 421 or 429; 425; 512; and 9 (Track I) or 3 (Track II) hours of appropriate electives in English or French. French students choosing applied linguistics must take German 425, 435, 510, or 512, 5 hours of German linguistics, such as 426, 436, 631, or 632, and 6 hours of linguistics electives in English or German. Spanish students must take Spanish 421 or 429; 425; 512; and 9 (Track I) or 3 (Track II) hours of appropriate electives in English or Spanish. The student's graduate advisor must approve the electives chosen.

3. Cognate Field. Six hours in graduate courses numbered 400 and above in a field outside the department or language family of the first concentration but related to the student's principal area of research. Students choosing applied linguistics as a second concentration are strongly urged to take their cognate work in a second language.

4. Additional requirements: For any languages taken as a first or second concentration, a student must demonstrate competence by taking a test. The test will include reading, writing, listening, and speaking, and should be completed by the time the student reaches 40 hours of study beyond the bachelor's degree. Standardized examinations that may be used for this purpose include applicable portions of either the National Teachers Examination, the MLA Examination for Teachers and Advanced Students, or the proficiency standards of the United States Foreign Service Institute (FSI). If a student has not chosen a third language as his or her cognate area, basic competence (determined by a reading examination with translation into English administered by the department) in a third language is required. If the student's first and second languages are Romance languages, the third language should be chosen from another language family.

   For students choosing applied linguistics as an area of second concentration, reading competence in a second language is required. Competence will be determined by translation of a text from the foreign language into English. The test to be administered by the department.

   A comprehensive examination on the language and literature of the first and second concentrations must be passed before the student may be admitted to candidacy. The candidate is required to defend his/her dissertation in an oral examination. Central emphasis is put on the doctoral dissertation as a final test of the candidate's scholarly qualifications.

   Graduate Teaching Assistants with a second concentration in another language should have the opportunities to strongly encourage to instruct in the languages of both their first and second concentration, subject to staffing needs.

   Doctoral students are strongly encouraged to reside and study abroad and will be assisted in identifying potential sources of financial support (e.g., Fulbright, McCloy, Rotary fellowships).

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The Ph.D. program in Modern Foreign Languages is available to residents of the state of Alabama. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

Asian Languages

GRADUATE COURSES

431 Readings in Chinese Literature (3) Prereq: Mastery of intermediate-level Japanese or consent of instructor. May be repeated. Maximum 9 hrs.

451 Readings in Japanese Literature (3) Prereq: Mastery of intermediate-level Japanese or consent of instructor. May be repeated. Maximum 9 hrs.

French

GRADUATE COURSES


411 French Literature of the 16th Century (3) highlights of 16th-century French literature. Except from Rabelais and Montaigne, readings of poems from writers from Lyon and members of Pitié. Prereq: 300-level literature course.

412 French Literature of the 17th Century (3) Major works of Enlightenment. Prereq: 300-level literature course.

413 French Literature of the 18th Century (3) Major works of Enlightenment. Prereq: 300-level literature course.


416 Survey of Francophone Literature (3) Examination of French literature outside metropolitan France, particularly Africa and Caribbean. Prereq: 300-level literature course.

420 French Cinema (3) French cinema from earliest days through New Wave directors. Prereq: 300-level literature course. May apply toward major.

421 Phonetics (3) Foundation in science of phonetics. Practical exercises and individual performance. Laboratory training highly recommended. Graduate credit not allowed for departmental majors. Prereq: Intermediate Composition and Conversation or equivalent.

422 Advanced Grammar (3) Improving one's written French by studying basic and more refined structures of French language. Writing creative free-style compositions. Prereq: Intermediate Composition and Conversation or French for Business.

423-24 Advanced Conversation (1,1) Informal conversation with native speaker on contemporary topics. Stresses in-class contact rather than outside preparation. Prereq: Intermediate Composition and Conversation or French for Business. 2 hrs weekly.

425 Introduction to Descriptive Linguistics (3) Theory and practice of techniques of linguistic analysis in subfields of phonetics, phonology, morphology, syntax, semantics, pragmatics and historical linguistics; discussion of relevance to learning and teaching of foreign languages and to study of literary texts. Recommended
ITALIAN

GRADUATE COURSES

401 Dante and Medieval Culture (3) Introduction to significance of this great Italian writer. Prereq: 212 or consent of instructor.
402 Petrarca and Boccaccio (3) Prereq: 212 or consent of instructor.
403 Literature of the Rinascimento (3) From Pulci to Tasso, Quattrocento and Cinquecento. Prereq: 212 or consent of instructor.
405 Modern Italian Poetry (3) From Pascoli to Montale. Prereq: Italian 212 or consent of instructor.
406 The Modern Italian Novel (3) From Manzoni to Camilo. Prereq: 212 or consent of instructor.
409 Directed Readings (3)
410 Italian Theatre (3) Survey of Italian theatre from Renaissance to present. Prereq: Intermediate Italian or consent of instructor.
421 Topics in Italian Literature and Cinema (3) Italian literature and cinema from 1930 to present focusing on literature works translated into English and adapted into film. Investigation of relationship between literature and cinema and achievement of greater understanding of Italian culture since 1930. Films in Italian with English subtitles. May be repeated. Maximum 6 hrs. (Same as Cinema Studies 421.)
510 Readings in Italian Literature (3) Topics vary. May be repeated with consent of department.
591 Foreign Study (1-15) See College of Arts and Sciences.
592 Off-Campus Study (1-15) See College of Arts and Sciences.
593 Independent Study (1-15) See College of Arts and Sciences.

SPANISH

GRADUATE COURSES

421 Phonetics (3) Prereq: Intermediate Conversation and Composition or consent of instructor.
422 Advanced Grammar (3) Finer points of grammatical structures. Required for all majors. Available to non-native speakers only. Prereq: Intermediate Composition and Grammar and minimum of 8 hrs of Appalachian Spanish.
423 Advanced Conversation (3) Development of speaking skills to advanced level through wide range of activities. Available to non-native speakers only. Prereq: Intermediate Conversation and Composition, or Spanish for Business or consent of instructor.
424 Advanced Composition (3) Development of writing skills to advanced level through numerous compositions on assigned topics. Available to non-native speakers only. Prereq: 422 or consent of instructor.
425 Introduction to Descriptive Linguistics (3) (Same as French 425, German 425, Russian 425, and Linguistics 425.)
426 Methods of Historical Linguistics (3) (Same as German 426, French 426, Russian 426, and Linguistics 426.)
429 Romance Linguistics (3) (Same as French 429 and Linguistics 429.)
430 Selected Topics in Romance Literature (3) Content varies. May be repeated. Maximum 9 hrs.
451-52 Senior Seminar (3, 3) For majors in Spanish; minors admitted at discretion of instructor. Intensive study of language, literary style, and literary criticism based on selected major topics. (Same as Russian and Eastern European Studies 451.)
510 Spanish Phonetics and Advanced Grammar (3) Phonetics, pronunciation, stylistics, and selected topics in modern movement. Prereq: Conversation or consent instructor.
550 Studies in Spanish Literature (3) Content varies. May be repeated. Maximum 9 hrs.
591 Foreign Study (1-15) See College of Arts and Sciences.
592 Off-Campus Study (1-15) See College of Arts and Sciences.
593 Independent Study (1-15) See College of Arts and Sciences.

PORTUGUESE

GRADUATE COURSES

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 conversation. Prereq: 3 hours at 300-level in another Romance language or equivalent.
431-32 Topics in the Literature & Language of Portuguese-speaking World (3, 3) Outstanding works of literature and culture from Portuguese-speaking countries. Topics may vary. Prereq: At least one course at this 300-level or the equivalent. May be repeated. Maximum 12 hrs.
591 Foreign Study (1-15) See College of Arts and Sciences.
592 Off-Campus Study (1-15) See College of Arts and Sciences.
593 Independent Study (1-15) See College of Arts and Sciences.

RUSIAN

GRADUATE COURSES

401-02 Advanced Grammar, Conversation, and Composition (3, 3) Prereq: Intermediate Russian Composition and Conversation or equivalent. (Same as Russian and East European Studies 401-02.)
125 Introduction to Descriptive Linguistics (3) (Same as French 425, German 425, Spanish 425, and Linguistics 425.)
126 Methods of Historical Linguistics (3) (Same as French 426, German 426, Spanish 426, and Linguistics 426.)
571 Spanish American Novel: Mexico and the Caribbean
(3) Critical study of major novels from Mexico, Central America, Caribbean and Venezuela. Modern period.


573 The Spanish American Novel: Chile and the River Plate Nations (3) Novels from Chile, Argentina, Uruguay and Paraguay. Modern world.

575 Spanish American Modernismo (3) Various facets of Spanish American Modernism in poetry and prose, 1890-1920.

576 Contemporary Spanish American Poetry (3) Major poets in Spanish American from post-modernismo to present day.

577 Spanish American Drama (3) Major playwrights of 20th-century Spanish America.


579 The Spanish American Short Story (3) Short story by major writers in Spanish America from Romanticism to present day, theory and criticism of genre.

591 Foreign Study (1-15) See College of Arts and Sciences.

592 Off-Campus Study (1-15) See College of Arts and Sciences.

593 Independent Study (1-15) See College of Arts and Sciences, Letter grade or S/NC.

600 Doctoral Research and Dissertation (3-15) P/NP only. E

621 Seminar in Spanish Literature (3) Topics vary in field of Peninsular literature. May be repeated with consent of department. Maximum 9 hrs.

631 Seminar in Spanish American Literature (3) Topics vary. May be repeated with consent of department. Maximum 9 hrs.

Music (College of Arts and Sciences)

MAJOR DEGREES

Music ............................................ M.M.

Wayne Bailey, Head

Professors:

Bailey, Wayne, D.M.A. .......... Colorado
Ball, Charles H. (Emeritus), Ph.D. .... Peabody
Bittaz, George C., M.M. ......... Converse
Brook, John P. (Liaison), M.M. ...... Alabama
Coker, J., M.A. ......... Sam Houston
Combs, F. M., M.A. ......... Missouri
DeVine, George F. (Emeritus). ....... DeVine
Frid, Herbert W. (Emeritus). .......... Frid
Gay, W., Ph.D. ......... New Mexico
Hawthorne, W., Ph.D. ......... Cincinnati
Murphy, B. A., Ph.D. ......... Ohio State
Romines, J. J., M.M. ............ Northern Colorado
Schallert, G. T., D.A. ............ SUNY-Fredonia
Wentzel, A. N., M.M. .......... Southern Cal

Starr, W. J. (Emeritus), M.M. ...... Eastman
Slutzenberger, D. R., D.M.A. ....... Maryland
Tipp, A. W., Ph.D. ............ Michigan

Associate Professors:

Adams, Fay, M.M. ......... New England
Bolting, M. E., M.M. .......... Tennessee
Brown, Donald R., Hs.D. ......... Tennessee
Brunell, D. E., M.M. .......... Indiana
Carter, P. S., M.M. .......... Colorado
Davis, Dolly C., M.M. ......... Tennessee
Dubbey, T. S., D.M.A. ......... Yale
Hough, Don, M.M. .......... Tennessee
Leach, C. F., M.M. .......... New Mexico
Searle, S. M., M.M. .......... Tennessee
Spelt, G. R., M.M. .......... Indiana
Zelmanovich, Matus, M.A. ....... Lvo

Assistant Professors:

Baldwin, Wesley, M.M. ......... New England
Baley, A. L., D.M.A. .......... South Carolina
Binder, S. L., D.M.A. .......... Florida State
Freeman, Carroll, M.P.A. .......... Oklahoma City
Gay, Jr., L. C., Ph.D. .......... Columbia
Hawthorne, W., Ph.D. .......... Cincinnati
Murphy, B. A., Ph.D. .......... Ohio State
Romines, J. J., M.M. ............ Northern Colorado
Smith, C. B., M.M. .......... SUNY-Fredonia
Wentzel, A. N., M.M. .......... Southern Cal

The Department of Music offers the Master of Music degree with concentrations in accompanying, choral conducting, composition, instrumental conducting, jazz, music education, music theory (with an optional emphasis in music technology), musicology, performance (organ, piano, strings, voice, winds, and percussion), and piano pedagogy and literature.

Applicants must have completed an undergraduate degree that is approximately equivalent in music requirements to degrees conferred by UT Knoxville, with a major appropriate to the applicant's prospective area of concentration on the master's level.

Applicants who plan to pursue the concentration in performance or music education are required to audition for the appropriate area faculty. Applicants for admission to the program in composition must submit scores and tape recordings of representative works. Applicants for the concentration in jazz must audition in jazz improvisation and jazz piano proficiency and interview with members of the faculty in this area. Other applicants are required to have an interview with members of the faculty of the prospective area of concentration.

All entering master's degree students are required to take Diagnostic Examinations in music theory, ear-training, and music history/literature. These examinations are given by the Department of Music at the beginning of each semester.

THE MASTER'S PROGRAM

A minimum of 33 semester hours of coursework is required for the Master of Music degree. These hours are specifically distributed according to the area of concentration. All concentrations require coursework in music bibliography, music history/literature and music theory and allow for elective courses. Specific curricula are available from the department.

concentrations require a written and oral final examination.

A thesis is required of students in composition, musicology, and music theory. A graduate recital or performance project is given in lieu of thesis by students with concentrations in performance, pedagogy, jazz, accompanying, choral conducting, and instrumental conducting.

The concentration in music education is designed for persons who hold a Bachelor's degree in Music or Music Education and certification to teach music in the public schools. Both thesis and non-thesis options are available.

Music Education

GRADUATE COURSES

500 Thesis (1-15) P/NP only. E

502 Registration for Use of Facilities (3-15) Required for student not otherwise registered during any semester when student uses University facilities and is not on academic calendar. May not be used toward degree requirements. May be repeated. S/NC only. E

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

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

530 Advanced Band Literature and Conducting (3) Reading, conducting, and interpreting band scores suitable for school, college, and community bands. Contemporary and standard band literature. Prereq: 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 (1) Performance of music from various cultures; production of musicals appropriate for students in grades K-8. Singing, dancing, acting, costumes, set design, and non-traditional instrumental ensembles. Limited to students majoring or concentrating in art, dance or theatre. Prereq or coreq: 570. May be repeated. Maximum 6 hrs.

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

590 Special Topics in Music Education (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

593 Special Problems in Music Education (3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

Music Ensemble

GRADUATE COURSES

503 Small Jazz Ensemble (1) May be repeated. Maximum 12 hrs.

504 Jazz Ensemble (1) May be repeated.
Music

Music in the Renaissance (3) From 1400 to 1750; rise of opera and oratorio, sacred and secular cantatas, instrumental forms, and performance practices.

Music in the Classical Period (3) Evolution of classical style from pre-classic music to music of Haydn, Mozart, and early Beethoven.

Music in the Romantic Period (3) Nineteenth-century musical styles from Beethoven to post-romanticists.

Music in the Twentieth Century (3) From 1890, Debussy, to present, Stockhausen and others.

Music History

GRADUATE COURSES

500 Thesis (1-15) P/NP only. E

501 Graduate Recital (2) E

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or for full time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

511 Lecture Recital (2) E

521 Special Topics in Performance (1-3) Prereq: Consent of department head. E

540 Secondary Applied Music (1) May be taken by music majors desiring applied study on a 2nd or 3rd instrument. May be repeated for a maximum of 4 hours credit on each instrument. Admission by audition. Requires payment of Applied Music fee. E

550 Music in the Baroque Period (3) From 1600 to 1750; rise of opera and oratorio, sacred and secular cantatas, instrumental forms, and performance practices.

560 Music in the Classic Period (3) Evolution of classical style from pre-classic music to music of Haydn, Mozart, and early Beethoven.

570 Music in the Romantic Period (3) Nineteenth-century musical styles from Beethoven to post-romanticists.

580 In the Twentieth Century (3) From 1890, Debussy, to present, Stockhausen and others.

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

Musickeyboard

GRADUATE COURSES

420 Piano Literature Seminar (3) Topics vary. May be repeated. Maximum 6 hrs.

520 Piano Literature Seminar (3) Topics vary. May be repeated. Maximum 6 hrs.

531-41 Recital Project (2, 2) Preparation and accompaniment of full recital for accompanying concentrations only. S/NC-Vocal recital, S/NC-Instrumental recital. Prereq: Consent of instructor.


560 Organ Literature Seminar (3) Topics vary. May be repeated. Maximum 8 hrs.

Music Performance

GRADUATE COURSES

All performance courses require an audition and consent of instructor. May be repeated. Maximum 8 hrs toward M.M. degree.

403 Flute (1-4)

405 Oboe (1-4)

410 Bassoon (1-4)

415 Clarinet (1-4)

420 Saxophone (1-4)

425 Trumpet (1-4)

435 Trombone (1-4)

440 Baritone (1-4)

445 Tuba (1-4)

450 Percussion (1-4)

455 Voice (1-4)

460 Violin (1-4)

465 Viola (1-4)

470 Cello (1-4)

475 String Bass (1-4)

476 Electric Bass (1-4)

479 Guitar (1-4)

480 Piano (1-4)

485 Harpsichord (1-4)

490 Organ (1-4)

494 Composition (1-3)

495 Composition with Electronic Media (1-3)

496 Composition for Media (2)

499 Improvisation (1-2) May not be used toward applied music requirement.

500 Flute (1-4)

505 Oboe (1-4)

510 Bassoon (1-4)

515 Clarinet (1-4)

520 Saxophone (1-4)

525 Horn (1-4)

530 Trumpet (1-4)

535 Trombone (1-4)

540 Baritone (1-4)

545 Tuba (1-4)

545 Tuba (1-4)
550 Percussion (1-4)
551 Accompanying and Coaching (1-4)
555 Voice (1-4)
560 Violin (1-4)
565 Viola (1-4)
570 Cello (1-4)
575 String Bass (1-4)
576 Electric Bass (1-4)
579 Guitar (1-4)
580 Piano (1-4)
585 Harpsichord (1-4)
590 Organ (1-4)
594 Composition (1-3)
595 Composition with Electronic Media (1-3)
599 Improvisation (1-4)

**Music Theory**

**GRADUATE COURSES**

430-40 Counterpoint I (3) Study of counterpoint in modal and tonal styles, works of Palestrina and J.S. Bach. Prereq: 220. 440-Writing of contrapuntal forms of 18th century and earlier; analysis of works from 18th through 20th centuries. Prereq: 430.

450 Choral Arranging (2) Analysis of scores and writing of arrangements for choirs. Prereq: Theory IV or consent of instructor.

510 Musical Styles (3) Elements of design and their role in definition of musical styles. Prereq: Consent of instructor.

520 Analytical Techniques (3) Analytical techniques in counterpoint, contemporary approaches. Prereq: Consent of instructor.

530 Music Theory Pedagogy (3) Techniques, methods, and materials involved in college-level theory programs. Prereq: Consent of instructor.

540 Computer Music Transcription (3) Projects in notation, playback, and publication of music. Prereq: Consent of instructor.

550 Computer Projects (3) High-level programming languages used to design and implement computer-managed instruction; Internet development tools; writing of documentation for computer projects. Prereq: Consent of instructor.

550 Technology in Music Research (3) Use of technology to research projects in music analysis or pedagogy; development and execution of research projects. Prereq: Consent of instructor.

595 Independent Study (1-15) See College of Arts and Sciences. Prereq: Consent of department head.

**Music Voice**

**GRADUATE COURSES**

410-20 Song Literature I, II (2, 2) 10-German songs. 420-French, Italian, Russian, Scandinavian, Czechoslovakian, British, and American art songs. Graduate credit not available for students in vocal performance.

425 Functional Diction for Singers (3) Comprehensive survey of singing diction in six languages: English, French, German, Italian, Latin and Spanish. Basic instruction in International Phonetic Alphabet; development of basic diction skills; overview of diction styles and traditions in each language; survey of diction resources and reference materials. Does not fulfill deficiency requirements for graduate students in voice or accompanying.

510 Vocal Literature Seminar (3) Topics vary. May be repeated. Maximum 6 hrs.

520 Music Theatre Performance Techniques (1) Improvisation, movement, and basic techniques for dramatic vocal performance. Prereq: Vocal major or consent of instructor. May be repeated for credit. Maximum 2 hrs.

530 Opera Performance (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

540 Opera Production (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

550 Advanced Vocal Pedagogy I (3) Study of vocal production, examination of different methods. Prereq: Consent of instructor.

560-65 Choral Literature I, II (2, 2) Choral music from middle ages to present with consideration of historical development of major choral genres.

570 Vocal Chamber Music Performance (2) Prereq: Consent of instructor.

580-85 Choral Literature I, II (2, 2) Choral music from middle ages to present with consideration of historical development of major choral genres.

590 Advanced Choral Conducting (3) Study of choral literature, development of choral rehearsal skills. Prereq: Consent of instructor.

594 Project in Choral Conducting Performance (1-3) Conducting choral literature; preparation of choral performances. Prereq: Consent of instructor. May be repeated.

595 Choral Conducting Seminar (3) Score reading and interpretation; preparation of choral performances. Prereq: 590 or consent of instructor. May be repeated.

**Nuclear Engineering**

**College of Engineering**

**MAJOR**

**DEGREES**

**Nuclear Engineering**

H. L. Dodds, Head

Professors:
- Dodds, H. L., Ph.D.
- Mihalco, J. T., Ph.D.
- Mix, L. F., Ph.D.
- Mynatt, F. R., Ph.D.
- Shannon, T. E., Ph.D.
- Uhrig, R. E. (Distinguished Prof.), Ph.D.

Associate Professors:
- Groer, P. G., Ph.D.
- Hines, J. W., Ph.D.
- Pevy, R. E., Ph.D.
- Ruggles, A. E., Ph.D.
- Scott, T. H., Ph.D.
- Townsend, L. W., Ph.D.

Adjunct Professors:
- Groer, P. G., Ph.D.
- Hines, J. W., Ph.D.
- Pevy, R. E., Ph.D.
- Ruggles, A. E., Ph.D.
- Scott, T. H., Ph.D.
- Townsend, L. W., Ph.D.

**Nuclear Engineering Program**

The Department of Nuclear Engineering offers programs leading to the Master of Science and Doctor of Philosophy degrees. Students may elect a traditional nuclear engineering M.S. or Ph.D. program (focusing on fission energy or fusion energy) or a radiological engineering concentration at the master's level.

The radiological engineering concentration prepares students for careers in the radiation safety field (health physics). The program is designed for graduates of undergraduate programs in engineering, physics, biology and chemistry.

**THE MASTER'S PROGRAM**

A graduate program leading to the Master of Science is available to graduates of recognized undergraduate curriculum in engineering and physics. Each applicant will be advised as to the necessary prerequisite courses before he/she enters the program.

The student must complete 24 semester hours of coursework approved by the student's advisory committee that includes the following:

1. A major consisting of a minimum of 12 semester hours of graduate courses in nuclear engineering. This must include at least one of the following sequences: 511, 512, 551, 552, 571, 572.

2. A minor of 6 semester hours of elective courses in mathematics, statistics or computer science.

3. Six semester hours in either nuclear engineering or a related field.

The M.S. candidate must also demonstrate research or design capability. This requirement may be satisfied by a thesis project or engineering practice projects as described below:

**Thesis** - The student performs independent research on a topic approved by the graduate committee. He/she submits a thesis on this research. The student must pass an oral examination on the thesis and all graduate coursework. The student must enroll for six semester hours of NE 500 (Thesis).

**Engineering Practice** - The student performs independent research on two to four separate topics approved by his/her graduate committee. Each project is similar to a thesis project but smaller in scope. He/She submits a report, in thesis format, on each project. The student must then pass an oral examination on his/her engineering practice projects and all graduate coursework. The student must enroll for six semester hours of NE 598 (Nuclear Engineering Practice).

**THE DOCTORAL PROGRAM**

Students in the field of nuclear engineering desiring to study for the Doctor of Philosophy must have a Bachelor of Science or Master of Science from a recognized university, with a major in engineering or physics. All candidates will be required to demonstrate general competence in a comprehensive examination in the areas of engineering science, mathematics, physics, and nuclear engineering.

Specific course requirements for the Ph.D. in Nuclear Engineering include:

1. A minimum of 48 semester hours beyond the Bachelor's degree, exclusive of credit for...
the M.S. thesis or Nuclear Engineering Practice. 
2. A minimum of 24 semester hours in doctoral research, NE 600. 
3. A minimum of 30 semester hours in nuclear engineering core courses numbered 500 and above (or the equivalent), with at least 9 semester hours of 600-level courses. These are exclusive of thesis or dissertation credit. 
4. A minimum of 12 semester hours in mathematics, computer science, or statistics courses beyond standard nuclear engineering undergraduate requirements numbered 400 or above. 
5. A minimum of 6 semester hours in courses numbered 500 or above from a department other than nuclear engineering. The choice depends on the student's overall plan and should expand his/her knowledge in a given field. 
6. A reading knowledge of one foreign language may be specified by the student's doctoral committee. 

The comprehensive examination is prepared by the nuclear engineering faculty and consists of 12 hours of written examinations. All past examinations are filed in the library, and students are encouraged to review them. Students are invited to take the comprehensive examination after completing approximately 30 semester hours of coursework. A student who fails the written part of the examination must take and pass the examination the next time it is offered to remain in the Ph.D. program. Registration for NE 600 is not permitted until the written examination is passed. The comprehensive examination is completed with a successful oral defense of the dissertation proposal. A candidate must successfully defend, in an oral examination, all work presented for the degree--all coursework and the dissertation.

GRADUATE CREDIT FOR UNDERGRADUATE COURSES 
400-level courses in nuclear engineering may be used for graduate credit. However, students must recognize that at least two-thirds of the minimum required hours (30) in a master's degree program must be taken in courses numbered 500 or above.

GRADUATE COURSES
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. Prereq: Nuclear and Radiological Engineering Laboratory I.
404 Nuclear Fuel Cycle (3) Mining, milling, fabrication, inventory management, reprocessing, waste disposal, regulatory and radiation safety issues and requirements. Prereq: 470 or equivalent.
406 Radiation Shielding (3) Types of radiation sources, fundamentals of gamma ray and neutron attenuation, radiological effects, approximate methods of shielding design, discrete ordnates, and Monte Carlo. Prereq: Physics 232.
421 Introduction to Nuclear Criticality Safety (3) Fundamentals of nuclear criticality safety; criticality accidents; safety standards; overview of experiments, computational methods, and applications. Prereq: Introduction to Nuclear Engineering.
432 Radiation Risk Analysis (3) Radiation risk assessment for external and internal radiation; dose-response models, dose rate effects, prediction of radiation risks, radiation safety standards. 
463 Introduction to Fusion Energy I (3) (Same as Electrical Engineering 463.)
464 Introduction to Fusion Energy II (3) (Same as Electrical Engineering 464.)
470 Nuclear Reactor Theory (3) Fundamentals of reactor physics relative to cross sections, kinetics of elastic scattering, reactor kinetics, reactor systems analysis, and nuclear data. Analytical and numerical methods applicable to general criticality problems, eigenvalue searches, perturbation theory and multigroup diffusion equation. Prereq: Introduction to Nuclear Engineering.
471 Nuclear Reactor Theory II (3) Thermal spectrum computational methods: heterogeneous effects in fast and thermal reactors; considerations in reactor core design; equations that relate thermal and neutronic variables; power distribution calculations and reactivity control methods. Prereq: 470.
484 Introduction to Maintenance and Reliability Engineering (3) Principles of maintenance and reliability engineering and maintenance systems management. Information extraction from machinery measurements, rotating machinery diagnostics, nondestructive testing, life prediction, failure modes, lubrication of analysis, establishing predetection and preventive maintenance system management systems. Prereq: Senior standing in engineering and consent of instructor. (Same as Materials Science and Engineering 484, Mechanical Engineering 484 and Mechanical Engineering 484.)
494 Special Topics in Nuclear Engineering (3) Problems related to recent developments and practice. Prereq: Senior standing and consent of instructor. May be repeated. Maximum 6 hrs.
500 Thesis (1-15) P/NP only. E
502 Registration for Use of Facilities (3-15) Required for the student who chooses to register during any semester when student uses University facilities and/or facility before degree is completed. May not be used toward graduate degree requirements. May be repeated. S/NC only. E
511-12 Transport Processes in Nuclear Engineering (3) (3) Phases of nuclear and non-nuclear fluids, integral and integral and system conservation equations for single and multi-component fluids; in-depth development of differential equations; 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. Prereq: 521.
541 Reactor Fuel Management (3) Topics relative to reactor physics, fuel depletion, inventory control, and numerical methods. Prereq: 401.
543 Selected Topics in Nuclear Criticality Safety (3) Criticality safety computational and experimental methods for enrichment, fabrication, storage, reprocessing, and transportation; overview of safety practices and regulatory requirements. Prereq: 421 or consent of instructor.
550 Radiation Measurements Laboratory (3) Physics and electronics associated with radiation detection and measurement methods of data analysis. Appropriateness of particular detector measurement and fundamentals of radiation detection instrumentation operation. Prereq: 551.
552 Radiological Assessment and Dosimetry (3) Transport of radionuclides in environment, food chain pathways, internal dosimetry and personal dosimetry. Prereq: 551 or consent of instructor.
553 Radiation Risk Analysis (3) Methods for radiation risk analysis and extrapolation; parameter estimation, real data analysis, extrapolation techniques. Prereq: 552 or consent of instructor.
571 Reactor Theory and Design (3) Analytical and numerical techniques for neutronics modeling of nuclear systems. Fundamentals and adjoint methods of transport equation, Multigroup diffusion theory. Core analysis methods and codes. Prereq: 401 or equivalent.
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.)
597 Special Topics in Nuclear Engineering (3) Lectures and recitation on recent advances in nuclear engineering. Prereq: Consent of instructor. May be repeated with consent of department.
598 Nuclear Engineering Practice (3-9) Experience in solving and reporting on engineering problems. Prereq: Approval of department. May be repeated. Enrollment limited to alternative plan students. S/NC only.
600 Doctoral Research and Dissertation (3-15) P/NP only. E
611-12 Selected Topics in Reactor Theory (3-3) Transport theory, control rod theory, stochastic methods. Selected topics from literature. Prereq: 572.
621 Selected Topics in Radiation Protection (3) Prereq: 551, 552. May be repeated with consent of department.
671 Advanced Topics in Applied Artificial Intelligence (3) Recent advances in engineering applications of artificial intelligence. Prereq: 577. (Same as Mechanical and Aerospace Engineering and Engineering Science 571.)
697 Special Topics in Nuclear Engineering (3) Investigation of new developments. Prereq: Consent of instructor.
Nursing
(College of Nursing)

MAJOR
Nursing........................................M.S.N., Ph.D.

Joan L. Creasia, Dean
Martha Alligood, Director of M.S.N. Program
Sandra Thomas, Director of Ph.D. Program

Professors:
Alligood, Martha R., Ph.D. .......... New York
Creasia, Joan L., Ph.D. .......... Maryland
Droppleman, Patricia G., Ph.D. .......... Tennessee
Farr, Glen, Pharm.D. .......... Tennessee
Groer, Maureen, Ph.D. .......... Illinois
Mozingo, Johnie N., Ph.D. .......... Walten
Pierce, Joan U., Ph.D. .......... Utah
Seavor, Carol, Ed.D. .......... Massachusetts

Associate Professors:
Brown, Sheila, Ph.D. .......... Tennessee
Davis, Mitzi, Ph.D. .......... Tennessee
Ellison, Kathy Jo, Ph.D. .......... Alabama (Birmingham)
Fenske, Mildred M., Ph.D. .......... Tennessee
Hall, Joanne, Ph.D. .......... San Francisco
McGuire, Sandra, Ed.D. .......... Tennessee
Modrin-McCarthy, Mary Anne, Ph.D. .......... Tennessee
Smith, Helen, Ph.D. .......... Maryland
Wallace, Debra C., Ph.D. .......... South Carolina

Assistant Professors:
Brown, Allie J., M.S.N. .......... Alabama (Birmingham)
Brown, Mary Lynn, Ph.D. .......... Tennessee
Conlon, Kathleen P., M.S.N. .......... SUNY (Buffalo)
Evans, Ginger W., M.S.N. .......... Tennessee
Fox, Marie X., M.S.N. .......... Tennessee
Grace, Pamela, Ph.D. .......... Tennessee
Helton, Sally M., M.S.N. .......... Texas Women's
Kollar, Mary, Ph.D. .......... Tennessee
Nalle, Maureen, Ph.D. .......... Tennessee
Pierce, Margaret, M.S.N. .......... Tennessee
Pullen, Lisa, Ph.D. .......... Mississippi State

THE MASTER'S PROGRAM

The College of Nursing offers the Master of Science in Nursing degree with concentrations in adult health nursing, family nurse practitioner, mental health nursing, nursing administration, and nursing of women and children. The program is accredited by the National League for Nursing Accrediting Commission and is unconditionally approved by the Tennessee Board of Nursing.

The purpose of the Master's program in nursing is to prepare leaders, managers, and practitioners who facilitate clients' achievement of optimal health in the dynamic health care system. The program prepares advanced practice nurses for a career in adult health nursing, nursing of women and children, and mental health nursing as well as role preparation as nurse practitioners, clinical nurse specialists or nursing administrators. Advanced practice nursing involves the delivery of care, management of resources, interdisciplinary collaboration, and application of technology, information systems, knowledge, and critical thinking.

Admission Requirements
1. Meet requirements for admission to The Graduate School.
2. Achieve a score of 500 or above on the verbal and on the quantitative portions of the Graduate Record Examination.
3. Achieve a TOEFL score of 550 or above if native language is not English.
4. Hold a Bachelor's degree in Nursing (BSN) from a National League for Nursing accredited program.
5. Hold or be eligible for licensure to practice nursing in Tennessee.
6. Have an undergraduate GPA of 3.0 or higher on a 4-point scale, or a GPA of 3.3 for courses in the undergraduate major.
7. Have completed a health assessment and physiology course within the past five years.
8. Hold a bachelor's degree in a discipline other than nursing (master's entry student or RN) from an accredited college or university.
9. Have satisfactorily completed the following prerequisite courses: chemistry (6 hrs); microbiology (including lab); anatomy and physiology (6-8 hrs); nutrition (covering lifespan in health and illness); behavioral sciences (12 hrs in sociology, anthropology, growth and development, and at least one general psychology course); undergraduate research course or equivalent prior to enrollment in graduate research course.
10. New students normally are admitted to the program only at the beginning of fall semester. However, under special circumstances and on a space available basis, a B.S.N. graduate may be admitted at the beginning of spring or summer term in a temporary non-degree status. Applications from full-time BSN and master's entry students for fall admission must be received by February 1. Part-time and post-master's applications must be received by October 1.

Special Requirements

1. Each student must hold professional liability insurance.
2. Registered nurses must be licensed to practice nursing in Tennessee.
3. Each student must present proof of hepatitis B vaccination and rubella and rubella immunization or sufficient titer for immunity; TB status.
4. Each student must present evidence of current 2-person CPR certification.
5. Non-registered nurses must have completed courses in chemistry, nutrition, microbiology, anatomy, and physiology plus 12 semester hours of behavioral science courses.
6. Contact student services for more detailed information about the application process: Student Services/MSN Program, UTK College of Nursing, 1200 Volunteer Blvd., Knoxville, TN 37996-4180; phone: 423-974-7606.

Thesis and Non-Thesis Options

The thesis option is available for interested students and is especially encouraged for those who are considering pursuit of doctoral degrees sometime in the future. Students who choose the non-thesis option must register for 580 Nursing Project or 582 Supervised Research.

Program Requirements

All students must complete a minimum of 36 semester hours distributed as follows:

Core (9 credits)
503 Health Promotion in Advanced Practice Nursing
510 Theoretical Foundations of Nursing
520 Advanced Practice Nursing and Health Delivery Systems

Advanced Practice Core (9 credits)*
504 Advanced Health/Physical Assessment
505 Advanced Clinical Pharmacology
515 Advanced Pathophysiology for Nursing Practice

Research (9-12 credits)
501 Research: Methods, Design & Analysis
500 Thesis
580 Nursing Project
582 Supervised Research

Concentration (12 credits)—Choose one
530-531 Adult Health Nursing
550-551 Nursing of Women and Children
580-581 Mental Health Nursing
570-571-72 Family Nurse Practitioner I, II, III
590-591 Nursing Administration I, II

Elective (6 credits)—Required for students in nursing administration concentration only.

*Not required for nursing administration concentration.

Students who enter the program as non-RNs must complete the following undergraduate nursing courses in addition to meeting the requirements listed above:
301 Clinical Pharmacology
302 Introduction to Professional Nursing
304 Nursing Assessment and Health Promotion
306 Health Deviation Concepts I
316 Health Deviation Concepts II
330 Nursing of Adults
414 Community Mental Health Nursing
415 Family/Community Health Nursing
431 Nursing of Children

Registered nurses whose bachelor's degrees are not in nursing must have completed courses in chemistry, nutrition, microbiology, anatomy, and physiology plus 12 hours of behavioral science courses. They must also complete 305, 332, 405, and 433 and complete or successfully challenge the following:
301 Clinical Pharmacology
304 Nursing Assessment and Health Promotion
306 Health Deviation Concepts I
316 Health Deviation Concepts II
330 Nursing of Adults
401 Family Health Nursing
411 Psychosocial Long Term Nursing
431 Nursing of Children
A total of 16-18 credits can be obtained by successful completion of the NLN Nursing Mobility Profile Examination. See graduate catalog for other challenge options. RNs who are in the process of completing a BSN at UTK with the intent of enrolling in the MSN program follow the same plan with the addition of 313.

**Final Examination Requirements:**
All students must successfully complete a final examination as required by The Graduate School. For thesis students, the examination will consist of an oral defense of the thesis as well as other written or oral questions designed to measure student mastery of the entire program of study. For non-thesis students, the written examination will cover the entire program of study and shall be at the discretion of the student's committee, be followed by an oral examination.

**Special Policies**
1. If the clinical performance of any student for any course is found to be unsatisfactory, the student will receive a grade of "I" for the course.
2. If a student achieves a final grade of "D" or "F" for any required undergraduate or graduate nursing course, he or she will not be permitted to repeat the course and will be required to withdraw from the program.
3. If the clinical performance of any student is characterized by unethical, unprofessional or unsafe behavior, or behavior that places the client in jeopardy, the student will be required to withdraw from the program.

**THE DOCTORAL PROGRAM**

The College of Nursing offers a doctoral program leading to the Doctor of Philosophy degree with a major in Nursing. This is a unified program offered jointly with The University of Tennessee, Memphis, College of Nursing. Students may complete all or part of the program on either site. The dissertation must be completed in its entirety at one site.

The doctoral program prepares nursing scholars capable of integrating research, theory, and practice into their roles as researchers, educators, and/or administrators. Specifically, the graduate of this program should be able to:
1. Analyze, test, refine, extend, and expand the theoretical basis of nursing practice.
2. Conduct nursing research that generates knowledge and advances nursing as a discipline.
3. Provide leadership as nurse researchers, educators, and/or administrators in current and emerging health care settings.
4. Collaborate with members of other disciplines in health-related research of mutual concern.
5. Analyze, develop, and recommend health care policy at various levels.

**Admission Requirements**
1. Meet requirements for admission to The Graduate School.
2. Hold a master's degree in nursing from a program accredited by the National League for Nursing. Some outstanding applicants who are prepared at the bachelor's level in nursing may be considered. In such cases, graduate level courses in nursing theory, concentration specialty, and/or research will be integrated into the formal program of doctoral degree requirements.
3. Have a minimum cumulative graduate grade-point average of 3.3 on a 4.0 scale for previous college work.
4. Have a combined score of at least 1000 on the verbal and quantitative sections of the Graduate Record Examination.
5. Have successfully completed a basic statistics course and graduate nursing theory and research courses prior to enrollment in nursing doctoral level courses.
6. Have TOEFL scores of at least 550 if native language is not English.
7. Complete Graduate Program Data Form, College of Nursing.
8. Submit Graduate School Rating Forms from three college level instructors and/or nurses and administrators who have supervised applicant's professional work.
9. Submit a sample of scholarly writing (e.g., thesis, published paper).
10. Submit an essay describing personal and professional aspirations.
11. Submit Graduate Application for Admission, academic transcript(s), Graduate Record Exam scores, and, if required, TOEFL scores to the Graduate School. Submit three Graduate School Rating Forms, sample of scholarly writing, and Graduate Program Data Form with essay to the Director of the PhD program prior to November 1 of the year prior to fall admission.
12. Schedule a personal interview with the College of Nursing PhD Student Admissions Committee prior to March 15 of the year preceding Fall admission. International applicants may be interviewed by telephone or teleconferencing at the discretion of the admissions committee.

**Program Requirements**

The following courses are required for all students:
- 620 Directed Research
- 601-02 Theory Analysis & Construction I II 6
- 605-06 Nursing Research Seminar 4
- 607 Qualitative Nursing Research 3
- 608 Quantitative Nursing Research 3
- 609 Research Practicum 4
- 610 Nursing Science Seminar 3
- 611 Advanced Nursing Seminar 3
- 612 Health and Nursing Policy/Planning 3
- 614 Nursing Preceptorship 3
--- Statistics 6
--- Cognates 6
--- Electives 3
600 Dissertation 24
TOTAL 72

*Note: A minimum of 1 hour per semester must be taken for 4 semesters.

Possible cognate areas include, but are not limited to, anthropology, art and family studies, psychology, education, management, medical ethics, public health, social work, philosophy, and statistics.

**Doctoral Committee**

Early in the student's program, a nursing faculty advisor will be selected by the student in consultation with the program director. The student's dissertation committee consists of the faculty teaching core courses and one representative from the cognate area. The student then selects the dissertation committee. Four faculty holding the rank of assistant professor or above comprise the committee, three of whom (including the chair) must be approved by the Graduate Council to direct doctoral dissertations. At least one member of the committee must be from an academic unit other than nursing.

**Special Policies**
1. A maximum of 6 graduate hours taken before acceptance into the doctoral program may be applied toward the degree.
2. Minimum grades of B in all nursing doctoral courses and a 3.0 cumulative GPA are required for continuation in the program.

**MINOR IN GERONTOLOGY**

Graduate students in the College of Nursing may pursue a specialized minor in gerontology. This interdepartmental/interdisciplinary minor gives the student an opportunity for combining the knowledge about aging in American society with his/her major concentration. Please refer to Human Ecology for specific requirements.

**ACADEMIC COMMON MARKET**

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The Ph.D. program in nursing is available to residents of the states of Alabama, Arkansas, or West Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

**GRADUATE COURSES**

500 Thesis (1-15) P/NP only.
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. Prereq or coreq: 510, graduate level statistics. F, Sp.
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N only. F, Sp.
503 Health Promotion in Advanced Practice Nursing (3) Principles of health promotion, education, and innovative strategies for achieving wellness of individuals, families, groups, and communities.
504 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. Didactic (2.5) and lab (1.5).
505 Advanced Clinical Pharmacology (3) Pharmacological agents utilized to treat common, recurrent health problems; indications, contraindications, side and interactive effects of commonly prescribed drugs. Prereq: 301 or equivalent or consent of instructor. F, Sp.
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, reasoning, and decision making for advanced practice nursing. F, Sp.
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.
515 Advanced Pathophysiology for Nursing Practice (3) Advanced physiologic and pathophysiologic concepts,
565 Teaching Practicum (1-6) Individually designed teaching experience in college teaching of nursing. Fieldwork situations. Prereq: Consent of instructor. S/NC or letter grade. Sp

566 Educational Principles and Strategies (3) Exploration and analyses of selected education, curricula; teaching-learning, measurement, and evaluation principles and strategies as applied to instruction of undergraduates in graduate and special student professional development programs. Prereq: Consent of instructor. Sp/F

570 Family Nurse Practitioner I (4) Application of advanced health physical assessment and diagnostic reasoning in family nursing management and primary care of individuals and their families with actual and potential health problems; clinical experience in role of family nurse practitioner in variety of settings. Prereq: 504, 515. Coreq: 520. Didactic (2) and practicum (2). Sp

571 Family Nurse Practitioner II (6) Continuation of 570. Nursing management and primary care of individuals and their families in all developmental life stages; clinical experience in variety of settings. Prereq: 504, 515. Coreq: 520. Didactic (2) and practicum (4). F

572 Family Nurse Practitioner III (7) Continuation of 571. Nursing management of chronic health problems of individuals and families in all developmental life stages; role refinement and exploration of major issues of family nurse practitioner; clinical experience in variety of settings. Prereq: 571. Didactic (2) and practicum (2). Sp

577 Special Topics (1-3) Topic determined by faculty and student interest. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

580 Research Project (3) Student-initiated scholarly project with faculty supervision. Review and critical evaluation of literature in specific area of interest; development of research design culminating in a "state of the art" paper. Prereq: Consent of instructor, first course in concentration. Su/F

582 Supervised Research (3) Supervised research culminating in scholarly project. Experimental learning of research process. Participation in ongoing faculty research project by completing specified portion of project under faculty guidance. Prereq: Consent of instructor, 501, 510. May be repeated. Maximum 6 hrs. E

583 Directed Clinical Practice (1-9) Additional opportunities for advanced nursing practice. Objectives to be developed collaboratively by student and faculty. Prereq: Completion of graduate level courses in clinical nursing. Maximum 9 hrs. S/NC or letter grade. E

585 Seminar in Gerontology (1) (Same as Human Ecology 585, Gerontology 585, Exercise Science 585, Public Health 585, Psychology 585, and Sociology 585.)

590 Nursing Administration I (6) Exploration, analysis, and application of selected organizational, management, and leadership theories and financial principles to delivery of nursing services. Prereq: Consent of instructor. Prereq or coreq: 501. Didactic (2) and practicum (4). F

591 Nursing Administration II (6) Continuation of 590. Utilization of human and financial resources, conflict resolution, and organizational development with application to mid-level and top-level nursing administration positions. Prereq: 550, 2 hrs and 4 labs. F

593 Independent Study (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

600 Doctoral Research and Dissertation (19-3) Independent research

609 Research Practicum (1-3) Supervised individual or group research experience under guidance of faculty. Prereq: 601. May be repeated. Maximum 12 hrs. S/NC or letter grade. E

610 Nursing Research Seminar (2) Critical Analysis and synthesis of theses in selected focus areas, nursing science. Prereq: Admission to doctoral program in nursing or consent of instructor. Sp

611 Advanced Nursing Seminar (2) Exploration of historical and current issues of interest to doctorally prepared nurses. F

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. E

613 Nursing Management of Complex Systems (3) Contemporary organizational and management theories and techniques needed for effective administrative leadership in nursing education, practice, research, and entrepreneurial settings. F

614 Nursing Preceptorship (3) Individually-designed practicum, field, or internship experiences in variety of administrative, educational, research, or clinical practice settings. Prereq: 501, 602. F

615 Nursing Management of Complex Systems: Academic Institutions (3) Organizational structure and dynamics of leadership in nursing education. Application of management and nursing theories in academic, faculty practice models, research and publication issues, promotion and tenure, faculty governance, and administrative responsibilities and strategies. Prereq: 556 or equivalent. Su

620 Directed Research (3) Exploration of theoretical considerations and research methodologies in nursing research with completion of study under faculty guidance. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. Sp

Nutrition
(Neal of Human Ecology)

MAJORS

DEGREES

Human Ecology ....................... Ph.D.
Nutrition .............................. M.S., M.S.-M.P.H.

Michael B. Zemel, Head

Professors:
Beauchene, Ray E. (Emeritus), Ph.D. ....................... Kansas State
Carruth, Betty Ruth, Ph.D. ....................... Missouri
Namey, T. C., M.D. .......... Washington, D.C.
Sachan, Dilip S., Ph.D. ....................... Illinois
Skinner, Jean D., Ph.D. ....................... Oregon State
Smith, John T. (Emeritus), Ph.D. ....................... Missouri
Zemel, Michael (Liaison), Ph.D. ............... Wisconsin

Associate Professors:
Bailey, James W., Ph.D. ....................... Iowa State
Bennett, D. M. (Memphis), M.S. ....................... Alabama
Haugh, B., Ed.D. ....................... Columbia
Koehl, Michael, Ph.D., Loyola
Moussa, Naima, Ph.D. ....................... Paris
Whelan, Jay, Ph.D. ....................... Penn State
Zemel, Paula, Ph.D. ....................... Wayne State

Assistant Professors:
Bittle, Joyce (Memphis), Ph.D. ....................... Tennessee
Chencharick, Judith, (Memphis, M.S.)
The Master of Science program is available in Nutrition, with a concentration in nutrition science or public health nutrition. A graduate degree combined with a Dietetic Internship (D.I.) beyond the baccalaureate degree qualifies the graduate to apply for the Registration Examination to become a Registered Dietitian (R.D.). Students may request more information from the department about the D.I. program. Students may also select an interdisciplinary minor in gerontology. The program is accredited by the American Dietetic Association.

ADMISSION REQUIREMENTS

A final file for review includes the Graduate School application file, completed departmental application form, Graduate Record Examination (GRE) scores for the general section, and three Graduate School Rating Forms completed by individuals who can attest to the applicant's potential for graduate education. Forms may be obtained from the Departmental Office, 225 Jessie Harris Building, University of Tennessee, Knoxville, TN 37996-1900. Forms may also be obtained from the Department's website at http://nutrition.utk.edu/.

Admission into the graduate program in the department is contingent on completion of undergraduate courses that give the necessary background for success in the graduate program. Required undergraduate courses include: general and organic chemistry, physiological chemistry/biochemistry, physiology, statistics and advanced nutrition. Admission to the Ph.D. program in Human Ecology with a concentration in Nutrition Science requires a master's degree. Applicants to all programs with related experience may be given preference.

THE MASTER'S PROGRAM

Students may choose a thesis or non-thesis option in Nutrition. Attendance at Nutrition 540 is required every semester.

Thesis Option: The program consists of a minimum of 33 hours with at least 6 hours of coursework in the department. NTR 511, 512, 540, 541 and 3 hours of graduate level statistics are required. Students in public health nutrition must take NTR 511, 512, 513, 514, 515, 516, 541 and the minor in public health. Six hours of Thesis 500, and 6 hours outside the department are required. A minimum of 22 hours at the 500 or 600 level is required.

An oral comprehensive examination is required upon completion of the thesis.

Non-Thesis Option: The program consists of a minimum of 30 hours with at least 60 hours of coursework in the department. NTR 511, 512, 513, 514, 515, 516, 540, 541 and 6 hours outside the department are required. A minimum of 24 hours at the 500 or 600 level is required.

A written comprehensive examination is required for completion of the program.

DUAL M.S.-M.P.H. PROGRAM

The College of Human Ecology offers a coordinated dual program leading to the conferral of both the Master of Science with a major in Nutrition (public health nutrition concentration) and the Master of Public Health. The dual program allows students to complete both degrees in less time than would be required to earn both degrees independently.

The program is designed to meet the needs of students who are interested in the benefits of majors in both nutrition and public health. Therefore, it accommodates the interests of students who: 1) plan a career in public health nutrition and want to acquire the knowledge and skills of the nutritionist and public health professional; 2) plan a career in nutrition and want to acquire the knowledge and skills and the perspective of the public health professional; or 3) plan a career in public health and want to acquire the knowledge, skills and perspective of the nutritionist.

Admission Requirements

Applicants for the M.S.-M.P.H. program must make separate application to, and be competitively and independently accepted by, the Department of Nutrition for the M.S. Department of Health and Safety Sciences for the M.P.H., and the Public Health Academic Program committee.

Students who have been accepted by both departments may apply for approval to pursue the dual program anytime prior to, or after, matriculation in either or both departments. Such approval will be granted, provided that dual program studies be started prior to entry into the fourth semester of the M.S. and M.P.H. programs.

Curriculum

A dual degree candidate must satisfy the requirements for both the M.S. (public health nutrition concentration) and the M.P.H. degrees, as well as the requirements for the dual program. All candidates for the dual degree must successfully complete Health and Society (PH 555), two credits of Seminar in Public Health (PH 509), and a minimum of 60 credits. The Department of Nutrition will award a maximum of 12 semester hours of credit toward the M.S. degree and a total of 36 semester hours of credit toward the M.P.H. degree for successful completion of approved graduate level courses offered in the Department of Health and Safety Sciences. The Department of Health and Safety Sciences will award a maximum of 11 semester hours of credit toward the M.P.H. degree for successful completion of approved courses offered in the Department of Nutrition. All courses for which such cross-credit is awarded must be approved by the Public Health Academic program Committee and the student's graduate committee. A single block field experience (or public health internship) is required of all students and the analytical field paper incorporates public health nutrition and the student's public health concentration.

Dual degree students who withdraw from the program before completion of the requirements for both degrees will not receive credit towards the M.S. or M.P.H. degrees for courses taken in the other program, except as such courses qualify for credit without regard to the dual program.

Approved Dual Credit

M.S. courses must be counted toward the M.P.H. program must include 10 semester hours of Field Study in Community Nutrition (NTR 515) and 1 semester hour of Graduate Seminar in Public Health (NTR 508). M.P.H. courses must be counted toward the M.S. include Public Health Administration (PH 520), Biostatistics (PH 530), and Epidemiology (PH 540).

THE PH.D. CONCENTRATION

The nutrition science concentration enables students to study the science of nutrition from the cellular level to the application of nutritional principles by people in a changing environment.

The doctoral program emphasizes human nutrition, nutritional epidemiology, experimental nutrition, and intermediary metabolism. Cognate areas may include anthropology, biochemistry, chemistry, communications, education, food technology, human development, physiology, public health, sociology, statistics, and/or toxicology.

Minimum requirements include:

1. Sixteen hours in nutrition including 4 hours at the 600 level (exclusive of dissertation).
2. NTR 511, 512, 541, and 2 hours from either 542-544.
3. Four hours of NTR 540, attendance required every semester.
4. Six hours of statistics.
5. Six hours in a cognate area.
6. Nine hours at the 600 level.
7. Students without college teaching experience are required to take the fall semester teaching seminar for GTAs and NTR 548 comprising a faculty-supervised problem in college teaching.

GRADUATE COURSES

500 Thesis (1-15) P/NP only. E
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or for faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
500 Culture, Food, and Nutrition (3) Food-related behavior of individuals and groups in United States. Sociocultural, economic, and technological influences. Nutrition and food surveys, public policy. Prereq: Advanced Nutrition or consent of instructor. F,A
509 Graduate Seminar in Public Health (1) (Same as Public Health 509, Exercise Science 509, Nursing 509 and Social Work 509.)
511 Advanced Physiological Chemistry (4) Bioenergetics, flux control and hormonal interactions. Prereq: Advanced Nutrition or equivalent. F
513 Community Nutrition I (3) Orientation to community; assessment of nutrition problems, needs, and resources; functional roles of public health nutritionist. Concurrent field experiences. Prereq: Advanced Nutrition or consent of instructor. F
514 Community Nutrition II (3) Planning, implementation, and evaluation of public health nutrition programs. Concurrent field experiences. Prereq: 513 or consent of instructor. Sp
515 Field Study in Community Nutrition (1-12) Preregistration and analysis of state or regional community nutrition programs. Location of in-depth study to be selected in consultation with instructor. Prereq: 513, 514 and consent of instructor. S/NC only. Su
516 Maternal and Child Nutrition (3) Nutrition principles related to growth and development during pregnancy, infancy, and childhood to age 5, high risk conditions. Prereq: Advanced Nutrition or consent of instructor. F
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. Prereq: Advanced Nutrition or consent of instructor. Sp,A
518 Nutrition and Aging (3) Nutritional problems of adulthood: nutritional requirements, dietary intakes; effects of nutrition on biological aging. Prereq: Advanced Nutrition or consent of instructor. S,A

521 Physiological Basis for Diet and Disease (2) Altered nutrient needs as result of metabolic changes that occur in selected disease states. Prereq: Nutrition in Disease or consent of instructor. Sp

522 Nutrition Counseling (2) Individual eating habits and disorders, evaluation strategies for effectiveness of helping process. Prereq: Nutrition in Disease or consent of instructor. F

524 Nutrition Education: Principles, Implementation, and Evaluation (3) Conceptual models, principles, application, and evaluation methods in nutrition education research. Prereq: 508 or consent of instructor. F

546 Seminar in Nutrition (1) May be repeated. S/NC only. E

541 Research Methods (1) Basic principles of planning, conducting, and interpreting nutrition and foodservice systems administration research. Prereq: 6 graduate hrs in nutrition and food system administration and statistics. Sp

542 Advanced Experimental Nutrition (2) Application of research principles to individual project using experimental animals. Prereq or coreq: 541. Sp

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. Prereq or coreq: 541. Sp

547 Field Experience (3-9) Experience in food-related industry or agency under supervision of faculty member. Prereq: Consent of Instructor. S/NC only. E

548 Directed Study in Nutrition (1-3) Advanced study in nutrition. Prereq: Consent of Instructor. May be repeated. Maximum 6 hrs. E

549 Special Topics (1-3) Recent advances in nutrition or food systems administration. Prereq: Consent of Instructor. May be repeated. Maximum 6 hrs. E

600 Doctoral Research and Dissertation (3-15) P/NP only. E

602 Advanced Topics in Nutrition Science (1-3) Comprehensive individual study and group discussion of topics related to current problems in nutrition. Prereq: 512 or consent of instructor. May be repeated. F

603 Current Trends in Food and Sociocultural Change (2) Critical evaluation of research. Prereq: 508 or consent of instructor. F

507 Professional Development Seminar (1) (Same as Agriculture 507, Animal Science 507, Biosystems Engineering 507, Food Science and Technology 507, and Plant and Soil Sciences 507.) May be repeated. S/NC only. E

Samples, T. J., Ph.D. ………… Oklahoma State
Trigiano, R., Ph.D. ………… NC State
Williams, D. B., Ph.D. ………… Penn State

Associate Professors:
Day, J. W., Ph.D. ………… Mississippi State
Rogers, S. M., M. A. ………… Texas A&M
Witte, W. T., Ph.D. ………… Maryland

Assistant Professors:
Brown-Faust, J. E., Ph.D. ………… Michigan State
Hamilton, S. L., Ed.D. ………… Tennessee
Klingeman, W. E., Ph.D. ………… Georgia
Menendez, G. L., M.S. ………… Tennessee

The Department of Ornamental Horticulture and Landscape Design offers the Master of Science degree with concentrations in floriculture, landscape design, turfgrass, woody ornamentals, and public horticulture. Various interests may be emphasized in any of these commodity areas, including micropropagation, innovative production and maintenance systems, and the molecular biology, genetics, histology and stress physiology of ornamentals.

THE MASTER'S PROGRAM

Admission Requirements

Students having bachelor's degrees in fields both related and unrelated to ornamental horticulture may apply, although acceptance may require some prerequisite courses. For admission to the M.S. degree program, a student must meet all of the requirements of The Graduate School and must have completed (in semester hours): 12 hours of upper level ornamental horticulture and/or landscape design (in some cases, depending on individual student's interests and up to the discretion of a major professor in consultation with the OHLD Graduate Coordinator, upper level courses in other agricultural, biological or environmental subjects may substitute for some or all of these hours); 6 additional hours of biological science; 6 hours of math; 8 hours of chemistry. In addition, three completed rating forms and a written statement of career goals and interest in ornamental horticulture are required. Students from non-science fields applying for the program may wish to enroll as non-degree graduate students while taking prerequisites.

Both thesis and non-thesis options are available, each guided by a graduate committee with three or more faculty members. For further information see web site at http://web.uky.edu/~uthort/ or contact the Graduate Liaison.

Degree Requirements

1. Approval of the academic program by the master's committee.

2. Successful completion of 12 hours of coursework in OHLD at the graduate level (400 or above), exclusive of 500, 502, 503, and 593. Two of these hours must be 590. Six of these hours may be satisfied by Botany 412, 521, 522, Plant and Soil Science 471, Animal Science 571, Ecology and Evolutionary Biology 520, or Information Sciences 560.

3. Attendance at graduate seminar each semester enrolled.

4. Preparation of a publication-ready, written or graphic communication.

Thesis Option:

1. Satisfactory preparation of a written thesis proposal and its oral defense to the student's committee, prior to enrolling on 500.

2. Successful completion of 30 hours of graduate credit, which must include 6 hours of 500. At least 14 of these hours must be at the 500 level or above.


Non-Thesis Option:

1. Successful completion of 34 hours of graduate credit, which must include 2-4 hours of 503. At least 22 of these hours must be at the 500 level or above.

2. Completion of a project and preparation of a written report summarizing the project.

3. Passing written and oral examinations covering the project and coursework.

GRADUATE COURSES

410 Nursery Management and Production (3) Modern management methods as applied to retail and wholesale nurseries and landscape contracting firms. Methods of producing liners, container and field-grown woody ornamental plants. Prereq: 220, 330, and Plant and Soil Science 210, or consent of instructor. 2 hrs and 1 lab. Sp

440 Advanced Turfgrass Management (4) Principles and scientific basis of turfgrass management, development, ecology, physiology, soil fertility, and grass nutrition, climatic influences on grass culture; physiology of clipping and water management; design, construction, and management of golf courses; and physiological influences of pest infestation and control measures. Prereq: 340 or consent of Instructor. 3 hrs and 1 lab. Sp

450 Specialty Landscape Construction (3) Methods of design, materials, and construction techniques for specialized components of landscape industry. Irrigation systems, outdoor lighting, garden ponds and water features. Prereq: Basic Landscape Construction. F

451 Plant Tissue Culture (3) (Same as Botany 451.)

460 Professional Practices in Landscape Construction and Management (2) Professionalism, salesmanship, proposals, bidding, estimating, specification, and contract management in landscape services industry. Interaction with industry representatives through special presentations. Prereq: 350 or consent of instructor. F

480 Advanced Landscape Design (3) Comprehensive application of landscape design tools and skills to variety of projects; special experiances: landscape planning and analysis, plant design and layout, and materials estimating. Prereq: Fundamentals of Landscape Design and Supplemental Landscape Design Graphs. 2-3 hr labs. Sp

486 Computer Aided Landscape Design (3) Computer Aided Design (CAD) related to landscape design and construction. Site planning and construction of related landscape plans and 3-D drawings. Operating system used is AutoCAD and LANDCAD software. Prereq: Fundamentals of Landscape Design, Microcomputer Applications to Problem Solving or consent of instructor. 2-3 hr labs. S,Sp

500 Thesis (1-15) P/NP only. E

501 Special Topics in Ornamental Horticulture and Landscape Design (1-3) Topics to be assigned. May be repeated. Maximum 6 hrs. Prereq: Consent of instructor. E

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements for 3-15 hours. Prereq: 220, 330, and Plant and Soil Science 210, or consent of instructor. E

503 Non-Thesis Project (1-2) Library, field, or laboratory project under supervision of faculty members. Not for thesis candidates. May be repeated. Maximum 4 hrs. E

507 Professional Development Seminar (1) (Same as Agriculture 507, Animal Science 507, Biosystems Engineering 507, Food Science and Technology 507, and Plant and Soil Sciences 507.) P/NP only. E

Ornamental Horticulture and Landscape Design

(College of Agricultural Sciences and Natural Resources)

MAJOR DEGREE

Ornamental Horticulture and Landscape Design ………………….. M.S.

Mary L. Albrecht, Head

Professors:
Albrecht, M. L., Ph.D. ………… Ohio State
Augé, R. M. (Liaison), Ph.D. ………… Washington State
Callahan, L. M., Ph.D. ………… Rutgers
Catter, G. Douglas, Ph.D. ………… Ohio State
Graham, E. T. (Emeritus), Ph.D. ………… Penn State
Greeshoff, Peter M. (Rachef Chiar of Excellence), Ph.D. ………… Australian National University
McDaniel, G. L., Ph.D. ………… Iowa State

Ornamental Horticulture and Landscape Design 159
509 Scientific Communication (1) (Same as Agriculture 509, Animal Science 509, Food Science and Technology 509, and Plant and Soil Sciences 509.)

511 Plant Disease Fungi (4) (Same as Entomology and Plant Pathology 510.)

521 Flowering Physiology (1) General phenomenology, photoperiodism, thermoperiodism, interactions of external factors, juvenility, and hormonal regulation. Prereq: Introductory Plant Physiology or equivalent. 5 hrs weekly for 5 weeks. Sp, A

522 Stress Physiology (1) Introduction to abiotic plant stress physiology: drought, flooding, salinity, light, pollutants, other stresses. Prereq: Introductory Plant Physiology or equivalent. 3 hrs weekly for 5 weeks. Sp, A

523 DNA Analysis (1) Practical experience in isolating Genomic DNA from plants and fungi, amplification of DNA using arbitrary oligonucleotide primers. DNA profiling techniques (DAF, ASPAP) isolation and purification of amplified products. Data analysis of relationships between organisms. Prereq: 8 hrs biological and/or botanical sciences, 8 hrs chemistry, consent of instructor. 1 hr and 4 labs weekly for 5 weeks. Sp, A

524 Plant Cell Electrophoresis (1) Practical experience with isolating native and denatured proteins from plants and fungi determining protein concentrations, PAGE of proteins including total proteins and assays for specific enzymes (isozyme) analyses. Prereq: 8 hrs biological and/or botanical sciences, 8 hrs chemistry, consent of instructor. 1 hr and 4 labs weekly for 5 weeks. Sp, A

525 Plant Microtechnique (1) Practical and scanning electron microscopy methods for investigating aspects of plant development, histochemistry and pathological structures in contemporary and/or Abs 300 species. Prereq: 8 hrs biological and/or botanical sciences and consent of instructor. 1 hr and 4 labs weekly for 5 weeks. Sp, A

526 Public Horticulture (1) Use of plants for public education, enrichment, and human well being. Professional practice and development; discussion of selected reading from field. F

590 Seminar (1) Presentations and discussion of topics. May be repeated. Maximum 2 hrs. E

592 Internship (1-2) Application of horticultural and design principles and practices in supervised, professional setting, approved by department. S/NC or letter grade. E

593 Problems in Ornamental Horticulture and Landscape Design (1-3) Independent study. Current topic related to technology and science. May be repeated. Maximum 6 hrs. E

Pathology
See College of Veterinary Medicine and Comparative Experime ntal Medicine

Philosophy
(Continued from Arts and Sciences)

MAJOR

Philosophy .................................................. M.A., Ph.D.

Kathleen Bohstedt, Head

Professors:

Aquil, Richard E., Ph.D. ............... Northwestern
Cebik, L. B., Ph.D. .............. Nebraska
Cohen, Sheldon M., Ph.D. ............... Northwestern
Davis, John W. (Emeritus), Ph.D. ........... Enory
Edwards, Rem B. (Emeritus), Ph.D. ........... Enory
Graber, Glenn C., Ph.D. ............... Michigan

Nelson, James L., Ph.D. ........... SUNY (Buffalo)
Postow, Betsy C., Ph.D. ............... Yale
Van de Veale, Dwight, Jr., Ph.D. ............... Yale

Associate Professors:

Bennett, James O., Ph.D. ............... Tulane
Bonstedt, Kathleen Emmett (Liaison), Ph.D. ............... Ohio State
Nol, John E., Ph.D. ............... Ohio State
Osborne, Martha Lee, Ph.D. ............... Tennessee

Assistant Professor:

Hamlin, H. Phillips, Ph.D. ............... Georgia
Kaplan, Jonathan, Ph.D. ............... Stanford

The Department of Philosophy offers graduate study leading to the Master of Arts and Doctor of Philosophy. The M.A. program includes thesis and non-thesis options and offers a concentration in medical ethics and in religious studies. The Ph.D. program also has a concentration in medical ethics. Detailed information may be obtained from the Director of Graduate Studies in Philosophy.

THE MASTER'S PROGRAM

The department offers both a thesis and a non-thesis option. The course requirements for an M.A. with a thesis are 30 hours, including 6 hours in Philosophy 500. Of non-thesis hours, at least two-thirds must be in courses at or above the 500 level. No philosophy course numbered under 400 may be taken for graduate credit. There are no particular courses that M.A. students are required to take. The nature of the student's coursework should be determined in consultation with the student's faculty committee. The non-thesis M.A. requires 30 hours of coursework of which at least two-thirds must be in courses at or above the 500 level. Students seeking the non-thesis option must pass an oral examination on all work offered for the degree. An additional oral examination may be required. As a part of the Master's degree, and in addition to a final comprehensive examination, a culminating (capstone) experience is expected. Examples of culminating experiences include presenting a paper at a refereed national or regional philosophy conference, or presenting a paper at a departmental colloquium.

THE DOCTORAL PROGRAM

Students must hold an M.A. with a major in Philosophy or an equivalent degree when entering the Ph.D. program. Twenty-seven hours of coursework beyond the M.A. is required, of which 6 hours will be in courses numbered above 600. See the Philosophy Department Graduate Student Procedures for specific course requirements.

Students must demonstrate a reading knowledge of a foreign language, generally a living language in which there exists a significant body of philosophical literature. (In special circumstances relating to the area of dissertation research, the Graduate Committee may approve a language not satisfying these conditions.) This may be done by passing the doctoral language examination given by the appropriate department, if available, or by passing French 302 or German 332 with a B or better. Bi- or multilingual (normally, foreign) students, whose native language (other than English) is one in which there is a significant body of philosophical literature, are exempted from the foreign language requirement.

Students receiving the Ph.D. with concentration in medical ethics are also exempted.

CONCENTRATIONS

Medical Ethics
The department has an M.A. and Ph.D. program of graduate study with a concentration in medical ethics. Detailed information concerning the program may be obtained from either the Director of Graduate Studies in Philosophy or the Director of the Medical Ethics Program.

Religious Studies
The department has an M.A. program of graduate study with a concentration in religious studies. Details concerning the program may be obtained from the Director of Graduate Studies in the Department of Religious Studies.

ACADEMIC COMMON MARKET
An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.A. and Ph.D. programs in Philosophy are available to residents of the states of Alabama, Delaware, or West Virginia; Kentucky or Texas (concentration in medical ethics only); the Ph.D. program to residents of Louisiana or Mississippi, or Virginia (concentration in medical ethics only); and the M.A. program to residents of Oklahoma (concentration in medical ethics only). Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE COURSES

400 Special Topics (3) May be repeated when topic varies. Maximum 6 hrs.

411 Modern Religious Philosophies (3) (Same as Religious Studies 411.)

412 Classical Indian Systems of Philosophy: The Moksha Tradition (3) (Same as Religious Studies 412.)

420 Topics in History of Philosophy (3) Figures or movements from antiquity through mid-twentieth century. Prereq: 6 hrs of philosophy or consent of instructor. May be repeated when topic varies. Maximum 9 hrs.

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

440 Contemporary Ethical Theory (3) Topics in metaphysics or ethics. Prereq: 6 hrs of philosophy or consent of instructor.

446 Theoretical Issues in Medical Ethics (3) Prereq: 240 or 345 or consent of instructor.

473 Philosophy of Mind (3) Problems of mind and body in relation to consciousness and personal identity. Prereq: 6 hrs of philosophy or consent of instructor. May be repeated when topic varies. Maximum 6 hrs.

479 Studies in Recent Continental Philosophy (3) Selected thinkers or topics: existentialism, phenomenology, hermeneutics, structuralism, post-structuralism. Prereq: 6 hrs of philosophy or consent of instructor. May be repeated when topic varies. Maximum 6 hrs.

500 Thesis (1-15) P/NP only. E

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

510 Philosophical Research (3) Paper workshop (writing, revising papers, getting papers ready for publication). Does not count toward hours required for degree. May be repeated. S/NC only.
Physics and Astronomy
(College of Arts and Sciences)

MAJOR

Physics

DEGREES

M.S., Ph.D.

Lee Riedinger, Head

Professors:

Barnes, F. E., Ph.D. ........................................ California
Bingham, C. R., Ph.D. ..................................... Tennessee
Blass, W. E., Ph.D. ......................................... Michigan State
Breig, M. P., Ph.D. .......................................... Oregon
Bugg, W. M., Ph.D. ............................................ Tennessee
Burdofeerer, J. (Distinguished Prof.), Ph.D. ............... Free University Berlin
Callcott, T. A., Ph.D. ....................................... Purdue
Childers, R. W., Ph.D. ....................................... Vanderbilt
Cramer, H. W. (UTSI), Ph.D. ............................... Yale
Equeijuz, A. G., Ph.D. ...................................... Brown
Elston, S. B., Ph.D. ........................................... Massachusetts
Georgiou, S. F., Ph.D. ....................................... Manchester
Guidry, M. W., Ph.D. ....................................... Rutgers
Hart, E. L., Ph.D. ............................................. Cornell
Lewis, J. W. L. (Distinguished Prof.) (UTSI), Ph.D. ........... Mississippi
MacKee, J. (Distinguished Scientist), Ph.D. ................. Rensselaer
Mahon, G. H. (Distinguished Scientist), Ph.D. ............... California
Nazarewicz, W. K., Ph.D. ................................... Warsaw
Painter, L. R., Ph.D. ......................................... Tennessee
Pegg, D. J., Ph.D. ........................................... New Hampshire
Plummer, E. W. (Distinguished Scientist), Ph.D. .............. Cornell
Quinn, J. (Willis Lincoln Chair of Excellence), Ph.D. ......... Maryland
Quinn, J. (Distinguished Scientist), Ph.D. ....................... Cornell
Riedinger, L. L., Ph.D. ..................................... Vanderbilt
Selkin, I. A. (Distinguished Prof.), Ph.D. (Chicago
Shih, C. C. (Liaison), Ph.D. .................................... Cornell
Sorensen, S. P., Ph.D. ...................................... Copenhagen
Strayer, M. R., Ph.D. ......................................... MIT
Thompson, R. J., Ph.D. ..................................... Duke
Ward, B. F. L., Ph.D. ....................................... Princeton

Associate Professors:

Carrighth, G. Ph.D. ........................................... Tennessee
Farrell, T. L., Ph.D. .......................................... Clemson
Levin, J. C., Ph.D. ........................................... Oregon
Shieh, S. Y., Ph.D. ........................................... Maryland

Assistant Professors:

Daunt, S. J., Ph.D. .......................................... Queens
Dean, D. J., Ph.D. ........................................... Vanderbilt
Parigger, C. (UTSI), Ph.D. .................................... New Zealand
Read, K. F., Ph.D. ............................................ Cornell
Sanders, A. J., Ph.D. ......................................... Tuffs
Siopsis, G., Ph.D. ........................................... Cal Tech
Weitering, H. B., Ph.D. ...................................... Groningen (Netherlands)

Research Professors:

Kamyshkov, I., Ph.D. ....................................... ITEP (Russia)
Thonnard, N. Ph.D. ......................................... Kentucky
Zhang, J. Y., Ph.D. .......................................... Lanzhou

Graduate programs leading to the Master of Science and Doctor of Philosophy are offered in a number of concentration areas: astrophysics, atomic and low temperature physics, biophysics, chemical physics, condensed matter and surface physics, elementary particle physics, geophysics (Master's only), health physics (Master's only), molecular spectroscopy, nuclear physics, and theoretical physics.

Departmental graduate programs leading to the M.S. and Ph.D. are also available at The University of Tennessee Space Institute, Tullahoma, where opportunities for study and research are available in quantum optics and laser physics, atomic and molecular spectroscopy, fluid physics, and theoretical physics. For additional information, contact the department head.

ADMISSION REQUIREMENTS

A student who enrolls in The Graduate School with the intention of attaining an advanced degree in Physics will have completed an undergraduate major in Physics or its equivalent, Physics 311-12, 321, 361, 391-32, 421, 461, and 411-12, constitute the minimum courses prerequisite to graduate study.

A student who intends to present Physics as a graduate minor will have completed an undergraduate minor in Physics or its equivalent. Physics 311 and 431-32 constitute the minimum coursework prerequisite to a minor in Physics.

All first-year graduate students are required, for advising purposes only, to take a qualifying examination in undergraduate physics during the fall semester registration period.

THE MASTER'S PROGRAM

Thesis Option

This program is designed primarily for students intending to go into industrial or governmental laboratories as physicists. The course requirements include 24 semester hours of physics courses, of which at least 12 semester hours are taken from Physics 511-12, 521-22, 531-32, 541-42, or 571-72. Each candidate must present an acceptable thesis, 6 hours of 500, and pass an oral examination on course material and thesis.

The department offers an M.S. thesis program with a concentration in geophysics. Program requirements are: 12 hours from Physics 531-32, 541-42, 571-72; a minimum of 12 additional hours in geology, geophysics, and/or physics, as approved by the student's committee; and the presentation of an acceptable thesis, 6 hours of Physics 500, and the passing of an oral examination on course material and thesis.
Non-Thesis Option
This program is designed primarily for students intending to teach in colleges or universities on the elementary or intermediate level, or for students specifically intending to work toward a Ph.D. Students seeking the non-thesis option must apply to the department's graduate committee for permission to enroll under this program. The requirements are the satisfactory completion of 30 hours of coursework composed of 18 semester hours from Physics 511-12, 521-22, 531-32, 541-42, and 571-72; 6 semester hours in a minor field; and 6 semester hours from other courses numbered above 400 (preferably of advanced laboratory nature.) At least 20 hours must be taken at the 500 level or above. In addition, the candidate must pass a written examination administered by his/her committee.

THE DOCTORAL PROGRAM

All students are expected to take Physics 521-22, 531-32, 541-42, 551, 571-72, and 611. Physics 601-02 are normally required of students specializing in atomic physics; Physics 621-22 of students in nuclear physics; Physics 626-27 of students in elementary particle physics (and/or Physics 613-14 for students specializing in high-energy (high-energy physics); Physics 671-72 of students in condensed matter and surface physics; and Physics 681-82 of students specializing in molecular spectroscopy. Students specializing in chemical physics may substitute Chemistry 572 for Physics 551, and should complete at least 6 semester hours from Chemistry 580, 590, 670.

The courses Physics 531-32, 571-72, 521-22, 541-42 constitute the core curriculum. They are the usual basis for the departmental comprehensive examination which is normally taken by a well-prepared student after two years of graduate study.

The dissertation topic will be chosen with reference to one of the fields in which research facilities can be made available either at the University of Tennessee laboratories in Knoxville; the University of Tennessee Space Institute at Tullahoma, Tennessee; the Oak Ridge National Laboratory, Oak Ridge, Tennessee; or at other research facilities used by the University faculty.

Astronomy

GRADUATE COURSES

411 Astrophysics (3) Development of analytical physical models of galactic structure of universe, stellar and interstellar matter, and galaxies. Topics in astrophysics. Prereq: Physics 231 and consent of instructor.

490 Special Topics in Astronomy (1-3) Topics of current interest in astronomy and astrophysics. Acceptable for graduate credit in physics with consent of department. May be repeated with consent of instructor. Maximum 9 hrs.

Physics

GRADUATE COURSES


421 Modern Optics (4) Transmission of light in uniform, isotropic media; reflection and transmission at interfaces; mathematics of wave motion and interference effects. Rudiments of Fourier optics and holography. Prereq: 431 or Introduction to Physics: Modern Science and Mathematics Majors or Honors: Fundamentals of Physics for Majors or Fundamentals of Physics: Waves Motion, Optics, and Modern Physics and consent of instructor. 3 hrs and 3 labs.


461-52 Modern Physics Laboratory (3,3) Introduction to fundamental and modern techniques in experimental physics, and to theory and practice of measuring and data analysis. Selected experiments in nuclear, atomic, molecular and solid state physics, and magnetic fields. Prereq: Electronics Laboratory and either Fundamentals of Physics: Modern Physics or consent of instructor. 462 Advanced experiments and experimental techniques in modern physics; experimental team work. Thorough quantum mechanical interpretation of results and preparation of scientific reports. Prereq: 461. 4.5 hrs lab per week.

490 Senior Seminar (1-3) Topic of current interest. May be repeated with consent of department. Maximum 6 hrs.

500 Thesis (1-15) P/NP only. E

501 Graduate Research Participation (3) Advanced research techniques under supervision of staff research director whose area coincides with interests of student. Open to all graduate students in good standing. Prereq: Consent of department and research director. May be repeated with consent of department. Maximum 18 hrs. S/NC only. E

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May be used toward degree requirements. May be repeated. S/NC only. E

505 Physics of Fluids (3) Fluid mechanics, overview of fluid mechanics and associated computational techniques, general description of laminar and turbulent flows; subsonic, supersonic and hypersonic flows; continuum, transonic and free-moving body flows; pipeline, nozzle flow and sonic and supersonic expansion flows; radiation and nonreacting flow fields; shock-tube physics; and introduction to method of characteristics and Monte Carlo computational techniques.

506 Experimental Methods (3) Principles, real operational behavior, and hazards of laser-type, radiation detectors, photomultiplier tubes, image intensifiers, image converters, image dissectors, streak cameras, and fast framing cameras; high-vacuum systems including electronics-based devices; data acquisition techniques including synchronous detection, digital electronics methods and micro-computer data acquisition and registration methods.

507 Contemporary Optics (3) Topics in geometrical, physical, Fourier, and nonlinear optics and introductory laser physics. Extensive use of computers to simulate 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 medium; quantum theory of laser systems and operation of lasers; coherency; mode-locking, Q-switching and frequency stabilization; specific laser types: semiconductor and solid-state, excimer, copper vapor and dye lasers.

511-12 Theoretical Physics (3,3) Classical theoretical physics, limited to Physics 312, 432, advanced calculus, differential equations, and vector analysis.


532 Advanced Classical Mechanics (3) Canonical transformations, Hamilton-Jacobi theory and action-angle variables, KAM theorem and Hamiltonian chaos, dissipative chaos, relativistic kinematics, Minkowski spacetime, relativistic scattering and threshold problems. Prereq: 531.


555 Solid State Physics (3) Elementary solid state physics. Crystal structures, reciprocal lattice, bonding in solids, energy bands, semiconductors, phonons, free-electron gas, theory of metals, superconductivity, magnetism, and other forms of broken symmetry. Prereq: 552 or consent of instructor.

556 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. Prereq or coreq: 531 and 542.


574 Group Theory for Physicists (3) Introduction to abstract group theory, discrete and continuous groups, representation theory, Noether's theorems, symmetries and degeneracies, application of group-theoretical methods to atomic physics, solid-state physics, and particle physics. Prereq: 571-72.

591 Foreign Study (1-15) See College of Arts and Sciences.

592 Off-Campus Study (1-15) See College of Arts and Sciences.

593 Independent Study (1-15) See College of Arts and Sciences.

594 Special Problems (3) Especially assigned theoretical or experimental work on problems not covered in other courses. May be repeated. Maximum 9 hrs. E

599 Seminars (1-3, E) Mechanics; Biomedical; c Heat and Thermodynamics; d Electromagnetics; e Modern Physics. May be repeated with consent of department. Maximum 18 hrs. E

600 Doctoral Research and Dissertation (3-15) P/NP only. E

601-02 Advanced Atomic Physics (3,3) Atomic structure, Dirac equation for one-electron system, quantum mechanical, self-consistent field approximation, electron configuration and atomic systems; Bethe-Salpeter equation, Thomas-Fermi method, angular momentum theory, atoms in external fields, interaction with radiation, oscil-
605 Laser Spectroscopy (3) Applications of lasers to spectroscopy of atomic and molecular systems; optical absorptance, laser-induced fluoroscenes, and Raman spectroscopy; molecules and atoms, quantum beats, resonance fluorescence, photon echoes, self-induced transparency; saturation and Doppler-free spectroscopy. Laser cooling and trapping. Prereq: 521, 541.

606 Nonlinear Optics (3) Nonlinear optical susceptibilities, wave propagation in nonlinear media, frequency and phase conjugation, parametric amplification and oscillation, stimulated Raman processes, two- and multi-photon processes, four-wave mixing and phase conjugation, transient coherent optical effects and free induction decay, optical breakdown and nonlinear effects in plasmas. Prereq: 522.

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 atomic and higher order coherence; atomic scattering phenomena. Prereq: 521.

611 Advanced Quantum Mechanics & Field Theory (3) Second quantization, quantization of electromagnetic field, mass, energy, absorption, and scattering of light, birefringence, pair production, and annihilation, quantum field theory methods in condensed matter physics and quantum optics. Topics vary according to instructor. Prereqs: 522 and 542 or equivalent. Prereq or coreq: 561 or consent of instructor.

612 Advanced Topics in Quantum Field Theory (3) Renormalization, Schwinger-Dyson equations, quantum field theory, quantum chromodynamics, quantum electrodynamics, and advanced topics in quantum physics. Topics vary according to interest of student, instructor and present state of physics. Prereq: 561 or 611 or consent of instructor.

613-14 Quantum Field Theory (3,3) Modern formulation of quantum field theory and its applications: second quantization of free and interacting particles; field quantization in quantum mechanics, quantum field theory, quantum chromodynamics, quantum electrodynamics, and advanced topics in quantum physics. Prereq: 561 or 611 or consent of instructor.

621-22 Nuclear Structure (3,3) General properties of nuclear matter, nuclear forces, nuclear properties, symmetries, nuclear models, nuclear forces, theory of light nuclei; nuclear spectroscopy; special nuclear models; theory of nuclear reactions; theory of beta decay. Prereqs: 551 or 555.

626-27 Elementary Particle Physics (3,3) 626-Survey in elementary particle physics covering experimental methods, conservation laws, invariance principles, and models of interactions. 627-Advanced topics; quark models, electroweak interactions and unification of elementary forces. Prereq: 522.

641 Advanced Topics in Classical Theory (3) To meet special needs of students. Advanced dynamics and hydrodynamics, electromagnetic theory, statistical mechanics, or theory of nonequilibrium processes. Prereq: 522, 542, 551. May be repeated with consent of department. Maximum 9 hrs.

642 Advanced Topics in Quantum Theory (3) To meet special needs of students. Angular-momentum theory, theory of atomic spectra, molecular structure and vibration theory, theory of radiation, electric and magnetic susceptibilities, high energy processes, scattering and collision processes, or theory of fields. Prereq: 522. May be repeated with consent of department. Maximum 9 hrs.

643 Computational Physics (3) Developing computer algorithms for solving representative problems in various fields of physics, electronics, meteorology, atmospheric physics, 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, optimization strategy. Prereqs: 522, 551, 542, and 572.

651 Collision Interactions (3) Interaction of electromagnetic radiation and charged particles with atoms and molecules or free particles, scattering, ionization, transport and capture, collective excitations, Cerenkov radiation, and stopping power. Prereq: 522.

663 Advanced Plasma Physics I (3) Same as Electrical Engineering 663.

671-72 Advanced Solid State Physics (3,3) Lattice dynamics, phonons, Brillouin zones, heat capacity, energy bands and structures, cohesive energy, work function. Crystal oscillators; electron-phonon coupling; effective mass approximation. Diamagnetism and diamagnetic measurements; neutron scattering and Fermi surface; superconductivity; superfluidity; anomalous skin effect. Prereqs: 522.

673 Advanced Solid State Physics II (3,3) Lattice dynamics, phonons, Brillouin zones, heat capacity, energy bands and structures, cohesive energy, work function. Crystal oscillators; electron-phonon coupling; effective mass approximation. Diamagnetism and diamagnetic measurements; neutron scattering and Fermi surface; superconductivity; superfluidity; anomalous skin effect. Prereqs: 522.

Planning

(Major of College of Arts and Sciences)

MAJOR

DEGREE

Planning ........................................ M.S.P.

Professors:

David A. Patterson, Director

Patterson, David, D.B.A..................... George Washington

Associate Professors:

Bowen, George E., M.A. .................... George Washington

Student academic progress is monitored by the faculty committee.


675 Advanced Thermodynamics (3,3) Thermodynamics of open systems, phase transitions, energy conservation, entropy, irreversible processes, applications to chemical and mechanical processes. Prereq: 522, 542, 551.


677 Advanced Thermodynamics (3,3) Thermodynamics of open systems, phase transitions, energy conservation, entropy, irreversible processes, applications to chemical and mechanical processes. Prereq: 522, 542, 551.


679 Advanced Thermodynamics (3,3) Thermodynamics of open systems, phase transitions, energy conservation, entropy, irreversible processes, applications to chemical and mechanical processes. Prereq: 522, 542, 551.

681 Laser Spectroscopy (3) Applications of lasers to spectroscopy of atomic and molecular systems; optical absorptance, laser-induced fluoroscenes, and Raman spectroscopy; molecules and atoms, quantum beats, resonance fluorescence, photon echoes, self-induced transparency; saturation and Doppler-free spectroscopy. Laser cooling and trapping. Prereq: 521, 541.

686 Nonlinear Optics (3) Nonlinear optical susceptibilities, wave propagation in nonlinear media, frequency and phase conjugation, parametric amplification and oscillation, stimulated Raman processes, two- and multi-photon processes, four-wave mixing and phase conjugation, transient coherent optical effects and free induction decay, optical breakdown and nonlinear effects in plasmas. Prereq: 522.
ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S.P. program is available to residents of the states of Arkansas, Kentucky, Virginia, or West Virginia. Additional information may be obtained from the Admissions Specialist at the Office of Graduate Admissions and Records.

GRADUATE COURSES

401 The City in the U.S. (3) Development and character of U.S. cities. Contemporary issues and selected case studies. (Same as Urban Studies 401.)

402 Survey of Planning (3) History of city development and planning; U.S. experience in urban and other levels of planning. State of the art, processes, comprehensive plans, implementation devices. Planning issues in society. Not for credit for M.S.P. degree.

446 Housing (3) Nature and demand for housing in the U.S. and abroad. U.S. experience, private market processes, and public and international policies in housing supply. Impact of new technology, and governmental programs to improve supply and quality of housing.

500 Thesis (1-15) P/NP only. E


502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or acquires tuition after degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

510 Fundamentals of Planning (Histo of planning, structure and development of urban areas, operations of contemporary planning, problems and issues.)

511 Graphic and Oral Communications in Planning (1)

512 Community Planning Process (1) Planning process, policy processes and decision processes. Independent or group studies of community development.

513 Theory of Planning (2) Analysis of nature and objectives of planning process. Role of planner and planning function in decision-making. Prereq: 510 or consent of instructor.

520 Planning Research Methods (4) Overall structuring of social science research in planning processes; familiarity with structure of planning literature and information sources, systematic research techniques and tools, practice in posing research questions and formulating hypotheses.

521 Information Systems and Networks in Planning (1) 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). Prereq: Basic experience with computer software or hardware or consent of instructor.

522 Statistics for Planners (3) Applications of statistical techniques. Intuitive explanations and practical applications. Computer analysis to explore concepts.

523 Planning Information Systems (3) Design, analysis, and use of information systems for planning and the planning process. Design of planning decision support systems; use of public data bases; impact of information revolution and new technologies on planning profession. Prereq: Consent of instructor.

530 Policy and Land Use Analysis (4) Basic methods of policy analysis and planning. Concept and framework for land-use planning. Population, employment, and economic base studies, and forecasting techniques. Coreq: 520 or consent of instructor.

531 Urban and Regional Analysis (3) Past, present and potential future patterns of urban and regional structures, and contemporary theories, models, and empirical research.

532 Planning Methods (3) Preparation of comprehensive plans for urban areas or regions. Development of baseline data and forecasts, formulation of alternative plans and strategies, and development of plan implementation programs. Extensive laboratory experience. Prereq: 510, 512, 520, 530 and S/NC or consent of instructor.

533 Planning and Transportation (3) (Same as Civil Engineering 558.)

534 Planning for Historic Preservation (3) Planning for preservation, restoration, and use of historic and culturally significant buildings, areas, and sections. Prereq: 510 and consent of instructor.

535 Planning and Property Development (3) Process of urban physical growth and change; function of private sector real estate development and its relationship to planning; planning and property development; public and private sector in urban development and redevelopment. Prereq: 510 or consent of instructor.

536 Urban Planning and Community Development (3) Planning and community development in the United States and abroad. Residential, commercial, and industrial planning and development. (Same as Geography 636.)

537 Urban Design (3) The relationship between urban design and planning. Planning and development strategies for urban areas. Prereq: 510 or consent of instructor.

538 Regional Planning and Development (3) Development of regional infrastructure and regional economic development. (Same as Geography 636.)

540 Local Government (3) Characteristics of local government structures and processes. Local government planning and policy development. (Same as Geography 636.)

541 Community Planning and Policy Development (3) Models and analytic tools for planning and policy development. (Same as Geography 636.)

542 Planning Theory (3) Planning theories and methods. (Same as Geography 636.)

543 Planning and Foreign Affairs (3) The role of planning in international relations. (Same as Geography 636.)

544 Planning and Environment (3) The role of planning in environmental protection. (Same as Geography 636.)

545 Planning and Ecosystems (3) Planning and the natural environment. (Same as Geography 636.)

546 Planning and Economic Development (3) Planning and economic development. (Same as Geography 636.)

547 Planning and Social Institutions (3) Planning and social institutions. (Same as Geography 636.)

548 Planning and Political Processes (3) Planning and political processes. (Same as Geography 636.)

549 Planning and Public Policy (3) Planning and public policy. (Same as Geography 636.)

550 Planning and Social Movements (3) Planning and social movements. (Same as Geography 636.)

551 Planning and Social Change (3) Planning and social change. (Same as Geography 636.)

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605 Planning and Social Change (3) Planning and social change. (Same as Geography 636.)
conducting research, the student must develop a detailed written research proposal that shall be approved by the student's committee. Upon completion of the thesis, this committee will also conduct the final oral examination that integrates the thesis and coursework.

Six hours of 500 Thesis are required. In addition to the thesis hours, a minimum of 24 hours of graduate coursework is required. At least 14 of these hours must be taken in courses numbered 501 and above. The student must take at least 12 of the 24 hours in Plant and Soil Sciences courses, excluding Thesis 500. The student's committee may require additional coursework beyond the 24 hours if the student's progress or background indicates a need or deficiency. All students pursuing the M.S. degree must take the following courses: 509 Scientific Communication (1 hr); 503 Seminar (1 hr); 511 Soil-Plant Relations (3 hrs). The student must also present an exit seminar to the Department over the research project.

All students pursuing a concentration in soil science must also take at least three of the following courses: 509 Scientific Communication, 512, 513, 514, and 516. All students must take two of the following courses: 532, 551, and 553.

A student who has started a degree under the thesis option is not eligible to transfer to the non-thesis option after the end of the first semester of graduate studies or after receiving a graduate assistantship stipend for more than one semester. A student who has started under the non-thesis option may transfer to the thesis option upon approval of a potential major professor and the department head.

**Non-Thesis Option**

A student desiring the non-thesis option should declare this intention at the beginning of the first semester of graduate studies, and must declare it before the beginning of the second semester. In lieu of a thesis, students are required to complete three hours of 593 for satisfactory participation in a single research program for a period of 12 weeks and the writing of an original, creative, and well-written report.

A graduate advisory committee will be assembled at the beginning of the student's program. The committee consists of the major professor, who acts as chair of the committee, and at least two other faculty members. This committee approves the student's plan of study and the participation and report on research activity from 593. In addition, this committee administers and evaluates a comprehensive written examination that serves to integrate the student's coursework.

In addition to three hours of 593, a minimum of 30 hours of coursework is required. At least 20 hours must be taken in courses 501 or above. The student must also take at least 12 of the 30 hours in Plant and Soil Sciences courses, excluding Thesis 500. The student's committee may require additional coursework beyond the 30 hours if the student's progress or background indicates a need or deficiency. All students must take the following courses: 509 Scientific Communication (1 hr); 503 Seminar (1 hr); 511 Soil-Plant Relations (3 hrs).

All students pursuing a concentration in soil science must take three of the following courses: 512, 513, 514, and 516. All students pursuing a concentration in plant breeding and genetics or in crop physiology and ecology must take two of the following courses: 532, 551, and 553.

**THE DOCTORAL PROGRAM**

A minimum of 72 hours beyond the Bachelor's degree, exclusive of credit for Thesis 500, is required. Of this number, 24 hours must be Doctoral Research and Dissertation 600. A minimum of 26 hours must be completed in courses numbered above 500 exclusive of doctoral research and dissertation, of which 6 must be in courses numbered above 500. A minimum of 9 hours of graduate course work taken during the doctoral program must be outside the department in one or more cognate areas.

The student and the major professor identify a doctoral committee composed of at least four faculty members holding the rank of assistant professor or above, three of whom, including the chair, must be approved by the Graduate Council to direct doctoral research. At least one member must be from outside the department. The student and major professor must approve all coursework applied toward the degree, certify the student's mastery of the major field and any cognate fields, direct the research, and recommend the dissertation for approval and acceptance by The Graduate School.

**GRADUATE COURSES**

412 Soil Genesis and Classification (3) Soil genesis and classification; the differentiation of soils by the various processes of soil formation. 2 hrs and 1 lab.

413 Environmental Soil Chemistry (3) Composition and chemical properties of soils and processes that govern fate and behavior of chemicals in soil environment: clay mineralogy, soil organic matter; mineral weathering and stability; aqueous speciation; surface chemistry; ion exchange, adsorption and molecular retention; oxidation-reduction; and soil acidity, alkalinity, and salinity. Prereq: Soil Science and Introduction to Organic and Biochemistry or Organic Chemistry or equivalent. F

414 Soil, Land Use, and the Environment (3) Soil as an environmental component and properties affecting land use. Soil as resource in development planning; consideration of nonsoil impacts of soil selection for land use, soil survey and resource data in land use, recognition and prevention of soil pollution. Prereq: Soil Science or consent of instructor. Sp, A

415 Soil Hydrology (3) Physical relationships among soil, liquid, and gaseous phases of soil system. Relationships of soil properties to processes governing transport of water, and chemicals in soil. Prereq: Soil Science. 2 hrs and 1 lab. Sp

421 Physiology and Ecology in Agroecosystems (3) Plant physiology and ecology applied to crop production and management. Plant physiology and ecology principles related to crop production practices, including water use efficiency and management of sustainable agroecosystems. Prereq: Crop Science. 2 hrs and 12-hr lab. F

432 Bioclimatology (3) Soil energy budget; interactions between global, regional and local climates and biological systems; quantification of macro- and microclimate; microclimates and their modification; automated weather station data collection and analyses; biological responses to eddy diffusion and temperature and their effects on biological systems. Prereq: 1 yr (physical or biological science). Junior standing. Sp

433 Agricultural Pesticides (3) Regulation of pesticide development, manufacture, transportation, marketing and use. Structure, use, mode of action, degradation, and environmental impact of pesticides used in agriculture, forestry and related areas. Prereq: 1 yr biological sciences and 1 semester chemistry. 2 hrs and 1 lab. Sp

434 Fruit and Vegetable Crops (3) Principles of production systems to counter environmental stresses and to increase productivity of warm season vegetable crops, small fruit crops, and deciduous tree fruit crops. Storage of crops after harvest. Prereq: Introduction to Crop Science and World Crops or Crop Science. 2 hrs and 1 1/2 hr lab. F

435 Field and Forage Crops (3) Agronomic principles of crop production and management. Crop improvement, cropping systems, tillage, fertilization, pest management, harvest and utilization of major field and forage crops. Prereq: Introduction to Crop Science and World Crops or Crop Science. 2 hrs and 1 lab. Sp

453 Principles of Plant Breeding (3) Genetic principles and techniques used in crop improvement. Consideration of breeding methods for various crop introductions and systems and applications. Discussion of heritability estimation, genetic advances through selection and theory of population. Prereq: Advanced Genetics and Crop Improvement, Genetics and General Genetics. 2 hrs and 1 1/2 hr lab. Sp, A

471 Statistics for Biological Research (3) Application of statistics to interpretation of biological research. Notation, descriptive statistics, probability, distributions, confidence intervals, t and chi-square tests, analysis of variance, mean separation procedures, linear regression and correlation. Prereq: Mathematics 121 or equivalent. F

500 Thesis (1-15) P/NP only. E

501 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. F

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May be repeated. Maximum 3 hrs. F, Sp

507 Professional Development Seminar (1) (Same as Agriculture 507, Animal Science 507, Biosystems Engineering 507, Food Science and Technology 507, Ornamental Horticulture and Landscape Design 507.) S/N only. F

509 Scientific Communication (1) (Same as Agriculture 509, Animal Science 509, Food Science and Technology 509 and Ornamental Horticulture and Landscape Design 509.) F

511 Soil-Plant Relationships (3) Principles of mineral nutrition of higher plants: plant physiological characteristics that influence uptake of water and nutrients; functions of nutrient elements in plants, soil factors influencing nutrient availability to plants; important relationships at soil-plant root interface; and responses to adverse soil environmental conditions. Prereq: 413 or 431 or introduction to Plant Physiology. 3 hrs and 1 rec. F, A

512 Pedology (3) Physical and chemical weathering processes, factors of soil formation, soil forming processes. Prereq: 412 or consent of instructor. 2 hrs and 1 lab. Sp, A

513 Advanced Soil Chemistry (3) Chemical properties and processes that operate in soil environment: thermodynamics of soil solutions and surface chemistry of soils, adsorbate complex formation, solubility, electrochemical equilibria, geochemical modeling of exchange equilibria, surface functionality and reactivity, adsorption phenomena, and surface complexation modeling. Prereq: 413 or consent of instructor. Sp, A

514 Advanced Soil Physics (3) Theory and mathematical modeling of flow and solute transport in saturated and unsaturated soil; geochemical analysis of soil heterogeneity for practical properties multi-scale pore processes, anisotropy, heterogeneity, scale, and conceptualization of flow and transport equations for unsaturated zone. Prereq: Calculus III, 415, or consent of instructor. Sp, A

516 Soil Biology and Biochemistry (3) Soil organisms and their activities in soils: soil physical, chemical and biological cycling of important elements, organic matter dynamics, and applications of agricultural and environmental biology and biochemistry. Prereq: Soil Science. 2 hrs and 1 1/2 hr lab. F, A
Political Science

(College of Arts and Sciences)

MAJORS DEGREES

Political Science ................. M.A., Ph.D.
Public Administration ............. M.P.A., J.D.-M.P.A.
Patricia Freeiland, Head

Professors:

Carlisle, D. H. (Emeritus), Ph.D. ....... North Carolina
Cunningham, Robert B., Ph.D. .......... Indiana
Fitzgerald, Michael R., Ph.D. .......... Oklahoma
Freeiland, Patricia K.
Ph.D. ......................... Wisconsin (Milwaukee)
Gant, Michael M., Ph.D. .............. Michigan State
Gorman, Robert A., Ph.D. ............. New York
Lyons, William P., Ph.D. .............. Oklahoma
Peters, John, Ph.D. ................... Illinois
Pias, Hyram, Ph.D. ................... Utah
Robinson, Nelson M. (Emeritus), Ph.D........ Syracuse
Scheb, John M., Ph.D. ............... Florida
Smith, T. Alexander, Ph.D. .......... Ohio State
Stephens, Otis H. (Distinguished Prof.), Ph.D. .......... Johns Hopkins
Ungs, Thomas D. (Emeritus), Ph.D. .... Iowa
Welbom, David M. (Emeritus), Ph.D. .... Texas

Associate Professors:

Folz, David H. (Liaison), Ph.D. .......... Tennessee
Houston, David J. (Liaison), Ph.D. .......... Texas
Folz, David H. (Liaison), Ph.D. .......... Maryland
Fitzgerald, Michael R., Ph.D. .......... Oklahoma

Fitzgerald, Michael R., Ph.D. .......... Oklahoma
Freeland, Patricia, Head

The Department of Political Science offers the M.A., M.P.A., and Ph.D. The department also offers a dual program with the College of Law. Inquiries concerning all programs should be directed to the departmental office.

ADMISSION REQUIREMENTS

Three departmental recommendation forms must be submitted to The Graduate School, at least two of which must be completed by instructors at the institution most recently attended. In addition, scores on the general portion of the Graduate Record Examination must be submitted.

THE MASTER OF ARTS PROGRAM

A Bachelor's degree or its equivalent is required for admission. Normally an average grade of 3.0 is also required together with an average of 3.2 in the last two years of political science or social science. In addition, a composite score of at least 1100 on the verbal and quantitative parts of the GRE is normally required.

Students pursuing the Master of Arts degree may follow one of two options:

Thesis Option: (30 hours) Coursework preparation of a thesis, and an oral examination on coursework and the thesis, is required. At least 12 of these hours must be in political science, with 6 in the field of methodology. Six hours may be earned through thesis credit.

Non-Thesis Option: (36 hours) Coursework, plus a written comprehensive examination on all coursework is required. At least 12 of these hours must be in political science, with 6 in the field of methodology. Six hours may be earned through thesis credit.

THE MASTER OF PUBLIC ADMINISTRATION PROGRAM

The M.P.A. program is intended to prepare students for public service careers by acquainting them with management principles, analytical tools, and the ethical dilemmas they will face as public administrators. It consists of a total of 39 semester hours, including a core program, an elective specialization and a recommended internship.

Applicants for admission to the program must have a Bachelor's degree or its equivalent. Normally, an overall average of 3.0 and an average of 3.2 in the last two years of political science or social science courses is required. In addition, a composite score of at least 1100 on the verbal and quantitative parts of the GRE is normally required.

Students must demonstrate proficiency in the use of software applications for the personal computer. This requirement can be fulfilled by achieving a satisfactory grade in Political Science 586, Workshop in Computer Applications. Exceptions to this requirement will be considered on an individual basis.

The M.P.A. is a non-thesis program requiring 39 hours. Specific requirements include the following:

1. Core Curriculum (24 hours)
   a. General perspectives (9 hours) - 550 Public Administration;
   b. Organization Theory; and any one of the following: 539 State and Local Government; 540 Public Law; 546 Law and the Administrative Process; 548 Public Policy Process; 558 The Politics of Administration; 566 Ethics, Values, and Morality in Public Administration.
   c. Analytical skills (6 hours) - 512 Quantitative Political Analysis; 514 Research and Methodology in Public Administration.

2. Management (9 hours) - 560 Public Budgeting and Finance; and any two of the following: 562 Public Management, 584 Human Resources Management; 556 Policy Analysis.

3. Specialization (9 hours)
   a. A specialization is designed by the student in consultation with the coordinator of the M.P.A. degree program. Possible specializations include general government, individual, health, budgeting and finance, planning, natural resources, program evaluation, criminal justice, public relations, personnel, and others.

4. Internship (6 hours) Internships are arranged in consultation with the coordinator of the M.P.A. degree program.

5. Final Examination: A written final examination, which may be followed by an oral examination, is required.

DUAL J.D.-M.P.A. PROGRAM

The College of Law and the Department of Political Science in the College of Arts and Sciences offer a coordinated dual degree
Awards of Grades

For grade recording purposes in the College of Law and the Department of Political Science, grades awarded in courses in the other unit will be converted to either Satisfactory or No Credit and will not be computed in determining a student's GPA or class standing. The College of Law awards a grade of Satisfactory for an approved M.P.A. course in which the student earns a grade of B or higher and a grade of No Credit for any lower grade. The Political Science Department will award a grade of Satisfactory for an approved law course in which the student earns a grade of 2.3 or higher and a grade of No Credit for any lower grade. Normal academic record of the student maintained by the Registrar of the University shall show the actual grade assigned by the instructor without conversion.

THE DOCTORAL PROGRAM

The Ph.D. program prepares students for careers in college teaching, as well as careers in other occupations related to service in the public or private sectors. Applicants for admission to the program should normally have completed a master's degree in political science or a related field with a 3.5 GPA and have earned a composite score of at least 1100 on the verbal and quantitative parts of the Graduate Record Examination. Doctoral students admitted to the program must complete 84 hours beyond the bachelor's degree, including 24 hours of coursework beyond the master's degree, graded A-F, must complete 84 hours beyond the bachelor's degree, including 24 hours of coursework beyond the master's degree, graded A-F, and must pass a final oral examination on the dissertation. In addition, students must satisfy a research tool requirement. Usually, students meet this requirement by completing 12 hours of coursework numbered above 500 in empirical theory and research methodology. However, if a student's advisor and program committee certify that competency in a foreign language is more appropriate research tool, a foreign language can be used instead.

In addition to the total hours required for the degree, the following requirements must also be met:
1. At least 69 hours must be in political science courses.
2. At least 54 hours in political science must be in courses numbered above 500.
3. Completion of Political Science 510, 511, and 512.
4. Completion of at least three courses or seminars at UT in each of the three broad subfields in which the student takes examinations.
5. Completion of at least one course or seminar in each of six broad subfields available for graduate instruction in the department.
6. At least 6 hours must be earned in political science courses numbered above 600.
7. A total of 24 hours must be earned by writing the dissertation.

MINOR IN ENVIRONMENTAL POLICY

The department participates in a program designed to give graduate students an opportunity to develop an interdisciplinary specialization in environmental policy. See Economics for program description.

GRADUATE COURSES

430 United States Constitutional Law: Sources of Power and Protection (3) Analysis of judicial review, constitutional powers of the President and Congress, federalism, sources of regulatory authority, and constitutional protection of political and economic rights.
431 U.S. Constitutional Law: Civil Rights and Liberties (3) Analysis of current issues in civil rights and liberties including first amendment freedoms, equal protection, privacy and rights of accused.
442 Administrative Law (3) Legal dimensions of administrative power and procedures, and constitutional controls over administrators.
452 Black African Politics (3) Recent evolution and current political environment of Black African nations. (Same as Afro-American Studies 452.)
454 Government and Politics of China and Japan (3) Examination of the political setting, structure and political processes in China and Japan.
459 Government and Politics of the Soviet Union (3) Origins and development of Soviet political system, and study of selected policy areas.
461 Policy Making in Democracies (3) Comparative approaches to policy-making and policy-making in public policies.
463 Contemporary Middle East Politics (3) Governments and movements in Middle East, their characteristics, bases, and interrelationships.
470 International Law (3) Nature and development of international law and compliance. Function of international law in context of international conflict.
475 Ancient and Medieval Political Thought (3) Survey of major ancient political thinkers from Socrates to Marsilius of Padua.
476 Modern Political Thought (3) Survey of major western political thinkers from Machiaveli to Marx.
500 Thesis (1-15) P/NP only. E.
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when the student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E.
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 subfields. May be repeated with consent of department. Maximum 8 hrs.
533 Congress (3) Formal, empirical and theoretical approaches to and models of the institutional workings of Congress and the behavior of legislators.
535 Mass Political Behavior (3) Theoretical and empirical analyses of public opinion, political socialization, political attitudes and behavior, especially voting behavior.
in Education, concentration in school psychology, and (3) Ed.D. with a major in Education, concentration in educational psychology: collaborative learning. One program has application deadlines of 15 January and 15 October: Ph.D. in Education, concentration in adult education. Application reviews are completed throughout the year for both concentrations under the M.S. degree program with a major in Educational Psychology.

Admission Requirements
Admission requirements include completion of all items in the unit admissions packet and three letters of recommendation. Up-to-date GRE scores are required for application to all degree programs except the master's degree program. For all doctoral programs, a writing sample is also required.

GRADUATE COURSES

**432 The Disadvantaged Student: Psychoeducational Perspectives (3)** Theory and research regarding etiology, psychosocial behavior and appropriate interventions. Sp

**460 Self-Management in the Helping Professions (3)** Applications of self-management strategies to career, social, emotional, and health domains for both helping professionals and their clients. Prereq: Introductory course in psychology or consent of instructor. SNC or letter grade. Sp, Su

**500 Thesis (1-15)** P/NP only. E

**502 Registration for Use of Facilities (3-15)** Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. SNC only. E

**503 Problems in Lieu of Thesis (2-3)** May be repeated. Maximum 9 hrs. SNC only. E

**504 Special Topics (1-3)** Instructor-initiated course offered at convenience of unit on topics of current interest. May be repeated. Maximum 15 hrs. SNC or letter grade. E

**506 Internship in Adult Education** (3) Practical field experiences in selected settings under supervision of practitioner and departmental representative. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

**510 Psychological Theories of Human Development Applied to Education (3)** Theory and research on emotional, social, and intellectual development over life span with applications to educational and therapeutic settings. F, Su

**513 Reflective Practice in Education and Psychology (3)** Concepts, theories and processes of reflective practice applied to educational settings. E

**514 Individual Study in Adult Education (3)** Prereq: Consent of supervising instructor. Approval form must be completed in office of unit head. May be repeated. Maximum 6 hrs. E

**515 Educational Applications of Behavioral Theories of Learning (3)** Behavioral theories and research, conditioning, observational learning, and ethological learning as systems apply to student motivation, discipline and learning. F, Su

**516 Educational Applications of Cognitive Learning Theories (3)** Cognitive theory and research; social learning, attribution and information processing as applied to education. Su

**518 Educational Specialist Research and Thesis (3)** May be repeated. P/NP only. E

**520 Survey of Adult Education (3)** Historical development, philosophies of adult education agencies, associations, programs, issues, and literature illustrating process of adult education, and diversity of continuing education. Prereq: Consent of instructor. F, Su

**521 Program Development and Operation in Adult Education (3)** Theories and methods from research to practice in planning and operating adult education programs. Prereq: Consent of instructor. F, Su

**522 Adult Development (3)** Theory and research in adult development and change over lifespan and its implications for adult learning in formal and informal contexts. F, Su

**523 Post-Secondary Education for Adults (3)** History, evolution, philosophy, functions of post-secondary, sub-university institutions, their programs and clientele. Prereq: Consent of instructor.

**524 Continuing Professional Education (3)** Theories and concepts supporting design and management of educational programs for adults in professions. Prereq: 520 or equivalent.

**525 Characteristics of Adult Learners (3)** Key characteristics of adult learners, current theory and research on adult learning, and implications for teaching and learning. Prereq: Consent of instructor.


**527 Controversies in Adult Education (3)** Controversies confronting field of adult education: development of critical analysis skills by looking at controversies from different perspectives. Sp

**528 Psychological Aging (3)** Theory and research of aging and gerontology related issues: psychological, emotional, and physical changes that occur in later life stages of human development. Implications for treatment programs and policy. Sp

**529 Facilitating Adult Learning (3)** Theory, research, and practice related to working with adults in teaching-learning situations. Sp, Su

**530 Methods of Collaborative Inquiry (3)** Philosophical and theoretical frameworks for designing and conducting collaborative inquiry projects. Practice in conducting research. Prereq: Consent of instructor. Sp

**532 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. Sp

**541 Psychoeducational Assessment (3)** Direct, psychological and neuropsychological assessment methods in learning environments. Prereq: Admission to school psychology program or consent of instructor, and Counselor Education and Counseling Psychology 525 or equivalent. May be repeated. Maximum 6 hrs. SNC only. E

**542 Practicum in Psychoeducational Assessment (3)** Application of assessment skills to clients in learning environments. Coreq: 541 or consent of instructor. May be repeated. Maximum 6 hrs. SNC only. F, Sp

**543 Practicum in Consultation (3)** Application of consultative skills to educational settings. Prereq: 545. Sp

**549 Internship School Psychology (1-6)** Supervised employment in unit approved school psychology internship site. Prereq: Enrollment in school psychology program and consent of instructor. May be repeated. Maximum 12 hrs. SNC only. E

**560 Discipline and Conflict Resolution (3)** Applications of major models of discipline and conflict resolution strategies in development of constructive atmosphere for classroom learning. Sp

**572 Cognitive Education: Models and Approaches (3)** Models and approaches in field of cognitive education: research and theoretical support for various program components, critical variables of organized individual learning that affect success of implementation. Sp

**573 Meeting Needs of Nontraditional and Underachieving Learners (3)** Exploration of students' needs at any age and level of functioning and current changes up to their fullest potential. Causes of academic and motivational problems, and approaches to overcome them. Learning to learn, cultural alienation, and personal world view and interpersonal, social, affective and learning. Su

**574 Facilitating Group Change (3)** Practical issues of group change. Analysis of cases of individual experiences in all types of educational settings in relation to systems theory and collaborative learning theory. Needs of individuals and groups, relation of inside and outside change agents. F, Su

**585 Seminar in Gerontology (1)** (Same as Human Ecology 585, Counseling Psychology 585, Exercise Science 585, Nursing 585, Public Health 585, Social Work 585, and Sociology 585.)

**593 Independent Study (1-3)** May be repeated. SNC or letter grade. E

**600 Doctoral Research and Dissertation (3-15)** P/NP only. E

**602 Directed Research (1-3)** Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. SNC or letter grade. E

**604 Special Topics (1-3)** Instructor-initiated courses offered at convenience of unit on topics of current interest. May be repeated. Maximum 15 hrs. SNC or letter grade. E

**608 Advanced Seminar in Curriculum and Learning (5)** Team-taught interdisciplinary seminar; themes, trends, and issues in curriculum and learning. Reading and discussions based on significant research and scholarly publications. Sp

**612 Modes of Inquiry in Educational Research (3)** (Same as Leadership Studies in Education 612.)

**620 Seminar in Adult Education (3)** Issues in adult education, theories and concepts, philosophical positions, research trends and methodologies. Prereq: 520 or equivalent. E

**621 Advanced Seminar in Program Planning (3)** Concepts, principles, and theories related to program planning in adult education. Prereq: 520 or equivalent. E

**622 Advanced Seminar in Adult Development and Learning (3)** Prereq: 621, or equivalent. E

**630 Doctoral Seminar in Collaborative Learning (3)** Issues, theories, concepts and research in collaborative learning. Prereq: Admission to Ed.D. in Education, concentration in educational psychology. May be repeated. Maximum 12 hrs. SNC or letter grade. E

**635 Ethical, Legal, and Professional Issues in Psychology (3)** (Same as Psychology 635 and Counselor Education and Counseling Psychology 635.) F

**649 Advanced Internship in School Psychology (1-4)** Supervised experience as school psychologist in unit approved internship site for doctoral level students. Prereq: Enrollment in doctoral level school psychology program and consent of instructor. May be repeated. Maximum 9 hrs. SNC only. E

**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. May be repeated. Maximum 9 hrs. SNC only. F, Sp

**655 Research in Psychoeducational Studies (1)** Data analysis, collection, and interpretation. May be repeated. Maximum 9 hrs. SNC only. F, Sp

**663 Scale Construction (3)** Development, pilot testing, and revision of attitude inventories, rating scales, and other paper-and-pencil techniques for assessing beliefs, personality characteristics, social behavior. Prereq: Consent of instructor. E, F

**668 Practicum in Instructional Planning (3)** Development and management of course or program of instruction in educational psychology. Prereq: 665, or consent of instructor. E

**669 Internship in Educational Psychology (1-6)** Supervised employment in unit approved educational psychology internship site. May be repeated. Maximum 12 hrs. SNC only. E

**674 Practicum in Psychoeducational Studies (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. May be repeated. Maximum 9 hrs. SNC only. F, Sp

**677 Doctoral Seminar in Psychopathology (5)** (Same as Counseling Psychology 677, and Counseling Psychology 678.) F

**680 Practicum in Psychoeducational Studies (5)** 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. May be repeated. Maximum 9 hrs. SNC only. F, Sp

**685 Research in Psychoeducational Studies (5)** Data analysis, collection, and interpretation. May be repeated. Maximum 9 hrs. SNC only. F, Sp

**690 Doctoral Seminar in Educational Psychology (5)** Team-taught interdisciplinary seminar; themes, trends, and issues in curriculum and learning. Reading and discussions based on significant research and scholarly publications. Sp
THE MASTER'S PROGRAM

Graduate study leading to the M.A. degree in psychology is available with a concentration in experimental psychology. This program is appropriate for students who desire a master's degree as part of their progress toward a doctorate or for those who wish to complement a degree in a different field.

Admission

Any student with a B.A. or B.S. may apply to the Department of Psychology for admission to the master's program. All students must also submit scores from the Graduate Record Examination (general and subject).

Major Advisor and Committee

Initially, the Director of Experimental Psychology will advise the student. As soon as possible, the student should select an advisor and obtain his or her approval for registration. Subsequently, the advisor and student will select two additional faculty members to comprise the student's master's committee. Final committee approval comes from the Graduate Dean, upon recommendation by the Department Head.

Program Requirements

All students must complete 30 semester hours of graduate level courses in psychology. These hours must include 504-05, or Statistics 531-32 or an equivalent sequence; 565 or 420; six semester hours of Thesis 500; and twelve hours of dissertation research (500-05 or Statistics 531-32 or an equivalent sequence). The program requires a minimum of 78 hours of graduate level courses, including courses required by the program; at least 6 hours in courses outside the Psychology Department; and at least 24 hours of dissertation research (Psychology 504-05 or Statistics 531-32 or an equivalent sequence) in experimental psychology. Theses and dissertations are required to be acceptable to two members of the faculty or, if appropriate, to an advisory committee. This examination is comprised of an integrative review or theoretical paper and an oral exam or additional questions.

THE DOCTORAL PROGRAM

A student with a B.A. or B.S. may apply to the Department of Psychology for admission to the doctoral program with a concentration in experimental psychology or clinical psychology. The doctoral program with a concentration in therapy is offered through the Life Science Program. Doctoral study in industrial and organizational psychology is offered through the Intercollegiate Program in Industrial and Organizational Psychology, to which application is made through the Department of Management.

Experimental Psychology

The Ph.D. program in Psychology with a concentration in experimental psychology is designed to allow students to select from a variety of specializations oriented toward careers in research, teaching, and application of psychology in academic, institutional, or industrial settings. The program is flexible, individualized, and emphasizes a professional apprenticeship model of training. A full description of the program is given in the "Handbook for Students in Experimental Psychology," available from the department. The basic requirements are as follows:

1. Twelve semester hours of statistics and research (504-05 or Statistics 531-32 or equivalent and 6 additional hours in research methods or design).
2. Fifteen semester hours in experimental psychology (531 or equivalent and 4 courses from the following: 511, 512, 513, 543, 546 or 547, 550, 560, and 570 or 571).
3. Six semester hours of research practicum (509).
602 Seminar in Social Processes in Special Education and Rehabilitation (3) Social phenomena which influence impact of disability on person and on significant others. Implications for habilitation. Prereq: Admission to doctoral program or consent of instructor.

603 Seminar in Research in Special Education and Rehabilitation (3) Development and implementation of research. Independent research studies. Research proposal. Prereq: 9 hrs of research core and consent of instructor.

610 Internship in College Teaching and Supervision (3-9) Supervised practice in college teaching and supervision. Prereq: Admission to doctoral program or consent of instructor. May be repeated. Maximum 9 hrs. S/NP only.

620 Internship in Research in Special Education and Rehabilitation (3-9) Placement with professional engaged in theoretically-based research: public school, institutions, agencies or university settings. Prereq: 9 hrs. May be repeated. Maximum 9 hrs. S/NP only.

630 Internship in Institutional Leadership in Special Education and Rehabilitation (3-9) Advanced level field experiences under supervision of practitioner. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/NP only.

679 Special Topics (1-13) Prereq: Admission to doctoral program. May be repeated. Maximum 9 hrs. S/NP or letter grade.

693 Independent Study (1-3) May be repeated. S/NP or letter grade.

Religious Studies

(Course of Arts and Sciences)

Charles H. Reynolds, Head

Professors:
Dungan, David L., Th.D. Harvard
Hackett, Rosalind J. J., Ph.D. Aberdeen
Humphreys, W. Lee, Ph.D. Union
Linge, David E., Ph.D. Vanderbilt
Lusby, F. Stanley (Emeritus).

M.Div.

Colgate Rochester
Norman, Ralph V., Jr., Ph.D. Yale
Reynolds, Charles H., Ph.D. Harvard

Associate Professors:
Fitzgerald, James L., Ph.D. Chicago
Gwynne, Rosalind W., Ph.D. Washington
Hodges, John O., Ph.D. Chicago
Levinger, Miriam L., Ph.D. Harvard
Schmidt, Glya G., Ph.D. Pittsburgh

Assistant Professor:
Hulsether, Mark, Ph.D. Minnesota

A master's degree in Philosophy with a concentration in religious studies is available. Contact the department for details of this program. Graduate courses in religious studies provide opportunities for students in a variety of disciplines to pursue work in religious studies as a graduate concentration.

GRADUATE COURSES

405 Modern Jewish Thought (3) History, culture, and geography of the now Israel, portion of Levant from 1860 to present. Founding of modern state of Israel, political complex. Middle East, Israel culture and literature. Writing emphasis course. (Same as Judaic Studies 405.)

411 Modern Religious Philosophies (3) Religious implications of major Western thinkers and movements from Nicolas of Cusa to nineteenth-century German Idealists. (Same as Philosophy 411.)

412 Classical Indian Systems of Philosophy: The Moksha Tradition (3) Investigation of selected writings and philosophic problems of traditions of Samkhya, Yoga, Vedanta, Advaita, and Jainism. Prereq: 374 or 376 or consent of instructor. (Same as Philosophy 412.)

416 Jesus and Paul Compared (3) Central ideas and concepts of each person with equivalent concepts in the other. Advanced study of Gospels and Epistles of Paul, involving extensive independent research.

425 Seminar in Western Religions (3) Selected figures, themes, movements, and problems. Content varies. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

430 Seminar in American Religion (3) Selected figures, themes, movements, and problems. Content varies. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

440 Seminar in Comparative Religion (3) Selected figures, themes, movements, and problems. Content varies. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

490 Readings and Research in Religious Studies (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.


505 Religious Texts and Contexts (3) Critical study of texts and their interpretations: sacred texts, canons, religious traditions, and religious literature. May be repeated. Maximum 6 hrs.

506 Historical and Comparative Studies of Religions (3) Description and analysis of religious traditions, movements, and southern culture. May be repeated. Maximum 6 hrs.


513 Religion, the Arts, and the Media (3) Material and expressive culture, religion and media: mass communication technologies, popular culture, issues of representation, cultural studies methodologies. May be repeated. Maximum 6 hrs.

514 Religion and Healing (3) Ecology of religion, nature, shamanism, healing of body and mind, spirituality, religious dimensions of medical ethics. May be repeated. Maximum 6 hrs.

515 Critical Reflection on Religion (3) Analytical and constructive thought by scholars of religion and religious traditions. Selected topics in philosophy, religious thought, and modern and post-modern religious thought. Prereq: 374 or 376 or consent of instructor. (Same as Religious Studies 515.)

520 Readings in the Study of Religion (1-6) May be repeated. Maximum 12 hrs.

523 Topics in the History of Religions (3) Prereq: Consent of instructor.

533 Topics in Religious Thought (3) Prereq: Consent of instructor.

591 Foreign Study (1-15) See College of Arts and Sciences.

592 Off-Campus Study (1-15) See College of Arts and Sciences.

593 Independent Study (1-15) See College of Arts and Sciences.
Russian
See Modern Foreign Languages and Literatures

Small Animal Clinical Sciences
See College of Veterinary Medicine and Comparative and Experimental Medicine

Social Work
College of Social Work

MAJOR

DEGREES

Social Work.................................. M.S.W., Ph.D.

Karen Sowers, Dean

Professors:
Bloch, Mary H. (Emeritus), M.S.................................. Ohio State
Cetingok, Muammer, Ph.D........................................ Washington (St. Louis)
Fayer, Catherine, Ph.D............................................ Michigan
Fryer, Gideon W. (Emeritus), Ed.D................................ Columbia
Gislon, Charles A., Ph.D........................................... Washington (St. Louis)
Granger, Ben P. (Emeritus), Ph.D.......................... Brandeis
Hirayama, Hisashi, D.S.W........................................ Pennsylvania
McLaman, Georgiana (Emeritus), M.S.W.S.S.W.................................. Tennessee
Mullins, M. Kate (Emeritus), Ph.D.......................... Chicago
Noe, Roger M., D.S.W............................................. Tulane
Orten, James D. (Emeritus), D.S.W.............................. Alabama
Rubenstein, Hia (Emeritus), Ph.D............................... Illinois
Shatz, Eunice (Emeritus), Ph.D.......................... Brandeis
Sowers, Karen, Ph.D...................................... Florida State

Associate Professors:
Bell, William J., D.S.W............................................ Tulane
Campbell, Paul M., D.S.W........................................ Alabama
Combis-Orno, Terri, Ph.D........................................ Tulane
Cuthirds, C. Thomas, D.S.W..................................... Tulane
Duprey, David R., Ph.D......................................... Florida State
Egan, Marcia, Ph.D............................................. Maryland
Ehle, Judith (Liaison), Ph.D...................................... Tennessee
Nugent, William, Ph.D......................................... Florida State
Orme, John, Ph.D............................................ Washington (St. Louis)
Patterson, David, Ph.D........................................... Utah
Spicuzza, Frank, M.S.W.S.S.W................................ Tennessee
Vaughn, Hugh H., Ed.D.............................................. Tennessee

Assistant Professors:
Bowie, Stan L., Ph.D............................................ Barry
Collier, Jenny C., M.S.W......................................... Tulane
Cummings, Sherry, Ph.D....................................... Georgia
Davey, Timothy L., Ph.D........................................ Florida State
DeCoster, Vaughn, Ph.D.......................................... LSU
Marley, Marsha, D.S.W.......................................... Tulane
Neff, James A., Ph.D.......................................... Florida State
Page, Timothy F., Ph.D...................................... Western Michigan
Rocha, Cynthia, Ph.D......................................... Washington (St. Louis)
Rogge, Mary, Ph.D........................................... Washington (St. Louis)
Staudt, Marlys, Ph.D....................................... Washington (St. Louis)

Field Practice Coordinators:
Allen, Sandra (Memphis), M.S.S.W................................ Tennessee
Bales, Melinda (Nashville), M.S.S.W................................ Texas (Arlington)
Betz, Phyllis (Knoxville), M.S.S.W................................ Tennessee

THE MASTER'S PROGRAM

The Master of Science in Social Work program prepares social workers to provide professional leadership in: (1) clinical social work practice and (2) social work management and community practice. These objectives are met through a curriculum requiring of all students a professional foundation and a concentration in either clinical social work practice or social welfare management and community practice. The M.S.S.W. program is accredited by the Council on Social Work Education.

Admission Requirements

Admission to the master's program is based on the following requirements:

1. A Bachelor's degree from an accredited college or university with appropriate preparation in the social sciences. At least three-fourths of the applicant's undergraduate work should be in the social sciences, humanities, physical sciences, and other Arts and Sciences subjects. Applicants must have a course in human biology and demonstrate a liberal arts perspective through coursework in at least four of the following five areas: economics or mathematics; government; political science or history; sociology or anthropology; psychology; philosophy, literature, or the arts. Applicants with other academic backgrounds may request consultation to discuss ways that they can meet the requirements.

2. A grade point of 2.7 or higher on a 4.0 scale. Applicants falling below this average may be considered for probationary admission on the basis of supplemental evidence of the ability to perform at a satisfactory level. The University requires a minimum GPA of 2.7 for admission to the Graduate School.

3. General qualifications acceptable for entrance into the professional practice of social work.

4. All applicants must submit up-to-date scores from the Graduate Record Examination (general). Preference is given to applicants with a GPA of 3.0 or above in their undergraduate work with substantial preparation in the social sciences.

Advanced Standing

The University of Tennessee College of Social Work has an advanced standing program. Admission to advanced standing requires: (1) a D.S.W. from an accredited program, (2) an overall undergraduate GPA of 3.0 or greater, and (3) personal qualifications acceptable for entrance into the professional practice of social work. Students admitted into advanced standing are required to complete a minimum of 42 hours of study in either of the college's concentrations - clinical social work practice or social welfare management and community practice. These students will follow the curriculum plan and meet all requirements of the concentration during three semesters of study in the program.

Specific information about the advanced standing program is available from the College.

Extended Study

Planned part-time programs are available in all three branches of the college. Admission requirements are the same as for full-time study. Coursework can be completed over a three-year period.

Financial Aid

Students may apply directly to the University's Financial Aid Office for assistance such as the National Direct Student Loan or the Work-Study Program. Other stipends are administered by the College and awarded on the basis of financial need. Applications for these funds must be made to the Branch of the College the student will attend. A student must first apply for University assistance, since College funds are not considered supplementary to those of the University. Additional information about College stipends may be obtained from the College of Social Work.

General Requirements

1. The program requires successful completion of a minimum total of 60 semester hours including completion of the foundation curriculum (30 hours) and 30 hours in one of the two concentrations (clinical social work practice or social welfare management and community practice).

2. Students may select a thesis or non-thesis option. Students pursuing the thesis option receive six credit hours for successful completion.

3. Successful completion of a comprehensive exam or thesis defense.

4. An overall GPA of 3.0 or better on all graded courses and satisfactory performance in field.

The Professional Foundation Curriculum

All students must complete 30 semester hours in the foundation curriculum consisting of 24 hours in foundation classroom courses and 6 hours in field practice. The foundation is the initial phase of the master's program and contributes to the process of professional identification, and presents a comprehensive, broad base of theory, knowledge and skills from which to practice. The foundation classroom courses include: Foundations of Social Work Practice I, II and III; Human Behavior in the Social Environment I and II; Social Welfare Policy and Services; Social Work Research; and Social Work and Oppression. Students also complete a two-semester field placement, Field Practice I (6 hours). Upon successful completion of the foundation curriculum, all students must complete a minimum of 30 hours in the concentration curriculum including field practice (12 hours). Students select a concentration in clinical social work practice or social welfare management and community practice.

Clinical Social Work Practice: The clinical social work practice concentration focuses on students developing expertise in clinical social work practice with client systems including individuals, families and small groups, particularly with clients from high-risk and vulnerable groups. The concentration emphasizes theoretical and empirical knowl-
Second-year placements are selected according to the student's area of concentration, individual career interests, and educational needs. The student actively participates with the field practice coordinator and the educational committee in selection of the second-year placement. The second-year field placement experience focuses on the integration of social work knowledge and values, and emphasizes the acquisition and development of practice skills.

Students are responsible for meeting the requirements of their placement agencies in terms of office hours and workload coverage. This responsibility takes precedence over scheduled University breaks and may result in variations in holidays and office hours for the student.

Students receiving a grade of NC in field practice may not repeat the field practice.

Transfer Credits
Coursework equivalent to the first year of the master's program, completed in another accredited graduate social work program, is usually accepted toward degree requirements. Applicants must meet the admission requirements of The Graduate School and the College of Social Work. Transfer coursework must be approved as equivalent to required and/or elective courses taken for graduate credit and passed with a grade of B or better. An S (earned on an S/NC system) for the field practicum is also accepted. In addition, transfer courses must be part of an otherwise satisfactory graduate program (B average) and be approved by the department. This coursework must be completed within the two-year period prior to the receipt of the degree.

A maximum of 6 semester credits from work earned in disciplines other than social work may be transferred as elective credits. The student's academic committee must approve the request and the transfer credit must meet Graduate School requirements.

Proficiency Examination
Students in the master's program may earn a maximum of nine hours by proficiency examination, with the exception of field practice courses. Students interested in proficiency examinations are referred to The Graduate School statement describing the procedure for applying for examination.

THE DOCTORAL PROGRAM
The College of Social Work offers the Doctor of Philosophy with a major in Social Work.

The focus of social work education at the doctoral level is to foster the development of an attitude of scientific inquiry, knowledge of the scientific method, ability to extend the knowledge base of social work practice, and effective participation in leadership roles in social work education, research, and practice.

The emphasis of the doctoral program is upon:
- The analysis of direct intervention and social administration and of the interrelationships among all of them and their social policy, organizations, and community contexts.
- Research-based knowledge to inform and guide social work practice, social policy, and social welfare program development.

The program consists of foundation courses, elective courses, and dissertation research. The courses are available only in Knoxville. Students and their committees can develop a plan for completing their research in Nashville and Memphis based on the availability of dissertation resources.

Students have the opportunity to work in the Children's Mental Health Services Research Center, a National Institute of Mental Health research center, as part of their training. The Center is one of only three such centers nationwide and focuses on services to children who have experienced mental health problems associated with abuse, neglect, violence, and a variety of psychosocial problems.

Admission Requirements
The Ph.D. program is designed for students who have completed a master's degree in an accredited school of social work and have post-master's social work/social welfare experience. Applicants who do not meet these requirements, but believe they have equivalent credentials should contact the Chair of Ph.D. program for further information regarding admissions criteria.

General Requirements
1. A minimum of 63 hours beyond the master's degree including: a) completion of 24 hours of required coursework, b) completion of 15 credits of advanced electives, at least 12 of which are taken outside the department, and 9 of those 12 related to the dissertation, and c) completion of at least 24 credit hours of dissertation research.

2. Successful completion of qualifying and comprehensive examinations.

3. Completion and defense of the dissertation.

Curriculum
The curriculum of the Ph.D. program consists of foundation coursework, electives, and dissertation research. The foundation curriculum consists of 24 hours of coursework in the history and philosophy of social work, issues in direct service and administration and planning, areas of practice, and research methodology and statistics. Upon this foundation, students and their academic committees develop a plan of study consisting of coursework in Social Work and other departments of the University.

Typically, the foundation curriculum is completed and elective coursework begun during the first year of study, the elective requirement is completed and dissertation research begun in the second year of study, and dissertation research is continued in the third year of study. While it is generally expected that the coursework will be completed on a full-time basis, dissertation research can be completed on a planned part-time basis.

Specific courses required are 601, 602, 612, 613, 640, 650 and Statistics 531 and 532 or any two graduate level statistics courses approved by the Doctoral Program Chair.

Examinations
All doctoral students are required to pass a qualifying examination and a comprehensive examination. The qualifying examination covers the foundation curriculum. The comprehensive examination is administered by members of the doctoral committee and is designed for the student to demonstrate comprehensive knowledge of the major and cognate areas and
the dissertation topic. In case of failure of either examination, the student may request a retake. The result of the second examination is final.

Financial Aid
Financial aid is available to qualified students in the form of fellowships, scholarships, and teaching and research assistantships. Graduate assistantships and other forms of assistance are awarded on the basis of merit and interest to applicants who are accepted into the Ph.D. program.

MINOR IN GERONTOLOGY
Graduate students in the College of Social Work may pursue a specialized minor in gerontology. This interdisciplinary/interdisciplinary minor gives the student an opportunity for combining the knowledge about aging in American society with his/her major concentration. Please refer to Human Ecology for specific requirements.

ACADEMIC COMMON MARKET
An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S.W. and Ph.D. programs in Social Work are available to students who are legal residents of the state of Arkansas; the Ph.D. to residents of Delaware, Oklahoma or West Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE COURSES
NOTE: 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) F/P only. E

501 Foundations of Social Work Practice I (3) Survey of history, mission, and identity of profession; basic theory, values, and methods; and generic to social work practice at various systems levels. Assessment, planning, communication, intervention, and evaluation skills. Prereq: Admission to College or consent of instructor. F

502 Registration for Use of Facilities (3-15) Required for students not otherwise registered during any semester when the student uses University facilities and/or takes courses. May not be used toward degree requirements. May be repeated. S/NC only. E

503 Foundations of Social Work Practice II (3) Generalist practice with individual, family, and community systems. Ecological theory and frame understanding of systems and their adaptation to environments. Various social work roles and intervention strategies pertaining to each client system. Prereq: 501 or consent of instructor. F

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. Prereq: Completion of first semester of foundation or consent of instructor. F

505 Social Work Research (3) Research methodologies with respect to evaluation 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. Prereq: Admission to college or consent of instructor. F

506 Practicum in Social Work Research (3) Supervised practice in application of research methods to social work.
Doctor of Philosophy. The M.A. program includes a thesis and non-thesis option. The graduate program has concentrations in criminology, energy, environment, and resource policy; and political economy. The criminology concentration includes 505, 563, 653, and 655. The energy, environment and resource policy concentration includes 560, 563, 661, 662, and 665. The political economy concentration includes 504, 540, 541, 643, 644, and 645. Both the master's and the doctoral program allow for the construction of individualized programs of study. Detailed information may be obtained from the Director of Graduate Studies in Sociology. All incoming students will be advised by the Director of Graduate Studies. New students are admitted in fall semester only and applications must be received by the Graduate Admissions and Records Office by February 1.

ADMISSION REQUIREMENTS

1. Acceptable scores on the general Graduate Record Examination (verbal, quantitative, and analytical) are required. GRE scores in the subject area (Sociology) are requested but not required.

2. Three letters of recommendation (forms may be obtained from the department).

3. Completion of the appropriate previous degree (baccalaureate, preferably with a major in one of the social sciences, for the M.A. program; master's degree in one of the social sciences for the doctoral program).

THE MASTER'S PROGRAM

Thesis Option

A minimum of 30 hours beyond the baccalaureate degree, including 24 hours of coursework and 6 hours of Thesis 500, is required. Students must complete Sociology 521, 531, Statistics 531, and one foundation course (504, 505, or 560). At or near the end of all coursework, the student must take an oral examination on course material and thesis. The examination will be administered by the student's committee.

Non-Thesis Option

A minimum of 30 hours of coursework is required, including Sociology 521, 531, Statistics 531, and one of the following: 504, 505, or 560. Sociology 534, 622, and Statistics 532 are recommended. Sociology courses at the 400 level may be taken with the approval of the student's committee. A student's plan of study should follow one of the following approaches: Plan 1, 6 hours in one of the department's concentrations and 6 hours in a second area, including areas outside the department, subject to the approval of the student's committee; Plan 2, 12 hours in a special area of study approved by the student's committee and the department's Graduate Program Committee. Students are encouraged to prepare a paper synthesizing their knowledge of the concentration(s). Students who incorporate supervised field experience in their programs are encouraged to prepare a report based on those experiences that demonstrates their understanding of research, theory, and report writing. All students must take final written and oral examinations that include questions on their general coursework in theory and methods and on their special areas of study.

Subject to approval by the student's committee, up to 12 hours may be taken in courses outside the department for either program.

THE DOCTORAL PROGRAM

Coursework

Twenty-four hours of coursework beyond the master's degree are required (exclusive of SINC credits). Twelve hours of course credit in Sociology at the 600 level are required. Students who enter the program without the courses required for the M.A. degree (521, 531, Statistics 531) or their equivalents must take them as remedial work which does not apply to their residence. Students must complete Sociology 522, 534, 622, 633, or 636; and Statistics 532 or another advanced course in statistics. Completion of 9 hours in each of two concentrations is encouraged. A student who cannot achieve his/her educational goals within the department's concentrations may construct an individualized course of study subject to the approval of the student's doctoral committee and the Graduate Program Committee. Sociology courses at 400 level may not be taken without the consent of the student's advisor and the Graduate Program Committee. Six hours may be taken in related fields without petitioning the Graduate Program Committee for approval. The student's program may include a minor or cognate field.

Comprehensive Examinations

Written examinations in four areas are required (sociological theory, research methodology, and two substantive areas). Doctoral students are eligible to take the theory and methodology examinations whenever offered. Substantive examinations may be taken upon completion of theory and methodology examinations. Detailed information on examinations and examination options (generalist, specialist, and colateralist) may be obtained from the department.

Dissertation and Final Examination

A dissertation based on original research must be completed (24 hours). The candidate must pass an oral defense of the dissertation, including the theory and methodology related to the research, in accordance with the deadlines specified by The Graduate School.

MINOR IN ENVIRONMENTAL POLICY

The department participates in a program designed to give graduate students an opportunity to develop an interdisciplinary specialization in environmental policy. See Economics for program description.

MINOR IN GERONTOLOGY

Graduate students in the Department of Sociology may pursue a specialized minor in gerontology. This interdisciplinary/interdisciplinary minor gives the student an opportunity for combining the knowledge and skills of American society with his/her major concentration. Please refer to Human Ecology for specific requirements.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain
programs at UT Knoxville on an in-state tuition basis. The M.A. program in Sociology is available to residents of the state of Virginia (concentration in criminology only); the Ph.D. to residents of Florida (concentration in criminology only), or West Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE COURSES

405 Sociology of Sport (3) Social meaning, organization, and processes of sport. Prereq: 291 or consent of instructor.

414 Sociology of Health Care (3) Organization of health care facilities, staff-patient relationships, demographic characteristics, and prevalence of disease.

415 Sociology of Aging (3) How people and institutions change with age in relation to major social institutions; impact that rapidly increasing number of older people has on society, effect of society on older people.

446 The Modern World System (3) Critical examination of capitalist world-system as social system, its coherence, boundaries, regions, member countries, linkages, and patterns of conflict. Analysis of who gets what, who, and how in global political economy.


455 Foundationsof Criminology (3) Critical overview of contemporary developments in criminology theories of crime causation and theories of criminal behavior. Prereq: 350 or equivalent.

540 Occupations (3) Occupations in relation to individuals and society, technology, economic stratification, and social organizations.

541 Collective Behavior, Social Movements, Social Networks (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 methods of development: modernization, colonization, dependency. Comparative impact of various development paths upon selected aspects of social structure and change.

545 Delinquency and the Social Structure (3) How study of delinquency and juvenile justice is affected by changes in political and social structure of society, and institutional influences, and changing views of the role of rules.

546 Social Implications of Development (3) How laws and legal processes are affected by social change, social impact of legal sanctions, relations between law and social justice.

550 Organizational and Corporate Crime (3) Analysis of crime and deviance committed by organizations. Case studies of corporate and organizational crime, organizational dynamics of crime, theories of corporate crime, and organizational response to this type of crime by governmental regulatory agencies.

462 Population (3) Demographic factors and social structure: trends in fertility, mortality, population growth, migration, distribution, and composition; population policy.

464 Urban Ecology (3) Relation of humans to their urban environment: conservation and use of urban technology. (Same as Urban Studies 464.)

471 Sociolinguistics (3) (Same as English 471 and Linguistics 471.)

480 Diffusion of Agricultural Technology (3) (Same as Rural Sociology 480.)

500 Thesis (1-15) P/NP only. E

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N/C only. E

504 Sociological Foundations of Political Economy (3) Survey of contemporary sociological theories of political economy, sources of political economy, and conflict.


507 Foundations of Social Psychology (3) Current and classical theoretical perspectives in social psychology.

510 Teaching Sociology (3) Art and craft of teaching sociology from curricular considerations through teaching techniques. May be repeated. Maximum 6 hrs. S21 Sociological Theory (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.

540 Occupations (3) Occupations in relation to individuals and society, technology, economic stratification, and social organizations.

541 Collective Behavior, Social Movements, Social Networks (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 methods of development: modernization, colonization, dependency. Comparative impact of various development paths upon selected aspects of social structure and change.

545 Delinquency and the Social Structure (3) How study of delinquency and juvenile justice is affected by changes in political and social structure of society, and institutional influences, and changing views of the role of rules.

546 Social Implications of Development (3) How laws and legal processes are affected by social change, social impact of legal sanctions, relations between law and social justice.

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480 Diffusion of Agricultural Technology (3) (Same as Rural Sociology 480.)

500 Thesis (1-15) P/NP only. E

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504 Sociological Foundations of Political Economy (3) Survey of contemporary sociological theories of political economy, sources of political economy, and conflict.


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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.
Graduate courses in Speech Communication provide opportunities for students in a variety of disciplines to investigate how oral language can affect changes in the knowledge, the understanding, the ideas, the attitudes, or the behavior of other human beings.

**GRADUATE COURSES**

420 Communication and Conflict (3) Communication as significant factor in development, management, and resolution of conflict at interpersonal, small group, organizational, or societal levels.

425 Interpersonal Health Communication (3) Interpersonal communication in health care settings: provider-client interactions, social support groups, stigma and disease, and contemporary models explaining use of health-related information.

440 Organizational Communication (3) Organizational setting and variables of communication process that affect quality of human interaction both within and outside organization.

466 Rhetoric of the Woman's Rights Movement to 1930 (3) Historical and critical study of public address in campaign for women's rights in United States from 1830's through 1920's. (Same as Women's Studies 486.)

476 Rhetoric of the Contemporary Feminist Movement (3) Historical and critical study of rhetoric in campaign for women's rights in United States from 1940's to present. (Same as Women's Studies 476.)

570 Legal and Ethical Issues of Communication (3) Communication rights and responsibilities. Prereq: Consent of instructor.

590 Directed Reading and Research (3) May be repeated. Maximum 6 hrs.

591 Foreign Study (1-15) See College of Arts and Sciences.

592 Off-Campus Study (1-15) See College of Arts and Sciences.

593 Independent Study (1-15) See College of Arts and Sciences.

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**Sport and Physical Activity**

*(College of Education)*

**MAJORS**

- Human Performance and Sport Studies... M.S.

D. Kelley, Leader

**Professor:**

- Beitel, Patricia A. (Emeritus), Ed.D. ............. North Carolina (Greensboro)
- Lay, Nancy E. (Emeritus), Ph.D. ............. Florida State
- Watson, Helen B. (Emeritus), Ph.D. ............ Michigan

**Associate Professor:**

- Jones, Ralph E., Ph.D. .................. Toledo
- Kelley, Dennis R., Ph.D. ............. Georgia State

**Assistant Professors:**

- Borovjak, Patricia C., M.S. ............. Tennessee
- McCutchen, M. G., Ed.D. ............. North Carolina (Greensboro)

The Sport and Physical Activity unit participates in graduate programs leading to degrees, majors, and concentrations in:

- Master of Science

**Human Performance and Sport Studies**

**Sport Management**

- See Education under Fields of Instruction for full description of all degree requirements.

Elective courses are offered in dance. These courses are appropriate for students interested in management of dance studios, teaching dance, or dance performances.

The purpose of the unit is twofold: 1) to provide the opportunity for students to attain knowledge and to develop the essential skills to be successful sport managers, and 2) to coordinate and provide instruction in many physical activities designed to improve physical fitness and encourage future participation in lifetime sports.

**ADMISSION REQUIREMENTS**

Applicants are required to complete the unit application which will be sent to all persons upon their initial inquiry about the program. Preference will be given to students with an overall GPA of 3.0 or higher. Students with a GPA between 2.7 and 2.99 are encouraged to submit GRE scores.

The following retention policy applies to all graduate students seeking a degree in this unit:

1. Graduate students are required to maintain an overall GPA of 3.0
2. Any student who fails to maintain this GPA will be advised in writing by the unit leader to seek assistance from his/her advisor.
3. If a student's overall GPA falls below 3.0 for a second semester, the student will have his/her degree status revoked.

**GRADUATE ASSISTANTSHIPS**

A limited number of graduate assistantships are available for qualified women and men who are graduates of accredited colleges or universities. These assistantships are open to students in the master's program. Students interested in these opportunities should file their applications before February. Letters should be addressed to Coordinator, Graduate Assistantship Program, Sport and Physical Activity unit, The University of Tennessee, Knoxville, TN 37996-2700.

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**Dance**

**GRADUATE COURSES**

415 Teaching Creative Dance for Children (2) Theory, methods, materials and practical experience in presentation and integration of creative dance in grades K-6. Mini-teaching experience.

480 Dance Through the 19th Century (3) Dance of various societies and cultures from pre-history through 19th century.

490 Dance in the 20th Century (3) History and philosophy of dance.

495 Dance Pedagogy (3) Principles and methods of teaching dance with practical application in mini-teaching experience. Prereq: Upperclass or graduate standing and consent of instructor.
Statistics
(College of Business Administration and Intercollegiate Program)

MAJORS

Statistics .......................................................... M.S.
Business Administration ........................................ MBA, Ph.D.

Robert W. Mee, Head

Professors:
Bozdogan, Hamparsum, Ph.D. ................. Illinois
Guess, Frank M., Ph.D. ...................... Florida State
McLean, Robert A. (Emeritus), Ph.D. ......... Purdue
Mee, Robert W. Ph.D. ....................... Iowa State
Parr, William C., Ph.D. ................. Southern Methodist
Philpot, John W., Ph.D. ................. Washington University
Sanders, Richard D. (Emeritus), Ph.D. .... Texas
Sylwester, David L., Ph.D. ............. Stanford
Thapen, Charles C. (Emeritus), Ph.D. .... VPI

Associate Professors:
Leitnaker, Mary G., Ph.D. .................. Kentucky
León, Ramón V., Ph.D. ............. Florida State
Walker, Esteban, Ph.D. ..................... VPI
Younger, M. S. (Liaison), Ph.D. .......... VPI

Additional Intercollegiate Program Faculty:
Aikens, Charles, Engineering; Bunting, Dawey, Arts and Sciences; Chatterjee, Arun, Engineering; Dassart, Don, Education; Dyer, Carl, Human Ecology; Fitzpatrick, Een, Arts and Sciences; Fribourg, Henry, Agricultural Sciences and Natural Resources; Cant, Michael, Arts and Sciences; Gillson, Charles, Social Work; Gross, Louis, Arts and Sciences; Hacket, Schuyler, Education; James, Lawrence, Business Administration; Ladd, R. T., Business Administration; Lounsbery, John, Arts and Sciences; Lyons, William, Arts and Sciences; Mclemore, Dan, Agricultural Sciences and Natural Resources; Miller, Mark, Communications; Omne, John, Social Work; Plow, Donald, Arts and Sciences; Raiput, Balbhum, Arts and Sciences; Ramakrishnan, Jan, Arts and Sciences; Samejima, Fumiko, Arts and Sciences; Saxton, Arnold, Agricultural Sciences and Natural Resources; Singletary, Michael, Communications; Smith, Julius, Arts and Sciences; Wagner, Carl, Arts and Sciences.

THE MASTER'S PROGRAM

The M.S. program in Statistics provides students with the foundations in theory and practice required for careers in applied statistics. In addition to the education traditionally offered in such a program, the department offers a concentration in industrial statistics, which provides unique opportunities for experiences in practical applications of statistics. Through involvement in the University of Tennessee Institute for Productivity Through Quality and related programs, department faculty participate in a variety of consulting and research projects in industry. Students may supplement their classroom study with an industrial internship and participation in research projects dealing with industrial problems. Department faculty also collaborate with researchers from many academic disciplines and hold joint appointments with the College of Agriculture, the Computing Center and the Medical Center. Statistics graduate students may gain consulting experience by working with faculty involved in these consulting activities. All students are encouraged to participate in supervised internship or consulting activities as part of their graduate program.

Students with undergraduate or graduate degrees in other disciplines are encouraged to enter the program. The candidate's mathematics background should include differential and integral calculus of several variables. Individuals with limited mathematics background should seek departmental guidance regarding specific ways in which they may prepare themselves for the program by taking coursework as non-degree students. Requests for application forms and further information may be sent to the Director of Graduate Studies, Department of Statistics, 300 Cumberland House, Nashville, TN 37240, or to e-mail waldorf@utk.edu or to http://www.stat.utk.edu.

Admission Requirements

General admission requirements for The Graduate School are stated beginning on page 12. Applicants for Statistics must submit results of the Graduate Record Examination (GRE) general portion, although GMAT exam scores may be substituted. Applicants for the statistics program must have completed at least two years of college-level mathematics, including the calculus of several variables and matrix algebra, and be proficient in a computer language. Applicants whose native language is other than English must submit results of the Test of English as a Foreign Language (TOEFL).

Curriculum

A minimum of 33 credit hours must be completed for the master's degree. Required of all students are 6 hours in statistical methods, 6 hours in statistical theory and 1 hour in statistical computing. Students must complete a minimum of 21 hours in approved statistics courses, exclusive of consulting, internship, independent study, or thesis.

Thesis or Independent Study

The thesis option for the master's degree requires the student to complete 6 hours for the thesis. Alternatively, the non-thesis option requires a minimum of 3 hours for an independent study project.

Comprehensive Examination

Students must pass a two-part written comprehensive examination covering 1) theory and 2) methods. Upon failing either part of the examination, the student may retake it. The result of the second examination is final. For students writing a thesis, this examination must be passed before the thesis is defended.

INTERCOLLEGIATE GRADUATE STATISTICS PROGRAM

The Intercollegiate Graduate Statistics Program (IGSP) is a formal University of Tennessee academic program established to enable students to earn either a minor or an M.S. in Statistics simultaneously with a master's or doctoral degree in another department. Approved coursework taken to meet doctoral requirements in the student's home department may also be credited toward the M.S. in Statistics. Similarly, approved coursework in statistics taken to meet the requirements for a master's or doctoral degree in another department may also count toward the minor in Statistics. The program is open to graduate students in all departments which have an approved minor and/or M.S. joint major curriculum offered through the program. The program is administered by an Executive Committee, consisting of college representatives from all colleges with approved programs, with advisory input from the program faculty.

Degree Program

Hours in Approved
IGSP Courses

Master's in home department, minor in Statistics 9
Master's in home department, M.S. in Statistics* 24
Doctorate in home department, minor in Statistics 15
Doctorate in home department, M.S. in Statistics* 24

The M.S. in Statistics requires 33 hours.

Course options consist of courses in statistics, offered either by the Department of Statistics or by other departments, which have been reviewed and approved by the IGSP Executive Committee. Students taking an M.S. in Statistics must pass the two-part comprehensive examination covering statistical theory and methods. Students taking a minor in Statistics in conjunction with a doctorate in another field must pass a written comprehensive examination in Statistics, constructed and evaluated by the student's Examination Committee. No formal comprehensive examination is required of students earning a Statistics minor along with a master's or doctoral degree in another field beyond questions which the home department wishes to include as part of the comprehensive examination for the master's degree.

General Admissions and Degree Requirements

1. The student's home department must have approved a program of courses with the Executive Committee. That program will specify the sequences of statistics courses, chosen from the IGSP approved list, that are considered appropriate by the home department. Students who wish to participate in this program should contact their college representative or the Chair of IGSP in the Department of Statistics.

2. The student's graduate committee must include a faculty member of the Department of Statistics at the rank of Assistant Professor or above.

3. The student's Admission to Candidacy form must contain all courses required for the chosen degree program set off in a group and labeled "Statistics Courses Required for the Minor or M.S. in Statistics." Should the student not decide to apply for admission to the program until after completion of some of the courses, the student's major professor should file a program change with the cooperating departments and assist the student in obtaining a Department of Statistics faculty member to serve on the student's graduate committee.

Successful completion of the Statistics M.S. or minor is recognized by appropriate documentation on the student's transcript.
students who do not complete the requirements of the minor or M.S. will still receive academic credit for the statistics courses they have successfully completed.

**Business Administration Concentration**

For complete listing of MBA program requirements, see Business Administration.

**MBA Concentration:** Statistics.

Minimum course requirements are 571, 566, 572 with prereq or coreq of 561.

**Ph.D. Concentration:** Statistics.

This degree provides students with a broad knowledge of the field of statistics, the ability to apply statistics in practical situations to problems of business and industry and the ability to develop new statistical methods; all of which takes place while students are exposed to coursework in the basic functional areas of business.

Minimum course requirements are: 673, 666, 691, and 592.

**Academic Standards**

A graduate student in the College of Business Administration whose grade-point average falls below 3.0 will be placed on probation. If a student's grade-point average remains below 3.0, the student will be dropped from the program unless a higher cumulative grade-point average is 3.0 or higher at the end of the probationary period. The probationary period is defined as the next semester's coursework as established by the degree program for full-time students and the next two semesters' coursework as established by the degree program for part-time students.

**Graduate Courses**

500 Thesis (1-15) P/NP only. E

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

511 Statistical Decision Making (3) Concepts regarding collecting, organizing, and drawing conclusions from data; probability and decision making; statistical reasoning. Prereq: Admission to College of Business Administration master's program. Not available for Statistics majors.

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 not given for both 531 and 537. Prerequisites: Mathematics 114 or 115.

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. Prereq: 531. Sp

537 Statistics for Research I (3) Principles and application of statistical methods, taking into consideration with Integral calculus, with consideration of major statistical computing system. Probability and hypothesis distributions, testing and forming hypothesis. Prereq: Math 2110 and 2210. Credit not given for both 531 and 537. Prereq: 1 yr undergrad mathematics and 1 undergraduate statistics course. F

538 Statistics for Research II (1-3) General linear model as applied to multiple regression and analysis of variance. Prereq: 537. Sp

551 Introduction to Computing for Data Management and Analysis (1) UT Computing environment for teaching graduate statistics graduate students. Use of operating systems 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. Coreq: 531, 537 or 571, or consent of instructor. F

553 Introduction to Mathematical Statistics (3) Basic probability models and theory of distributions of random variables. Prereq: Mathematics 241. F

564 Theory of Statistical Inference (3) Introductory theory underlying common statistical procedures of hypothesis testing and estimation. Prereq: 537. Sp

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 tolerance, estimation of variance components, problems of measurement, statistical industrial applications. Prereq: 571 or equivalent. F


572 Applied Linear Models (3) Simple and multiple linear regression using matrix algebra and general linear model; polynomial regression, weighted least squares regression, variable selection techniques, multicollinearity, regression diagnostics. Prereq: matrix algebra. F

573 Design of Experiments (3) One-way ANOVA, multiple range tests, sources of variation, transformations, random and complete block designs, incomplete block designs. Prereq: 571 and matrix algebra. Sp

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. Prereq: 536 or 572 or consent of instructor. F

576 Principles of Statistical Process Management (1-3) Statistical and other techniques applied to management of organizational processes. Prereq: Consent of department head.

577 Graduate Seminar (1-3) Directed readings and active participation in colloquium program of Department of Statistics and of student's minor program. Prereq: Consent of statistics department director of graduate studies. May be repeated. Maximum 2 hrs. S/NC only. F

592 Internship (1-4) Supervised off-campus experience in application of statistical principles and methods in business, industry, or government. Written and oral report. Prereq: Consent of department head. Credit not given for both 592 and 593. May be repeated. Maximum 12 hrs. S/NC only. F

593 Independent Study (1-6) Faculty directed readings and investigation of specific topic in probability or statistics. Written report and oral presentation. Prereq: 2 courses in statistics and consent of the statistics department director of graduate studies. May be repeated. Maximum 8 hrs. S/NC or letter grade.

595 Statistical Consulting Project (1-8) Supervised experience helping on-campus management to manage data, and develop and perform analyses specific to designs and hypotheses. Discussion of activities in regular seminar meetings. Faculty written reports and/or detailed diaries. Prereq: 572 or 538. May be repeated. Maximum 6 hrs.

602 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, essential of Monte Carlo simulation, and resampling techniques. Prereq: Knowledge of programming language and 572 or consent of instructor.


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. Prereq: 573 or consent of instructor.

675 Categorical Data Analysis (3) Log-linear analysis of multidimensional contingency tables. Log-linear regression; Theory, applications, analysis of categorical data; software. Prereq: 1 yr graduate-level statistics, regression analysis and analysis of variance and familiarity with UNIX or other statistical computer software.

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. Prereq: 554 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 association among multivariate data, multivariate analysis of variance, multivariate regression and variable selection, multivariate cluster analysis, common principal component model, factor analysis model, covariance structural models with latent variables, multivariate cluster analysis. Prereq: Matrix algebra and statistical inference, or matrix methods with experience in interactive computing, or consent of instructor.

683 Special Topics in Statistics (1-3) Presentation of specialized topics in statistics. May be repeated. Maximum 6 hrs. S/NC only.

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. Prereq: Consent of instructor. S/NC or letter grade.
The Department of Theatre offers the Master of Fine Arts degree with a major in Theatre, concentrations in costume design, international performance studies in directing, lighting design, scenic design, and theatre technology. Not all areas of concentration accept applicants every year.

Applicants must have completed undergraduate degrees approximately equivalent to the requirements of those specified for degrees conferred by The University of Tennessee at Knoxville.

Three letters of recommendation and interviews with appropriate faculty are required of all applicants. Applicants for admission to the M.F.A. design/technical theatre programs must submit samples of their work. Auditions are required of M.F.A. degree acting applicants.

For detailed information about the graduate program, contact the Director of Graduate Studies, Department of Theatre.

THE MASTER OF FINE ARTS PROGRAM

At least 60 semester hours, 40 of which must be at the 500 level or above, are required for the degree of Master of Fine Arts with a major in Theatre, which is normally to be completed in three consecutive years of full-time residence. Theatre 501 is required in the first year of residence. Three additional hours at the 500 level are required from history, literature, or dramaturgy. Students in the M.F.A. degree program are evaluated annually by juried performance or portfolio submission. Continuation in the program is with the approval of the faculty committee for the M.F.A. degree program. Theatre 598, Projects in Lieu. of Thesis, and an oral defense of the project must be completed satisfactorily before the degree is conferred.

In addition to the core requirements listed above, each area of concentration has specific requirements:

Design/Technical Production

Required courses are at least 12 hours of Theatre 580, Design and Technical Production Seminar, and at least 5 hours in the projects courses. Theatre 401, Principles of Design is required in the first year of residence.

International Performance Studies in Acting

Theatre 520-21-22-23-24-25 Master Class are required, along with one course in directing and two hours each in voice and dance.

International Performance Studies in Directing

Theatre 530-31-32-33-34-35 Master Class are required along with Theatre 401 Principles of Design. Directing candidates are also expected to take art and music survey courses and language courses as advised.

REQUIREMENTS FOR SECOND MASTER'S DEGREE

Students admitted to the MFA program who have already earned a master's or a doctoral degree may apply up to 12 credit hours from the previous graduate program to the MFA degree with approval of the student's committee, the Dean of the College of Arts and Sciences, and the Dean of The Graduate School.

Any such credits applied from a previous graduate program would be from courses that are directly relevant to the student's MFA curriculum and must have been earned within the time limit (6 years) established for completion of the MFA degree.

GRADUATE COURSES

401 Principles of Theatrical Design (3) Fundamental principles of design: visual and structural relationships. Projects assigned to develop understanding and perception. Prereq: Introduction to Theatre.

409 Special Studies in Acting (3) Study and problems in make-up design and application: character analysis. Prereq: Introduction to Theatre.

420 Special Studies in Acting (3) Content varies. Exercises in selected concentrated areas such as styles, techniques, approaches, e.g., Shakespeare, movement, humor. Prereq: Advanced Acting and consent of instructor. May be repeated. Maximum 4 hrs.

423 Period Movement and Dance (2) Movement styles and dances from Renaissance to 20th century. Prereq: Stage Movement or consent of instructor. May be repeated. Maximum 9 hrs.

501 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N Only. E

510 Studies in Theatre History (3) Intensive study of selected topics in theatre history. May be repeated. Maximum 9 hrs.

512 Dramatic Literature Analysis (3) Dramaturgical approaches to major playwrights, using a variety of analytical techniques, such as Aristotelianism and Structuralism.

520-21-22-23-24-25 Master Classes in Acting (6,6,6,6,6) Master classes in acting techniques, voice, and movement. Theatre MFA students only.

530-31-32-33-34-35 Master Classes in Directing (6,6,6,6,6,6) Master classes in directing techniques. Prereq: Admission to MFA program.

536 Projects in Play Directing (3) Practical work in play directing involving various lengths and kinds of scripts. May be repeated. Maximum 9 hrs.

542 Advanced Scenery Technology I (3) Study and practice of theatrical woodwork; production participation required. Prereq: 250. Graduate credit to theatre M.F.A. students only.

543 Advanced Scenery Technology II (3) Study and practice of scenic technology and theatrical production; production participation required. Prereq: 250. Graduate credit to theatre M.F.A. students only.

542 Advanced Scenery Technology III (3) Study and practice of stage rigging for theatrical productions; production participation required. Prereq: 250. Graduate credit to theatre M.F.A. students only.

545 Scenery Painting (2) Introduction to scenic painting techniques, color theory, and composition. Gaining skill and understanding through studio experience. Prereq: Consent of instructor.

546 Advanced Costume Pattern Making (3) Advanced studies in patterning period costume. Development of historic patterns through flat patterns and other methods. Prereq: Consent of instructor.

547 Millinery for the Stage (2) Pattern making and construction techniques for hats from antiquity to present. Prereq: Consent of instructor.
Transportation

See Marketing, Logistics and Transportation

Veterinary Medicine

(College of Veterinary Medicine)

MAJOR DEGREE

Veterinary Medicine D.V.M.

Comparative and Experimental Medicine M.S., Ph.D.

THE PROFESSIONAL PROGRAM

Admission Requirements

To qualify for admission to the professional program of the College of Veterinary Medicine, a candidate must have completed at least the minimum pre-veterinary course requirements listed below. These may be completed at any accredited college or university that offers a curriculum in the pre-veterinary fields.

- Humanities and Social Sciences
  - English 6
  - Physical Sciences
    - Physics 8
    - General Chemistry 8
    - Organic Chemistry 8
    - Biochemistry 4
    - General Biology 8
  - Genetics 3
  - Cellular Biology 3
  - Total 66

*May include, for example, courses in English literature, speech, music, art, philosophy, religion, language, history, economics, anthropology, political science, psychology, sociology and geography.

**Exclusive of laboratory.

***It is expected that this requirement will be fulfilled by a course in cellular or molecular biology.

Admission Procedures

Admission of new students is for the fall semester, with first priority given to residents of Tennessee.

The College of Veterinary Medicine utilizes the Veterinary Medical College Application Service (VMCAS) for all applicants. Forms and instructions for making application for admission may be obtained beginning June 1, 1984 from the Office of the Associate Dean, The University of Tennessee, College of Veterinary Medicine, P.O. Box 1071, Knoxville, TN 37901-1071.

Note: The deadline for receipt of the completed application materials by VMCAS is November 1. NON-TENNESSEE APPLICANTS MUST HAVE A MINIMUM CUMULATIVE GRADE-POINT AVERAGE OF 3.2 ON A 4.0 SCALE FOR APPLICATION TO BE CONSIDERED.

Applications are accepted only from U.S. citizens or permanent residents of the U.S.

D.V.M. Curriculum

The curriculum of the College of Veterinary Medicine is a nine-semester, four-year program. Each class begins in August and graduates four years later in May. The first three years generally follow the traditional fall, winter and spring semesters with the summer break following years one and two. The final year of the professional curriculum begins immediately following semester six and is a continuous clinical rotation experience extending over 54 weeks.

- Clinical Problem Solving in Small Animal: veterinary medicine, students receive an area of interest and career opportunities.

D.V.M. Curriculum

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Development of a strong basic science foundation is emphasized in the first year. Courses consist mostly of preclinical subjects of anatomy (gross and microscopic), physiology, immunology, bacteriology, virology, and parasitology. Also included in the first year are clinical subjects of physical diagnosis and epidemiology. Consideration of subject matter is incorporated during this year.

The second and third years include the study of diseases, their causes, diagnosis, treatment, and prevention, and courses are taught in an organ system basis. The final year (three semesters) is devoted to intensive education in solving animal disease problems involving extensive clinical experiences in the Veterinary Teaching Hospital. Each student will participate exclusively in clinical rotations in the Veterinary Teaching Hospital and in required externships (preferably off-campus).

Innovative features of this curriculum include: eight weeks of student centered, small group, applied learning experiences in semesters one through six; three weeks of dedicated clinical experiences in the Veterinary Teaching Hospital in semesters three through five; and elective course opportunities in semesters four, five, and six which allow students to focus on individual educational/career goals.

Students enrolled in the D.V.M. program are required to complete at least 14 credit hours in the sixth semester and may register for up to 10 credit hours of graduate courses without enrolling in The Graduate School. These hours will be credited toward the D.V.M. degree. This semester of elective study offers a unique educational alternative for select students in the CVM and is intended to enhance professional growth, concentration in an area of interest and career opportunities.

In addition to education in the science and art of veterinary medicine, students receive instruction in paramedical subjects such as animal behavior, medical communication, professional ethics, jurisprudence, economics, and practice management.

The curriculum requires successful completion of 163 semester credits.

THE GRADUATE PROGRAM

The College also administers a graduate program involving all departments which lead to the Master of Science and the Doctor of Philosophy degrees. Because of the interdisciplinary departmental administration of the College of Veterinary Medicine, the faculty have opportunities in the graduate programs of other instructional units, including Animal Science (nutrition, physiology, genetics and animal management), Microbiology (bacteriology, virology and immunology), Ecology, Evolutionary Biology (environmental toxicology), Public Health, and Comparative and Experimental Medicine. (Refer to other sections of this catalog for a full description of these programs.)

The majority of the graduate students and graduate faculty of the College of Veterinary Medicine are involved in the Comparative and Experimental Medicine program. This program provides a wide spectrum of interdisciplinary training that prepares graduates for teaching and/or research careers in the health sciences.

PROFESSIONAL COURSES

801-02-03 Application Based Learning Exercise (ABLE) I, II, III (2,2,1) Small group, student-centered learning sessions with faculty facilitator for self discovery of new information. Week-long sessions based on specific clinical case or problem, and integration of basic science and clinical material.

804-05-06 Application Based Learning Exercise (ABLE) and Clinical Exposure I, II, III (2,2,2) Week-long small group, student-centered learning sessions with faculty facilitator for self discovery of new information; based on specific clinical case or problem; integration of basic science and clinical material. One week of clinical experience through participation in specific clinical rotations in Veterinary Teaching Hospital.

811 Infection and Immunity II—Bacteriology and Mycology (3) Fundamental aspects of microbiology and cell biology as they relate to pathogens, bacterial and fungal diseases of animals: antimicrobial actions and mechanisms of bacterial resistance. General approaches to diagnosis, treatment and prevention.