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. ......................... Oklahoma State
Fisher, Bruce D., LL.M ... George Washington
Kiger, Jack E. (Warren L. Slagle Prof. of Acct), CPA, Ph.D. ........ Missouri
Reeve, James M. (Deloitte & Touche Prof.), CPA, Ph.D. .............. VPI
Roth, Harold P., CPA, Ph.D. ........................................... Louisiana State
Stanga, Keith G. (Arthur Andersen Prof.), CPA, Ph.D. ................. Arkansas

Associate Professors:
Behn, Bruce K., CPA, Ph.D. ...... Arizona State
Carcello, Joseph V., CPA, Ph.D. Georgia State
Murphy, Daniel, CPA, Ph.D. ....... North Carolina
Posen, Imogene A. (Emeritus), CPA, M.S ................................ Tennessee
Townsend, Richard L., CPA, Ph.D. ...... Texas
Woodroof, Jonathan B., CPA, Ph.D. .................................. Texas Tech

Assistant Professors:
Rose, Anna S., CPA, Ph.D. ...... Texas A&M
Rose, Jacob M., Ph.D. .......... Texas A&M

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.

The M.Acc. degree program is a full-time, weekday program. The nature of the program precludes students from simultaneously working full-time outside of classes.

Admission Requirements

Application deadlines for international applications are accepted for fall semester only, and the application deadline is March 1. Applications received after March 1 will be considered as space allows. 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 and graduate records in areas other than accounting may earn the M.Acc. degree by completing prerequisites in accounting and other related disciplines to supplement the applicant's undergraduate background.

Students entering the program should be computer literate and are expected to have completed coursework in 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 Department of Accounting and Business Law. Applicants whose native language is not English must submit results of the Test of English as a Foreign Language (TOEFL).

For admission to the M.Acc. program, consideration is given to (1) applicant's academic records with particular attention to the last two years of undergraduate work, (2) scores on the GMAT, and TOEFL for those whose native language is not English, (3) internships and/or work experience and other activities that demonstrate potential for leadership, and (4) recommendations from professors and/or work supervisors. The admission decision is based on all factors that make up the total application; therefore, there is no automatic cut-off for either grade-point averages or GMAT scores.

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.

Students take 12 hours each semester and 6 hours in the first summer session.

Program requirements are:

Business Core (9-12 hours*):
Business Administration 502-03.

Accounting Concentration (12 hours)*: Three concentrations are available:
Accounting Services: 507, 514, 518, 519, 521, 531, 541.
Systems: 514, 519, 521, 541, 542, 549.
Taxation: 507, 531, 532, 533, 534, 539.

Students must take at least four courses from the same concentration including either 519 or 539.

Accounting Electives (6-9 hours*):
Elective courses to be taken from graduate accounting courses. Students who do not have an undergraduate Accounting degree must complete the following prerequisites: 311, 341, 411, 414, and 431 and include 521 in their graduate program. All prerequisites must be completed prior to the start of the graduate program.

*As approved by the Director of the Master of Accountancy Program.
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 student 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 capstone courses in each concentration as follows: 519 Seminar in Business Risk and Assurance Methodology and 539 Multi-Jurisdictional Tax Planning and Policy.

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 and other areas are selected to supplement the student's individual background and to prepare the student in an area of accounting specialization (financial, managerial, auditing, tax or systems). 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 semester's 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 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 Student Services.

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 Accounting by Business and Nonprofit Organizations or consent of instructor.

511 Operational Auditing and Consulting (3)
Approaches to evaluate an entity's efficiency and effectiveness in various settings and techniques used in consulting to provide entity competitive advantage.

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

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

514 Risk Management in Networked Business Environments (3)
Security, integrity, and cost management-oriented risks and control measures for variety of different business system platforms and applications. Centralized mainframe environments, distributed client/server environments, intranets/ extranets, electronic commerce, and ERP systems. Prereq: Admission to M.Acc. program or information management concentration, or consent of instructor. (Same as Information Management 511.)

518 Professional Standards (3)
Basic standards and contemporary issues relevant to assurance providers. Actual practice cases to illustrate application. Prereq: Admission to graduate programs or consent of instructor.

519 Seminar in Business Risk and Assurance Methodology (3)
Business risk and emerging methodology used by assurance providers. Current practice cases to illustrate application. Prereq: Admission to graduate programs or consent of instructor.

521 Seminar in Advanced Managerial Cost Accounting (3)
Analysis of conceptual and current issues; impact on development and practice of managerial and cost accounting. Approaches to management accounting, decision and control models, and planning and control under conditions of uncertainty. Prereq: Cost and Managerial Accounting and admission to a graduate business program or consent of instructor.

531 Tax Research Strategy, and Entity Taxation (3)

532 Corporate Taxation and Reorganizations (3)
Organization and structure, distress, reorganizations, and special problems in taxation of corporations and shareholders. Prereq: Admission to M.Acc. program or consent of instructor. Prereq or coreq: 531.

533 Taxation of Partnerships and S Corporations (3)
Formation, operation, termination, and other special problems of partnerships. Election for S Corporations, and conversion of partnerships and S Corporations. Prereq: Admission to M.Acc. program or consent of instructor. Prereq or coreq: 531.

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

539 Multi-Jurisdictional Tax Planning and Policy (3)
Analysis of international, state and local tax law as it pertains to business transactions. Identification of tax planning opportunities and design of strategies to accomplish tax planning objectives. Policy issues related to multi-jurisdictional taxation. Prereq or coreq: 531.

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

542 Electronic Commerce (3)
Essential technological, strategic, and information security issues for conducting business-to-business and business-to-consumer electronic commerce. Effects of internet on business and society. Prereq: 541 or Business Administration 506, or consent of instructor. (Same as Information Management 512.)

549 Systems Issues and Policies (3)
Seminar in emerging topics in information 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. May be repeated. Maximum 6 hrs.

600 Doctoral Research and Dissertation (3-15) F/ 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 or emerging topics in accounting, Prereq: Consent of Ph.d. program advisor. May be repeated. S/NC only.

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

Business Law

GRADUATE COURSES

511 Business Law and Professional Responsibility (3)
Legal framework and ethical implications of business transactions. Principles and practices 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

Communications .................................. M.S.,Ph.D.

Ronald E. Taylor, Head

Professors:

Hovland, Roxanne, Ph.D. ......................... Illinois

Taylor, Ronald E., Ph.D. ......................... Illinois
Agricultural and Biosystems Engineering

(College of Agricultural Sciences and Natural Resources)

MAJORS DEGREES

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

Ronald E. Yoder, Head

Professors:

Bledsoe, B. L. (Emeritus), PE, Ph.D. .......... Oklahoma State
Henry, Z. A. (Emeritus), Ph.D. .......... NC State
Luttrell, D. H. (Emeritus), Ph.D. .......... Iowa State
McDow, J. J. (Emeritus), Ph.D. .......... Michigan State
Mote, C. R., Ph.D. .......... Ohio State
Sewell, J. I. (Emeritus), Ph.D. .......... NC State

Shelton, C. H. (Emeritus), M.S .......... VPI
Tomkins, F. D., PE, Ph.D. .......... Tennessee
Wilhelm, L. R., PE, Ph.D. .......... Tennessee
Wills, J. B., M.S. .......... Tennessee
Yoder, R. E. (Liaison), PE, Ph.D. .......... Colorado State

Associate Professors:

Burns, R. T., PE, Ph.D. .......... Tennessee
Buschermohle, M. J., Ph.D. .......... Clemson
Freeland, R. S., PE, Ph.D. .......... Tennessee
Grande, G. F., Ph.D. .......... Tennessee
Hart, W. E., Ph.D. .......... Purdue
Pordesimo, L. O., Ph.D. .......... Penn State
Reman, D. R., PE, Ph.D. .......... Cornell
Wilkerson, J. B., Ph.D. .......... Purdue
Womac, A. R., PE, Ph.D. .......... Tennessee
Yoder, D. C., Ph.D. .......... Purdue

Assistant Professor:

Buchanan, J. R., PE, Ph.D. .......... Tennessee

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 engineering, mathematics, or one of the physical or biological sciences. A graduate program leading to the Master of Science in Biosystems Engineering Technology is also available to graduates of a recognized curriculum in agriculture or related fields. These programs emphasize the application of engineering and engineering technology to agricultural and other biological systems. Major focus areas of the program are machinery systems; environmental quality and resource conservation; instrumentation, sensor, and control systems; and bioprocessing. Prerequisite courses may be required depending upon the applicant's academic background and interest area within the program.

A completed departmental data sheet and three completed Graduate School Rating Forms are required in addition to The Graduate School application. International students must submit scores from the GRE general examination. Each applicant will be advised about any prerequisite courses before entering a program. The student's program of study must be approved by his/her advisory committee and must comply with the requirements of The Graduate School.

A significant aspect of graduate education beyond formal courses and thesis projects is active participation in the professional community which exists within academic departments at universities. Student/faculty seminars are one of the professionally rewarding activities of the community. Accordingly, all graduate students are encouraged to participate in Biosystems Engineering 505 and other departmental seminars regardless of whether they are registered for seminar credit.

THE MASTER'S PROGRAMS

Biosystems Engineering

Applicants accepted into the program must complete at least 30 semester hours to earn a degree. Of these 30 hours, 20 must be in courses numbered 500 or greater (6 hours of thesis plus 14 hours of other courses). Other specific requirements for the 30 hours are:

Biosystems Engineering 504 (1) or 507 (1), 505 (1), and other major subject courses 12
Coursework in computational methods (mathematics, computer science, statistics, or any course containing appropriate computational components that may be approved by the department) 6
Program electives 6
Thesis 500 6

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.

Biosystems Engineering Technology

Thesis Option: Applicants accepted into the program must complete at least 30 semester hours to earn a degree. Of these 30 hours, 20 must be in courses numbered 500 or greater (6 hours of thesis plus 14 hours of other courses). Other specific requirements for the 30 hours are:

Biosystems Engineering Technology 504 (1) or 507 (1), 505 (1), and other major subject courses 12
Coursework in computational methods (mathematics, computer science, statistics, or any course containing appropriate computational components that may be approved by the department) 6
Program electives 6
Thesis 500 6

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 accepted into the program must complete at least 33 semester hours to earn a degree. Of these 33 hours, 20 must be in courses numbered greater than 500. Other specific requirements for the 33 hours are:

Biosystems Engineering Technology 504 (1) or 507 (1), 505 (1), and other major subject courses 12
Coursework in computational methods (mathematics, computer science, statistics, or any course containing appropriate computational components that may be approved by the department) 6
Program electives 6
Coursework in special emphasis area 6
Capstone Experience (project and report, typically 508) 3

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. At 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.

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 greater than 500 (including 24 hours of course 600) and 6 hours of courses at UT numbered greater than 600. Other specific requirements for the minimum 75 hours are:

- Major subject courses (mathematics, computer science, statistics, or any course containing appropriate computational components; may be approved by the department) 18
- Program electives (504, 505 or equivalent courses) 21
- Seminar (504, 505 or equivalent courses) 3
- Dissertation 24

In addition to completing the minimum 75 hours of graduate credit required for a degree, each doctoral student must also pass a comprehensive examination as required by the Graduate School.

Biosystems Engineering

GRADUATE COURSES

403 Machine and Component Design (3) Nature of design; functional analysis; creativity; geometric and kinematic requirements; plane mechanisms, force, stress, deflection, and time analyses applied to design project components and assemblies. Prereq: Power Units and Machinery or consent of instructor. 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 synthesis of power transmission and control circuits. Prereq: Fluid Mechanics or Hydraulics. 2 hrs and 1 lab. F

432 Bioprocess System Design and Analysis (3) Design of processing, storage, and handling systems for biological materials. Mass and energy balances, product and waste characterization, equipment specifications, economic analysis, safety, and human factors. Design content: 3 hrs. Prereq/coreq: Processing Food and Biological Materials. I hr and 2 labs. F

451 Electronic Systems (4) Basic electronics with biological applications. Analog and digital circuits; sensing and controlling physical and environmental parameters; sensor selection and interfacing; signal conditioning; process control. Laboratory experiments and design projects. Prereq: Circuits and Electronic Components. 3 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 does not use 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 program; ethics and professionalism; departmental procedures and resources. (Same as Biosystems Engineering Technology 504.) S/NC only. F

505 Professional Communications Seminar (1) Review of reports on research, discussion of ideas, recent advances and current topics; presentations by students. Should be taken in last full semester before graduation. Prereq: 504. May be repeated in doctoral program. Maximum 2 hrs. (Same as Biosystems Engineering Technology 505.) S/NC only. E

507 Professional Development Seminar (1) Same as Agriculture and Natural Resources 507, Animal Science 507, Biosystems Engineering Technology 507, Food Science 507, Ornamental Horticulture and Landscape Design 507, and Plant and Soil Sciences 507.) S/NC only. F

510 Similitude in Design and Research (3) Dimensional analysis, similarity equations, theory of models; true, distorted, dissimilar models; prediction equations; interpretation of data; applications to machinery, soil and water structures, agricultural buildings and other agricultural engineering systems. Prereq: Engineering Science 321, 341, 2 hr and 1 lab. F

525 Soil Erosion and Sediment Yield (3) (Same as Environmental Engineering 525.)

530 Research Problems in Biosystems Engineering (1-3) Theoretical and experimental studies relating to current problems in agricultural engineering. May be repeated. Maximum 6 hrs. E

541 Principles of Compost Engineering (3) Comprehensive study of composting: survey of installed systems; thermodynamics of composting; biology of composting; kinetics of heat incineration; feed conditioning; aeration; substrate characteristics; process kinetics; and odor control. Design component. Prereq: Thermodynamics, heat and mass transfer. F

543 Instrumentation and Measurement (3) Modern instrumentation technique 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

545 Monitoring Hydrologic Phenomena (3) Application of instrumentation theory to monitoring hydrologic phenomena; strengths and weaknesses of current equipment and strategies; equipment operation and solution of environmental monitoring problems. Prereq: 543 and knowledge of basic hydrology. 2 hrs and 1 lab. (Same as Environmental Engineering 545.) Sp, A

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

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

555 GIS and GPS Applications to Biosystems (3) Theory and applications of Geographical Information Systems (GIS) and Global Positioning Systems (GPS); acquiring, managing, and analyzing spatial data. Site-specific agriculture, environmental site assessment, natural resource management, and hydrology. Prereq: Graduate standing in engineering, biological or physical sciences. (Same as Biosystems Engineering Technology 555.) 2 hrs and 1 lab. F

575 Applied Microbiology and Bioengineering (3) (Same as Chemical Engineering 575, Environmental Engineering 575, and Microbiology 575.)

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

620 Computer Simulation of Agricultural Systems (3) Scientific approach to digital simulation; system definitions and boundaries, formulation of models, algorithms and solution techniques, encoding of prediction equations models, algorithms and solution techniques, encoding of prediction equations and model output. Verification and validation of simulation model results. Prereq: Knowledge of computer programming language. 2 hrs and 1 lab. F

630 Feedback and Control Systems (3) Differential equations for physical state space systems: solutions, transforms, and system response: types of control, frequency response, system compensation, and system analysis. Application to agricultural systems. Prereq: 451 or equivalent. 2 hrs and 1 lab. F

650 Selected Topics (1-3) Lecture, group discussion, and individual study on specialized developments. May be repeated. Maximum 6 hrs. E

Biosystems Engineering Technology

GRADUATE COURSES

422 Food and Process Engineering Technology (3) Application of basic engineering principles to agricultural and food processes. Fluid handling, drying, evaporation, thermal processing, heating and cooling, refrigeration and air conditioning, and related equipment. Prereq: Basic physics. 2 hrs and 1 lab. F

432 Agricultural Machinery and Tractors (3) Functions, selection, matching, and management of agricultural machinery systems. Tractor power ratings, engine and transmission systems, hydraulic systems, hitching, and ballasting. Field and material capacity, field efficiency, cost analysis, and machinery replacement strategies. Functional analysis of tillage operations, planters and drills, no-tillage systems, hay harvest systems, forage and small grain harvesting, and cotton harvesting. Crop drying processes, off-road machinery safety considerations, and operator ergonomics. Prereq: Mathematics 123 Basic Calculus or 125 Finite Mathematics or consent of instructor. 2 hrs and 1 lab. Sp

442 Agricultural Waste Management and Pollution Control (3) Waste removal fundamentals, characteristics of animal manure; techniques for collection, transporting, storing, and utilizing livestock waste. Prereq: Calculus or Finite Mathematics or equivalent. 2 hrs and 1 lab. F

452 Small Internal Combustion Engines (3) Theory, concepts, and mechanics of small internal combustion engines; theoretical cycles; selection, operation, adjustment, troubleshooting and repair of single-cylinder engines. Prereq: Basic calculus or finite mathematics or equivalent or consent of instructor. 2 hrs and 1 lab. Sp

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; material handling and disposal methods. Prereq: Basic calculus or finite mathematics or equivalent or consent of instructor. 2 hrs and 1 lab. Sp

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

592 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student does not use 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) (Same as Biosystems Engineering 504.) S/NC only. E

505 Professional Communications Seminar (1) (Same as Biosystems Engineering 505.) S/NC only. E

506 Physical Phenomena (3) Properties of materials, fundamentals of hydraulics, principles of electricity, thermal phenomena, applications in biological syst
due to the flexibility of the program, it would be of value to any student interested in agriculture or adult and continuing education. The program may be completed under a thesis or non-thesis option with a concentration in either agricultural education or agricultural extension education. Candidates for the master's degree must meet the general requirements of The Graduate School and those stipulated by the department.

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 36 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.

GRADUATE COURSES

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

501 Creative Component in Lieu of Thesis (3) Capstone experience completed under supervision of major professor and committee. Individual project: literature survey; development of teaching software; development of curriculum materials; development of white paper; or other suitable project. Prereq: Consent of major professor. Non-thesis majors only. E

502 Registration for Use of Facilities (1-15) Registration for use of University facilities and equipment. May not be used toward degree requirements. May be repeated. S/N/C only. E

511 Extension History, Philosophy and Objectives (3) Historical and philosophical foundation of adult education in American agriculture, key figures, issues, legislative movement, farmer organizations and programs. Cooperative Extension Service, origin, legislation and growth and nature of present objectives and programs. Prereq: 211 Foundations of Agricultural and Extension Education or consent of instructor. E

521 Extension Program Planning and Evaluation (3) Theories and methods of program development and evaluation and their use in extension education: planning and conducting needs assessments; planning, organizing, implementing and evaluating extension educational program content and learning activities; development and interaction of county, state and federal extension plans of work; and principles, techniques and instruments used to identify, gather and analyze information to evaluate extension programs. Prereq: 211 Foundations of Agricultural and Extension Education, 511, or consent of instructor. E

522 Educational Technology in Agricultural and Extension Education (3) Advanced concepts and methods relevant to both formal and non-formal instructional methodologies. Processes by which professionals plan and develop instructional materials; development of course content and delivery methods. Prereq: 435, 436 Student Teaching in Agricultural and Extension Education or consent of instructor. E

524 Research Methodology (3) Social science research methods related to the collection of data in agricultural and extension education. Issues: research design, reliability and validity in measurement, sampling procedures, logic of analysis, scaling and measurement, and selection and interpretation of appropriate inferential tests of significance. Prereq: 436 Student Teaching in Agricultural and Extension Education, 511 or consent of instructor. E

525 Curriculum Development in Agricultural and Extension Education (3) Models, principles and procedures for developing curricula in agricultural and extension educational programs and scheduling learning activities used to implement these planned programs. Prereq: 435, 436 Student Teaching in Agricultural and Extension Education, or consent of instructor. E

526 Agricultural Education for First-Year Teachers (2) Developing competencies needed by first-year teachers for planning, organizing and conducting a program of vocational agriculture in local community. Group meetings in selected centers and visits by instructors. Prereq: 435, 436 Student Teaching in Agricultural and Extension Education, or consent of instructor. E

527 Adult Education Strategies in Agricultural and Extension Education (3) Methods of developing and implementing educational programs for adults in agricultural and extension education and related contexts: different learning of adults and children (andragogy vs. pedagogy); understanding and determining adult needs, priorities and motivation for participating in educational programs; adoption of new ideas by adult learners; methods and materials effective in teaching adults; developing favorable attitudes toward post-secondary education and life-long learning. Prereq: 211 Foundations of Agricultural and Extension Education, 511 or 346 Instructional Strategies for Teaching Agricultural Education or consent of instructor. E

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

532 Managing Organizations, Programs and Personnel (3) Theory and principles of management for individual and organizational effectiveness of agricultural organizations. Prereq: 511, 521, or consent of instructor. E

533 Agricultural Leadership Development (3) Identification of styles, roles and styles of leadership; development of leadership techniques and skills required in working with organizations and youth groups. Methods of resolving conflicts, of communicating, of guiding and evaluating; ethical considerations for leaders. Prereq: 435, 436 Student Teaching in Agricultural and Extension Education, 521 or consent of instructor. E

540 Communications Techniques in Agriculture (3) Elements of effective use of mass media in agricultural and extension education. Effective technical writing and communication in professional and technical fields. Presenting modern technology in contemporary communication: Internet/World Wide Web, presentation software, computer graphics/multimedia and videocommunicating. Prereq: 436 Student Teaching in Agricultural and Extension Education, 521 or consent of instructor. E

Agricultural and Extension Education

(Graduate School of Agricultural Sciences and Natural Resources)

MAJOR DEGREE

Agricultural and Extension Education M.S.

Roy R. Lessly, Head

Professors:
Lessly, Roy R. (Liaison), Ed.D. Oklahoma State
Todd, John D. (Emeritus), Ed.D. Illinois
Waters, Randol G., Ph.D. Pennsylvania

Assistant Professor:
Delpiero, Jennifer A., Ph.D. Oklahoma State

The Department of Agricultural and Extension Education offers a program leading to the Master of Science degree with a major in Agricultural and Extension Education. The program is designed primarily for teachers of Agricultural Education and staff employed by the Agricultural Extension Service. However,
Agricultural Economics

(College of Agricultural Sciences and Natural Resources)

MAJOR DEGREES

Agricultural Economics ........................................... M.S.

D. L. McLemore, Head

Professors:

Badenhop, M. B. (Emeritus), Ph.D. ....... Purdue
Brooker, J. R. (Liaison), Ph.D. .......... Florida
Cleland, C. L. (Emeritus), Ph.D .......... Wisconsin
Cross, T. L., Ph.D. .......................... Oregon State
Eastwood, D. B., Ph.D. ................ Tufts
English, B. C. Ph.D. __________________ Iowa State
Garland, C. D., Ph.D. ..................... Tennessee
Gerloff, D. G., Ph.D. ..................... Texas A&M
Jensen, K. L., Ph.D. ...................... Oklahoma State
Keller, L. H. (Emeritus), Ph.D. .......... Kentucky
Kenkel, P. L., Ph.D. ...................... Kentucky
Klindt, T. H., Ph.D. ...................... Kentucky
Leuthold, F. O., Ph.D. ................ Wisconsin
McLemore, D. L., Ph.D. ............... Clemson
McManus, B. R. (Emeritus), Ph.D. .... Purdue
Martin, J. A. (Emeritus), Ph.D. ........ Minnesota
Mundy, S. D., Ph.D. ..................... Tennessee
Nor, R. H., Ph.D. .......................... Illinois
Park, W. M., Ph.D. ........................ Virginia Tech
Penasco, B. H. (Emeritus), J.D. ...... Tennessee
Rawls, E. L. Ph.D. ........................ Virginia Tech
Ray, D. E. (Blasingame Chair of Excellence), Ph.D. .... Iowa State
Riley, J. B., Ph.D. .......................... Oklahoma State
Roberts, R. K. Ph.D. ...................... Iowa State
Smith, G. F., Ph.D. ...................... Tennessee
Whitley, T. J. (Emeritus), Ph.D. ........ Purdue
Williamson, H., Ph.D. ............... Missouri

Associate Professors:

Barefield, D. A., Ph.D. .................. Texas A&M
Lerson, J. A., Ph.D. ..................... Oklahoma State

Assistant Professors:

De La Torre Ugarte, D. G., Ph.D. .......... Oklahoma State
Tiller, K. H., Ph.D. ..................... Tennessee

THE MASTER'S PROGRAM

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. At least 27 hours of graduate credit must be earned in courses numbered at or above the 500 level.

Agricultural Economics

The thesis option in agricultural economics is designed to prepare students for analytical and research careers in the public and private sectors, and to prepare students interested in entering a Ph.D. program. In the thesis option, 15 hours of agricultural economics, 6 hours of economic theory, 6 hours of quantitative methods, and 6 hours of thesis are required. Each student must pass a final oral examination. In the non-thesis option, 24 hours in agricultural economics, 6 hours of economic theory, and 6 hours of quantitative methods are required. Each student must pass both written and oral comprehensive examinations.

Agribusiness

The agribusiness concentration is designed to prepare students to succeed in the public or private sectors of agriculture, including product manufacturing and marketing, natural resource management, farm management, and financial analysis. Fifteen hours of agricultural economics, 3 hours of economic theory, 6 hours of quantitative methods, 6 hours of business, statistics, or communications electives, and 6 hours of internship are required. Each student must pass both written and oral comprehensive examinations.

Rural Sociology

The rural sociology concentration is designed to prepare students for careers in the social sciences related to rural areas. Nine hours of rural sociology in the department, 6 hours of sociological theory, 3 hours of research methods, 3 hours of statistics, and 6 hours of thesis are required. Each student must pass a final oral examination.

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) Macro-finance, financial objectives, acquisition of debt and equity funds, capital investments, capital allocation, credit analysis, bankruptcy and lender loan application analysis, insurance strategies, computer applications, kinds and sources of agricultural credit, and financial intermediation. Prereq: Introductory Economics. F

420 International Agricultural 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; institutional aspects of international marketing of agricultural products. Prereq: Intermediate Agricultural Economics or consent of instructor. Sp

430 Agricultural Policy (3) Values, goals and policy problems, Economic rationale and effects of policy. Historical development and current characteristics of commodity, credit, food, and trade policy. Prereq: Intermedium 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 agriculture settings. Case study work on strategic planning; assessing cost structure using budgeting and break even analysis; evaluating profitability, liquidity, and solvency using financial statements; analyzing investments using capital budgeting. Prereq: Farm Business Management or consent of instructor. F

450 Agricultural Industry Analysis and Forecasting (3) Analytical tools for making agriculturial sector analysis, 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) Repeated. May be used for the student not otherwise registered during any semester when student uses University facilities. Prereq: Consent of instructor. E

506 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: Principles of Economics for program description.

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

525 Agribusiness Operations Research Methods (3) Applications of operations research methods and concepts for agribusiness. Theoretical background and applied conditions of each technique with emphasis on applications. Prereq: Computer and other applications of each technique for relevant agribusiness problems. Prereq: Basic Calculus and 524. Sp

530 Agricultural Policy Analysis (3) Evaluation of public policies 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 concepts in agribusiness resource allocation; evaluation of both static and dynamic issues; decision theory with application to agricultural firms; aggregate impact of firm decisions on industry. Prereq: 505 or equivalent. Sp

550 Advanced Agribusiness Marketing (3) Use of economic concepts in agribusiness marketing decisions. Analysis of agricultural markets; buyer behavior in forum and fiber markets; competitive environment. Profitability analysis of marketing and distribution decisions; market planning and strategy; product evaluation and new product opportunity decision. Prereq: 505, Regression and Correlation Methods or equivalent. Sp
Animal Science

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/NC only. E

595 Professional Internship (6) Supervised intern-ship experience with appropriate agribusiness firm.

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 related to change 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 social and community indicators, and rural development processes. Prereq: 360 or equivalent. (Same as Sociology 580.) Sp

593 Special Topics in Rural Sociology (1-3) Current sociological issues involving application of sociological theory. Prereq: 360 or consent of instructor. May be repeated. Maximum 6 hrs. E

Agriculture and Natural Resources

(College of Agricultural Sciences and Natural Resources)

GRADUATE COURSES

607 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, Food Science and Technology 507, Ornamental Horticulture and Landscape Design 507, and Plant and Soil Sciences 507.) S/NC only. F


512 Teaching Internship in Agriculture (1) Supervised experience in teaching; text preparation and evaluation of agriculture students. May be repeated. Maximum 2 hrs for M.S. students; 4 hrs for Ph.D. students.

Animal Science

(College of Agricultural Sciences and Natural Resources and College of Veterinary Medicine)

MAJOR DEGREES

Animal Science M.S., Ph.D.
Veterinary Medicine D.V.M.

Kelly Robbins, Head

Professors:
Barth, K. M. (Emeritus), Ph.D. ............... Rutgers
Bell, M. C. (Emeritus), Ph.D. .............. Oklahoma State
Bland, J. K. (Emeritus), Ph.D. ............. Ohio State
Blyth, J. C. (Emeritus), Ph.D. ............. Missouri State
Boyer, R. W. (Emeritus), Ph.D. ............ Florida State
Buckley, R. L. (Emeritus), Ph.D. .......... Wisconsin
Murneek, R. L. (Emeritus), Ph.D. ........ Wisconsin
Oliver, S. P. (Emeritus), Ph.D. ............. Ohio State
Richardson, D. O. (Emeritus), Ph.D. ...... Ohio State
Robbins, K. R. (Emeritus), Ph.D. ......... Illinois
Saxton, A. M. (Emeritus), Ph.D. .............. NC State
Shirley, H. V. (Emeritus), Ph.D. .......... Illinois
Tugwell, R. L. (Emeritus), Ph.D. .......... Kansas State

Associate Professors:
Backus, W. R., Ph.D. ..................... Tennessee
Grizzle, J. M., Ph.D. .................... Florida
Harper, F., Ph.D. ......................... Rutgers
Heitmeyer, R. W., Ph.D. .................... Maine
Mathew, A. G. (Liaison), Ph.D. .......... Purdue
Schrack, F. N., Ph.D. ...................... Clemson
Smith, M. O., Ph.D. ...................... Oklahoma State
Waller, J. C., Ph.D. ....................... Nebraska

Assistant Professors:
Edwards, J. L., Ph.D. ...................... Florida
Pighetti, C., Ph.D. ....................... Penn State
Richards, C. J., Ph.D. ..................... Kentucky
Salisbury, M. W., Ph.D. ..................... New Mexico State

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, mammary, and metabolic), and management with orientation towards beef cattle, dairy cattle, swine, and poultry. The Ph.D. program offers concentrations in animal nutrition, animal breeding, animal physiology, animal anatomy, and animal management. For specific information, contact the department head. It is recommended that all first-year graduate students enroll in 507 and 509. All first- and second-year students are required to enroll in 596 each fall and each spring term.

THE MASTER'S PROGRAM

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 (letters of recommendation, personal interview, etc.) that indicates ability to complete requirements for the M.S. Prerequisite courses may be required if the student has insufficient undergraduate background. If the student has an unsatisfactory grade-point average, acceptance may be on a probationary (non-degree) basis and a minimum of 9 hours of graduate coursework must be completed the first term with a minimum grade-point average of 3.0 for admission to the M.S. program.

The program requires 48 semester hours of coursework beyond the B.S. and a minimum of 24 hours of graduate coursework, of which at least 14 hours must be taken in courses numbered at or above the 500 level. 6 hours of thesis. Included in the course requirements are 1 hour of Agriculture 512 and a minimum of 3 hours in statistics. These statistics courses must be chosen from the 400, 500, or 600 level of courses approved for use in the Intercollegiate Graduate Statistical Program (ICGSP). The remaining 18 hours of 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 credit 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 12 hours at the 600 level in two non-management concentrations.
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.

A minimum of five faculty members will constitute the student's advisory committee, of which at least one must be outside Animal Science. The major professor will be the chairperson. The student and the major professor select a program of study depending on the student's area of concentration and professional goal. The advisory committee approves the coursework and the dissertation research proposal and deter-
520 Animal Physiology (4) Major body systems and interrelationships: nervous, sensory, muscular, endocrine, excretory, respiratory, locomotory, and integument systems. Prereq: 320 or equivalent. 1 hr and 2 labs. F

Animal Science-Veterinary Medicine

See College of Veterinary Medicine and Comparative and Experimental Medicine.

Anthropology

(College of Arts and Sciences)

MAJOR

DEGREES

Anthropology .................................... M.A., Ph.D.

Andrew Kramer, Head

Professors:

Bass, William M. (Emeritus), Ph.D. ................................ Pennsylvania

Faulkner, Charles H., Ph.D. ................................... Indiana

Harrison, Faye V., Ph.D. ..................................... Stanford

Howell, Bonita A., Ph.D. ..................................... Kentucky

Jantz, Richard L., Ph.D. ...................................... Kansas

Klippe1, Walter E., Ph.D. ...................................... Missouri

Kingsberg, Lyle, Ph.D. ....................................... Northwestern

Logan, Michael H., Ph.D. .................................... Pennsylvania

Parramore, Paul W. (Emeritus), Ph.D. ......................... North Carolina

Associate Professors:

Kramer, Andrew (Liaison), Ph.D. ...................... Michigan

Mills, Mary K., Ph.D. ........................................ Tennessee

Assistant Professors:

Ferreira, Mariana, Ph.D. ...................................... California

Qirk6, Hector N., Ph.D. ........................................ Tennessee

Research Associate Professor:

Chapman, J., Ph.D. ........................................ North Carolina

Research Assistant Professors:

Elam, J. Michael, Ph.D. ....................................... Missouri

Frankenberg, S. (Curator), Ph.D. ......................... Northwestern

The Department of Anthropology offers both the M.A. and Ph.D. degrees with concentrations in archaeology, biological anthropology, cultural anthropology, anthropological linguistics, and sociocultural anthropology. 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 may do so 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, zoology, 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 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 by the same date. The department requires a letter of recommendation from the applicant indicating career goals and reasons for selecting the University of Tennessee, 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:
   - 510 Method and Theory in Cultural Anthropology
   - 560 Theory in Archaeology
   - 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 in 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 during regularly-scheduled final periods in each core class and are graded by 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 GEEs.

4. All M.A. students must attend the graduate section of the visiting lecturer program. To ensure compliance with this requirement, each student is required to register for one credit hour of Anthropology 550 in the fall semester of each year and fulfill all requirements for the course as 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 formally, 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 full members of the student’s M.A. committee.

In addition to the requirements listed above, M.A. students have the option of completing a minor in statistics. The statistics minor requires 9 hours of coursework, normally Statistics 537 and 538 plus one additional course from an approved list.

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 UT who are conditionally accepted into the Ph.D. program can enroll as doctoral students the semester following conferment 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 interest and faculty areas of research. Application should be submitted to the Ph.D. program. APPLICATIONS SHOULD 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 SERVE 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). Admission to the program requires either:

1. Acceptance of a Master's degree in anthropology, or
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 specialization, 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, but no later than a full semester after admission to candidacy, the student must present a written dissertation proposal to the department head and advisor.

Research: 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 be 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.

The department does not accept completion of the intermediate (200 level) sequence of a language as a formal option for fulfilling the language requirement.

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

1. Comprehensive Written Examination: When the Ph.D. aspirant has completed all of the foregoing requirements and is judged by the committee to be prepared in the field(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.

Dissertation Research: This period of research and writing will be under the direct guidance of the candidate's major professor. The major professor will act as chairperson of the candidate's committee. The candidate must earn a minimum of 24 hours in Anthropology 600 and maintain continuous registration until the dissertation is accepted. The option of presenting publishable papers.
as a dissertation is not a formal option for the Anthropology Department.

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 exam, which is ordinarily held as a colloquium. 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 on an in-state tuition basis. The M.A. program in Anthropology is available to residents of the states of Delaware, Georgia, Louisiana, Virginia, or West Virginia. The Ph.D. program is available to residents of Alabama, Delaware, Louisiana, Mississippi, South Carolina, or West Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Student Services.

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 ethnographies. Prereq: 130 Cultural Anthropology.

411 Linguistic Anthropology (3) Basic linguistic concepts applied to research in cultural anthropology: investigation of relationships between language and culture. Prereq: 130 Cultural Anthropology or Linguistics 200. (Same as Linguistics 411.)

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

413 Dynamics of Culture (3) Major forms of culture change, ranging from evolution and diffusion to religious revitalization and political revolt. Continuity and change in living environments related through use of archaeological, ethnographic, and historical materials. Prereq: 130 Cultural Anthropology or consent of instructor.

414 Political Anthropology (3) Organization and dynamics of power and politics in both state and non-state level societies. Role of symbols, rituals, and ideologies in producing and reproducing social relations. Relationship between actors (individuals) and structures. Encapsulation of traditional political forms and systems within modern states. Prereq: 130 Cultural Anthropology or consent of instructor.

416 Applied Anthropology (3) Introduction to principles, practice and ethics of anthropology applied to practical problems in non-academic settings. Overview of career opportunities in various domains of applied anthropology. Prereq: 130 Cultural Anthropology or consent of instructor.

431 Ethnographic Research (3) Conceptual and practical exploration of methods and techniques cultural anthropologists use in fieldwork. Prereq: 130 Cultural Anthropology or consent of instructor.

435 Historical Archaeology Laboratory (3) Laboratory processes for processing, identifying, and interpreting of artifacts from historical sites. Artifactual material from historic East Tennessean sites used for class projects. Recommended prereq: Historic Archaeology.

440 Cultural Ecology (3) Concepts and methods in studying dynamic interaction between prehistoric and present day cultures and their environments: ecological theory, methods of analysis, and review of selected case studies. Prereq: 120, 130, 410, or consent of instructor.

462 Early European Prehistory (3) Origins and evolution of human culture in Europe through beginnings of settled life. Paleolithic and Mesolithic chronology and lifeways. Prereq: 120 or consent of instructor.

483 Form of Complex Civilizations (3) Development of complex societies in Old World from origins of agricultural economics to rise of States. Mesolithic, Neolithic, and Metal Age lifeways in Africa, Europe, and Asia. Prereq: 120 or consent of instructor.

484 Principles of Zooarchaeology (3) Basic osteological studies of major vertebrate groups; aboriginal use of animals in subsistence and culture. Identification and interpretation of archaeologically derived molluscan and vertebrate remains; introduction to laboratory use of comparative collections. Prereq: 120 or consent of instructor.

485 Urban Archaeology (3) Field archaeology and interpretation of archaeological remains on historic urban sites in the Southeast. Lectures and field and laboratory research on urban sites in East Tennessee. Recommended prereq: Historic Archaeology.

488 Human Osteology (4) Intensive examination of human skeletal remains. Prereq: 110 and consent of instructor. 3 hrs and I lab.


494 Primate Behavior (3) Social organization and behavior of selected species: patterns of mating, size, and structure; patterns of mating; other social interactions; communication; and cultural behavior. Application of primate studies to human ethology. Prereq: 110 or consent of instructor.

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

510 Graduate Research (1-5) Independent investigation of special problems in anthropology. May be repeated. Maximum 18 hrs.

552 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester who 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 Method and Theory in Cultural Anthropology (3) Development of primary theoretical orientations by cultural anthropologists; formulation of research problems and methods of collecting, analyzing, and utilizing data. Prereq: Consent of instructor.

511 Special Topics in Cultural Anthropology (3) Seminars for advanced students on topics of special interest: ethnomedicine, psychological anthropology, comparative social organization, religion, and art. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

512 Urban Studies in Anthropology (3) Process of urbanization examined cross-culturally; theory and method in researching urban communities; urban problems and applied anthropology.

514 Anthropology of Development (3) Application of anthropological knowledge to the study of community and national development programs. Analysis of anthropologists' roles, values, and ethical issues in selected case-studies. Study 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 based on rank, caste, race, ethnicity, and class; inequalities engendered by sex role structure. Construction 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 Zooarchaeology (3) Approaches to analysis and interpretation of archaeological fauna. Interpretation of faunal remains in relation to archaeological contexts. Basic osteology and shell characters of species encountered in aboriginal sites; collection and use of comparative collections. May be repeated. Maximum 6 hrs.

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

522 Seminar in Anthropology (3) Theoretical and practical issues in contemporary archaeology: ethnological and zooarchaeological research. Consent of instructor. May be repeated. Maximum 6 hrs.

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

550 Contemporary Issues in Anthropology (1-3) Review of recent directions in method and theory in anthropology. May be repeated. Maximum 6 hours.


561 Archaeological Resource Management (3) Federal and state agencies, public interest groups, and professional anthropologists in relationship of federal and state agencies, public interest groups, and professional anthropologists in relationship of federal and state agencies, public interest groups, and professional anthropologists in conducting research on prehistoric American Indian cultures in Southeastern United States; Tennessee prehistory.

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

581 Forensic Anthropology (3) Application of human identification methods to skeletal remains. May be repeated. Maximum 6 hrs.

582 Paleoanthropology (4) Fossil record from origin of hominids to 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; biological anthropology. Prereq: 480.

585 Laboratory Studies in Biological Anthropology (3) In-depth study of specific anatomical areas and populations. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

589 Anthropological Genetics (3) Application of population and quantitative genetic techniques to study of human and nonhuman primate populations. Prereq: Consent of instructor.
Assistant Professors:
Altwick, M., B.Arch....................... FFH
Betanzos, C., M.Arch.......................... Cornell
DeKaye, M., M.Arch.............................. Oregon
Dodd, G., Ph.D. ............................... Pennsylvania
French, R. C., B.Arch......................... Tennessee
Klinkhammer, B., M.Arch.................... RWTH (Aachen)
Stach, E., IPMA................................. Bauhaus
Thurwol, A., M.Arch............................ Columbia
Wares, S. M., M.F.A............................. Tennessee

MASTER OF ARCHITECTURE PROGRAM

The School of Architecture offers two tracks leading to the Master of Architecture degree. Track 1 is for students seeking the first-professional degree who already hold a Bachelor’s degree or an advanced degree in another field. Track 2 is for students with an advanced first-professional degree who seek to develop an area of specialization. Contact the Graduate Program Head for additional information.

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 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 is required. 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 to include an essay and three letters of recommendation are also required. A personal on-site interview is desirable but not mandatory.

The general portion of the Graduate Record Examination is required of all applicants. Applicants should take the GRE at least one semester in advance of application for admission.

Degree Requirements
Track 1 requires a minimum of 48 semester hours of undergraduate preparation and 60 semester hours of graduate coursework, taking approximately 3 1/2 years of full-time study. A minimum of 4 hours of architectural electives or approved electives from another discipline must be taken at the 500 level or above.

Track 2 requires a minimum of 30 semester hours of graduate coursework.

Both tracks require 6 hours of Thesis 590 with a public presentation and oral defense of the thesis. Retention in the program is contingent upon evidence of satisfactory progress toward the degree. Student's progress will be reviewed each semester by the Graduate Program Head. Any questions regarding progress will be reviewed by the Graduate Program Advisory Committee.

For further information, contact the School of Architecture.

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 on an in-state tuition basis.

The M.Arch. program in Architecture is available to residents of the states of Arkansas, Delaware, Kentucky, Mississippi, or West Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Student Services.

GRADUATE COURSES

403 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.

405 Descriptive Analysis of Historic Buildings (3) Identification and analysis of characteristic elements of buildings from various architectural periods, American architecture. Survey techniques.

406 Ideas in Architecture (3) Historical and critical review of major ideas of architecture through the ages. Open to all students.

410 History and Theory of Urban Form (3) Patterns of community development. Selected historical and contemporary examples. Basic urban design issues and exemplary design approaches through lectures, readings, assignments and studio work.

411 History of Architecture (3) Historical and critical review of major ideas of architecture through the ages.

412 Non-Western & Indigenous Architecture (3) Building responsive to climate, material availability, and economic level, as designed by anonymous builders. Pre-historic times to present throughout the world. Fertile Crescent; Indus Valley; Hindu, Buddhist, and Mughal architecture of India, China, and Japan.

413 Tennessee Architecture (3) History of architectural design in Tennessee. Reading assignements, lectures, discussions, and studio work. Historical change in urban form and design.

414 Non-Western & Indigenous Architecture (3) Building responsive to climate, material availability, and economic level, as designed by anonymous builders. Pre-historic times to present throughout the world. Fertile Crescent; Indus Valley; Hindu, Buddhist, and Mughal architecture of India, China, and Japan.

417 The International Style (3) Survey of architectural history of modern movement, primarily in Europe and America, 1900-1940.


420 American Architecture, 1840-1940 (3) Stylistic periods from Gothic Revival through twentieth century.

421 History of Landscape Architecture (3) Intellectual, societal, and geographical influences that provide theoretical basis for design throughout history. Selected examples of landscape architecture analyzed in terms of design.
Art

(College of Arts and Sciences)

MAJOR

Art ........................................................................................................ M.F.A.

Norman Magden, Director

Professors:

Blain, Sandra J., M.F.A. ......................................................... Wisconsin
Brakke, P. M., M.F.A. ........................................... Yale
Daehnert, H. R. (Emeritus), M.F.A. .............................................. Wisconsin
Darrow, J. F. (Emeritus), Ed.D. ....... Illinois State
Falsetti, Joseph S. (Emeritus), M.S. Ohio State
Goldenstein, M. B., M.F.A. ...................................................... Nebraska
Habel, Dorothy, Ph.D. ............................................................... Michigan
Kennedy, William C., M.F.A. ................................................. Wisconsin
Lee, B., M.F.A. .............................................................. Michigan
Loland, W. E., M.F.A. .............................................................. Tennessee
Livingston, P. R. (Emeritus), M.F.A. .............................................. Lyons
Lyons, B. (Liaison), M.F.A. ........................................................ Arizona State
Magden, Norman, Ph.D. ......................................................... Case Western Reserve
Martinson, Fred (Emeritus), Ph.D. .................. Chicago
Metros, Susan E., M.F.A. ...................................................... Michigan State
Moffatt, F., Ph.D. ................................................................. Chicago
Peacock, D. (Emeritus), M.F.A. ...................................................... Iowa
Rising, T. J., M.F.A. .............................................................. Nebraska
Stewart, F.C., M.F.A. ............................................................... Claremont
Wilson, D., M.F.A. .............................................................. California (San Diego)
Yates, S., M.F.A. ................................................................. North Carolina (Greensboro)

Associate Professors:

Brogden, Sally B., M.F.A. ................................................................ NY College of Ceramics (Alfred)
Hiles, Timothy, Ph.D. ................................................................. Penn State
Neff, A., Ph.D. ................................................................. Pennsylvania
Staples, Carolyn, M.F.A. ........................................................ Michigan State

Assistant Professors:

Eversen, Kevin, M.F.A. .............................................................. Ohio
Jung, A., M.F.A. ................................................................. Wisconsin
Odem, Jennifer, M.F.A. ............................................................ Florida State
Wright, S. E., Ph.D. ................................................................. Stanford

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 School of Art. In addition to the admission requirements of The Graduate School, the School of Art specifically requires the following:

1. A detailed letter of intent including statement requesting assistance, 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.
Further information is available by writing to the School of Art.

**M.F.A. Requirements**

A minimum of 60 hours is required:

1. Successful completion of 20 hours of studio in a concentration area. An inter-area program must be approved by the graduate faculty only after the second semester in residence. Ten hours of concentration must be in second year courses (512, 514, etc.).
2. A minimum of 9 hours of graduate level academic (non-studio) courses of which at least 6 hours are to be in art history.
3. Eleven hours of electives which may consist of any combination of courses offered by the University for graduate credit.
4. Art 599, Project in Lieu of Thesis (20 hours). A third year of semi-independent study. Student must have completed all other coursework prior to registration.

Four semesters (normally the first 40 hours) beyond 599. Thirteen hours are required in residence. An exception is made for working professional designers who may complete their first 20 hours, with the permission of the faculty, on a part-time basis. Residence is defined by the School of Art as (1) a minimum enrollment of 6 hours per semester and (2) use of School of Art facilities so that students are available for discussion and criticism.

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 599. 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.

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 unsatisfactory, 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 the state of Kentucky (concentration in graphic design only). Additional information may be obtained from the Admissions Specialist in the Office of Graduate Student Services.

**GRADUATE MINOR IN THE HISTORY OF ART**

A graduate minor in Art History may be arranged with the consent of the student's department, the instructor, 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**

**GRADUATE COURSES**

481 Museology I: Museums, Purpose and Function (3) Development of museums of art, history, natural and applied science. (Same as Anthropology 481.)
482 Museology II: Exhibition Planning and Installation (3) Exhibition concept development and implementation. Exhibition design and installation techniques. Publicity, production, design and framing, shipping and storage. Prereq: 481 or consent of instructor. (Same as Anthropology 482.)
484 Museology III: Field Projects (1-12) Special field projects: restoration, preservation, registration, and other related research on or off campus. Prereq: 481 and 482, and consent of instructor. May be repeated. Maximum 12 hrs. (Same as Anthropology 484.)
499 Special Topics (3) Student-initiated course offered at convenience of department. May be repeated. Maximum 12 hrs.
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
507 Professional Practices: Teaching Internship (1) Individual study in development of teaching methodologies for teaching studio courses. For students who are not GTAs. Prereq: Consent of instructor. May not be used toward degree requirements. May be repeated. S/N only. E
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. 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.

**Art Ceramics**

**GRADUATE COURSES**

424 Ceramics: Clays and Glazes (3) Clay bodies, glaze theory and calculation. Formulating, mixing and testing of clay bodies and glaze formulas. Prereq: Ceramics: Portfolio Review.
429 Ceramics: Special Topics (3) Student-initiated course offered at convenience of department. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.
521 Graduate Ceramics I (2-4) May be repeated. Maximum 12 hrs.
525 Graduate Ceramics II (2-5) 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 coursework and successful second year evaluation by graduate faculty. May be repeated. Maximum 20 hrs. S/N only. E

**Art Design/Graphic**

**GRADUATE COURSES**

405 Computer Enhanced Graphic Design (3) Exploration of new technologies and their significance to graphic design. Prereq: Intermediate Graphic Design I, Graphic Design Production with a grade of C or better, and consent of instructor. May be repeated. Maximum 6 hrs.
451 Advanced Graphic Design (3) Theory and techniques of visual problem-solving as applied to advanced applications of graphic design. Prereq: Intermediate Graphic Design II with a grade of C or better.
452 Graphic Design Seminar (3) Discussion of design and professional issues: politics, economics, and ethics for graphic designer. Culminates in student-initiated project. Prereq: 451 with a grade of C or better.
453 Advertising Illustration (3) Media and techniques as applied to advertising illustration. Prereq: Black and White Illustration and successful completion of any portfolio review.
454 Editorial Illustration (3) Media and techniques as applied to editorial illustration for books, magazines, and newspapers. Prereq: Black and White Illustration and successful completion of any portfolio review.
456 Graphic Design Practicum (3-12) Practical work experience in graphic design field. Only by prearrangement with department. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.
459 Special Topics in Graphic Design (3) Student-initiated course offered at convenience of department. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.
550 Studies in Graphic Design/Illustration History (3) Design and illustration ca. 1650 to present. Prereq: M.F.A. candidate or consent of department. May be repeated. Maximum 6 hrs.
551 Graphic Design I (2-6) May be repeated. Maximum 10 hrs.
552 Graphic Design II (2-6) May be repeated. Maximum 10 hrs.
553 Computer Enhanced Design (2-6) Prereq: Consent of instructor. 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 coursework and successful second year evaluation by graduate faculty. May be repeated. Maximum 20 hrs. S/N only. E

**Art**

61
Art History

GRADUATE COURSES

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

411 Art of South and Southeast Asia (3) Survey of art and architecture of Indian subcontinent and Southeast Asia from 2000 B.C. to 20th century. Major achievements of each period in religious, political, and social contexts.

415 Art of China (3) Survey of art and architecture of China from neolithic period to 20th century. Major achievements of each period in religious, political, and social contexts.

419 Art of Japan (3) Survey of art and architecture of Japan from neolithic period to 20th century. Major achievements of each period in religious, political, and social contexts.

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

431 Medieval Art of the West, 800-1400 (3) Western European art of the "Dark Ages," Romanesque, and Gothic periods. Writing-emphasis course. (Same as Judaic Studies 431.)

441 Northern European Painting, 1350-1600 (3) From courtyard art of late Middle Ages to Northern Renaissance. Jan van Eyck, Roger van der Weyden, and Durer; early printmakers. Writing-emphasis course.

442 Art of Northern Europe, 1600-1675 (3) Concentrated study of Bruegel, Rubens, Rembrandt, Georges de la Tour, Vermeer, Poussin, and Hals. 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.

454 Renaissance and Baroque Theory (3) Theory of Western art in early modern period: development and evolution in European Art during Renaissance and Baroque periods. Prereq: 172 and 173 Western Art, or consent of instructor.


462 Art and Archaeology of Ancient Africa (3) Historical art traditions of sub-Saharan Africa. Prehistoric rock paintings; art from archaeological sites and ancient kingdoms. First and second millennia B.C. for early ferraccota sculpture and rock paintings, 11th through 19th centuries A.D. for later ancient kingdoms.

463 Arts of the African Diaspora (3) Aesthetic, philosophical and religious patterns of African descendents of Brazil, Surinam, Caribbean and United States. Full range of art forms: sculptural and performance traditions, architecture, textile, basketry and pottery art forms.

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 movement. Analytical and discussion of individual works of art in light of contemporary writings by artists and theorists. Prereq: Western Art I and II, or consent of instructor.


476 History of 20th-Century Painting and Sculpture in Europe (3) Development of Modern and Post-Modern movements in Europe. Investigation of progression of abstraction through more recent conceptual trends. Analysis of work of individual artists such as Picasso, Matisse, and others.

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 1960's.

485 History of Printmaking (3) Prints from 15th century to present, 20th century in Europe and U.S. Prereq: 172 and 173.

486 Art of Indian Asia (3) History of Indian art: Central Asia and Southeast Asia.

489 Studies in Art History (3) Concentration in individually selected area. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

571 Studies in Medieval Art (3) Art and architecture of Middle Ages; major monuments from Byzantium or western Europe. Prereq: M.F.A. candidate or consent of instructor. May be repeated with consent of department. Maximum 6 hrs.

572 Studies in Italian Renaissance Art (3) Art and architecture of 14th, 15th, and 16th centuries in Italy. Early or High Renaissance or Mannerist periods. Prereq: M.F.A. candidate or consent of instructor. May be repeated with consent of department. Maximum 6 hrs.

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.

574 Studies in Modern Western Art (3) Selected topics in 19th- and 20th-century western art. Prereq: M.F.A. candidate or consent of instructor. May be repeated with consent of department. Maximum 6 hrs.

575 Studies in Modern American Art (3) Selected topics in 19th- and 20th-century American art. Prereq: M.F.A. candidate or consent of instructor. May be repeated with consent of department. Maximum 6 hrs.

576 Studies in Asian Art (3) Selected topics in Japanese or Chinese art. Prereq: M.F.A. candidate or consent of instructor. May be repeated with consent of department. Maximum 6 hrs.

579 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 9 hrs.

Art Media Arts

GRADUATE COURSES

431 Photography III (3-6) Individual development of photographic problems and techniques. Prereq: 293 and 331. May be repeated. Maximum 12 hrs.

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 433.)

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.

441 Digital Photography II (4) Continuation of exploration 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 I (2-4) May be repeated. Maximum 10 hrs.

532 Photography II (2-4) 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.

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

595 Visiting Artist Seminar (3) 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/N only. E
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 (3-6) Student- or instructor-initiated course 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.

563 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.

564 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 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/N only: E

Art Sculpture

GRADUATE COURSES

441 Advanced Sculpture (3-6) Individual development of sculptural problems and techniques. Prereq: 6 hrs of 200 level sculpture. May be repeated. Maximum 12 hrs.

449 Special Topics in Sculpture (3-6) Student- or instructor-initiated course offered at convenience of department. Prereq: Successful completion of any portfolio review. May be repeated. Maximum 12 hrs.

541 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/N only: E

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, 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 course offered at convenience of department. May be repeated. Maximum 12 hrs.

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.

470 Fibre (2-4) Intermediate to advanced. May be repeated.

480 Enameling (2-4) Intermediate to advanced. May be repeated.

490 Wood (2-4) Intermediate to advanced. May be repeated.

Astronomy

See Physics and Astronomy

Audiology and Speech Pathology

(College of Arts and Sciences)

MAJORS

Degree Options

Speech Pathology

Stephen Handel, Interim Head

Professors:

Asp, Carl W., Ph.D. .......... Ohio State

Carney, Patrick J., Ph.D. .......... Iowa

Hedrick, Mark, Ph.D. .......... Vanderbilt

Payne, Pearl A., Ph.D. .......... Tennessee

Swanson, Lori A., Ph.D. .......... Purdue

Thelin, J. W., Ph.D. .......... Iowa

Assistant Professor:

Erickson, Mary L., Ph.D. .......... Southern Cal

Fippen, Peter, Ph.D. .......... Wisconsin

Harkrider, Ashley, Ph.D. .......... Texas

McCullough, Gary, Ph.D. .......... Vanderbilt

Stark, Jack L., Ph.D. .......... Pittsburgh

Nabelek, Anna (Emeritus), Ph.D. .......... Poland

Nabelek, Igor V. (Emeritus), Sc.D. .......... Prague

Peterson, H. A. (Emeritus), Ph.D. .......... Illinois

Silverstein, B. (Emeritus), Ph.D. .......... Purdue

Peterson, H. A. (Emeritus), Ph.D. .......... Illinois

Swanson, Lori A., Ph.D. .......... Purdue

Thelin, J. W., Ph.D. .......... Iowa

Assistant Professor:

Erickson, Mary L., Ph.D. .......... Southern Cal

Fippen, Peter, Ph.D. .......... Wisconsin

Harkrider, Ashley, Ph.D. .......... Texas

McCullough, Gary, Ph.D. .......... Vanderbilt

Stark, Jack L., Ph.D. .......... Pittsburgh

THE MASTER'S PROGRAM

A major is offered in Audiology or in Speech Pathology. Admission to these graduate programs is competitive. Both of these graduate programs are accredited by the Council on Academic Accreditation of the American Speech-Language-Hearing Association.

The master’s degree program in speech pathology is a two-year program and consists of the completion of 42 semester hours of academic content courses (including thesis) plus practicum. A minimum of three academic courses must be completed during all semesters (terms) except one. That is, students must take a minimum of nine semester hours of academic courses for at least four semesters or terms and six semester hours in the other semester or term.

The required courses are 505, 511, 526, 561, 582, 539 or 541, 520 or 524, and at least two seminars from the following courses: 522, 523, 531, 526, or 568 and at least 15 hours of elective courses. Undergraduate coursework may not be substituted for seminar courses. Students who have not completed an undergraduate course in each of the following three areas: articulation/phonological processing disorders, voice disorders, and fluency disorders, must complete one graduate course in each of the three areas.

Students majoring in speech pathology may elect either the thesis or non-thesis option. The master’s program in speech pathology with thesis includes six hours of
500 credit in the preparation of an acceptable thesis representing original independent work, and a final oral examination. Students in the non-thesis option must pass a final written examination. Students in the thesis option in audiology may elect either the thesis or non-thesis option. Students in audiology are required to take 511. The master’s program with thesis will include a minimum of 33 semester hours of approved graduate credit in audiology, including 6 hours of 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 8 hours of thesis, and no more than 6 hours of practicum. Students in the non-thesis option must present a total of 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;
5. An area of major interest;
6. Coursework and the last year to full-time beyond the master’s degree with the first or more calendar years of graduate study.

Students are expected to develop an area of major interest which will be pursued through an examination of research literature. These areas include:

1. Normal, deviant, or disordered speech, language, or hearing.
2. Speech and language processes.
3. Related disciplines providing insight into human communication processes.
4. Technical skills in instrumentation and experimental design.
5. An area of major interest.
6. An area of major interest.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at any of the approved University of Texas on an in-state tuition basis.

The M.A. program in Audiology is available to residents of the state of South Carolina. The M.A. program in Speech Pathology is available to residents of the state of Delaware. 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 Student Services.

GRADUATE COURSES

431 Stuttering (3) Nature, appraisal and treatment. Prereq: 304 or consent of instructor.
433 Observation of Clinical Practice (1) Prereq: Observation internship, Fundamentals of Speech Disorders, Articulation Disorders, or consent of instructor.
434 Clinical Practice in Speech-Language Pathology (1-4) Prereq: 433 and consent of instructor. Enrollment for fewer than 2 hrs must have prior departmental approval. Maximum 5 hrs. Preregistration required.
455 Problems in Speech Pathology (1-3) Prereq: Consent of instructor.
473 Audiology II (3) Basic principles of clinical audiology; pure tone, speech, masking and overview of special audiological tests. Prereq. 371.
494 Audial Auralization of the Hearing Impaired (3) Psychosocial aspects, amplification components, characteristics, assistive devices, speech acoustics, speech perception, speech reading, parent-infant, preschool school years of children, communicative impairment, epidemology, effects of aging/medication on the elderly, and case studies. Prereq: Prereq: Phonetics and Acoustics of Speech and 473, or equivalents or consent of instructor.
500 Thesis (1-15) P/NP only. E
502 Registration for Use of Facilities (3-15) Required of the student to be registered for the 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: Prereq: Communicative Disorders, Phonetics and Acoustics of Speech, and 433, or equivalents or consent of instructor.
506 Neural Bases of Speech and Language (3) Structure and function of central and peripheral nervous systems, role in speech and language. Prereq: 306.
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 methodology, application of statistics, and completion of a proposal and hypothetical 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. May be repeated.
514 Practicum in Verbo-Tonal Habilitation (1-4) Prereq: 494, 550, or consent of instructor. May be repeated. Maximum 6 hrs.
515 Practicum in Aural Rehabilitation (1-4) Prereq: 473 and 494. May be repeated. Maximum 6 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, tests and rationale for testing, etiology, therapy considerations and prognosis for recovery. Prereq: 508 or equivalent or consent of instructor.
522 Seminar in Articulation and Phonological Processing Disorders (3) Current research in diagnosis and management of articulation 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. Prereq: 524 or equivalent or consent of instructor.
524 Traumatic Brain Injury (3) Advanced neurogenic-cognitive-linguistic emphasis. Medical and speech-language pathology rehabilitation issues associated with traumatic brain injury (TBI), including its affect on adult TBI population. Prereq: 506 and 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 (1-4, 1-4, 1-4) Prereq: 534 or equivalent and consent of instructor. 534 may be repeated. Maximum 6 hrs. Enrollment for less than 2 hrs must have prior departmental approval.
535-36 Advanced Clinical Practice in Speech-Language Pathology (1-4, 1-4) Prereq: 100 hrs clinical experience, consent of instructor. May be repeated. Maximum 6 hrs each. Enrollment for less than 2 semester hrs 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 hrs must have prior departmental approval.
539 Motor Speech Disorders (3) Neuromotor organization for speech production; types of motor speech disorders and associated neuromuscular symptomatology; diagnosis and management of motor speech disorders. Prereq: 506.
541 Pediatric Oromotor Disorders (3) Evaluation, diagnosis, and treatment of pediatric oromotor disabilities that affect normal feeding and speech skills. Prereq: 506 or consent of instructor.
542 Hearing Disorders (3) Effects of heredity, development, age, and physical aging on hearing. Prereq: 473 or equivalent or consent of instructor.
543 Amplification Technology (3) Description of hearing aid circuits, components and performance characteristics. Electroacoustical and real-ear analysis of hearing aids. Coupler material and geometry effects. Clinical experience in troubleshooting, repair, and construction of hearing aids. Prereq: 473 and 507, or equivalents or consent of instructor.
545 Sound Measurement Techniques and Hearing Conservation (3) Techniques of measurement and analysis of sound; hearing conservation in schools and industry. Prereq: Consent of instructor.

546 Advanced Audiology (3) Theoretical bases for behavioral audiology and auditory imittance measurement. Prereq: 473 or equivalent or consent of instructor.

547 Special Problems in Audiology (1-3) Prereq: 473 or equivalent or consent of instructor. May be repeated. Maximum 6 hrs.

548 Special Study in Audiology (1-3) Special reading, consultation, and research activities in field of audiology. May be repeated. Maximum 6 hrs.

549 Hearing Science (3) Study of psychoacoustic phenomena and how they relate to perception and diagnostic and psychoacoustic measurement. Prereq: Consent of instructor. May be repeated. Maximum 10 hrs.

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

551 Seminar in Speech Pathology (2-3) Current research on the field of speech pathology. Topics vary. Prereq: 461 or equivalent. May be repeated with consent of department. Maximum 9 hrs.

552 Special Problems in Speech-Language Pathology (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 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 8 hrs.

561 Child Language Disorders (3) Current literature on assessment and intervention techniques for young language learners. Prereq: 461 or equivalent or consent of instructor.

563 Language Disorders: Birth to Three (3) Overview of family-focused, transdisciplinary intervention process. Assessment/treatment of infants, toddlers, and preschoolers. Description of disabilities and resulting communicative consequences. 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 alternatives, and state and federal guidelines.

576 Electrophysiological Assessment of Auditory Function (3) Auditory-evoked potentials and their anatomical origin. Use of various evoked potentials in evaluation and determination of site(s) of lesion. Prereq: 473, 507, and 546, or equivalents or consent of instructor.

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


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

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 Advanced Aural Habilitation/Rehabilitation of the Hearing-Impaired (3) Study of grieving process, counseling, group and individual amplification systems, classroom/speech acoustics, central auditory problems, therapy methods for habilitation and rehabilitation, speech reading, school-based programs, programs for adults and the elderly; student research experience in Precon Phonetics and Audiology, and Psychology of Speech, 473 and 494 or equivalents or consent of instructor.

595 The Verbotonal System: Auditory/Speech Perception (3) Auditory theory, therapy procedures, and SLI/VAG amplification/filters for diagnosis/evaluation/remediation of spoken language/listening skills of hearing-impaired children/adults: use of rhythms, movements and suprasegmentals; special audiological tests, auditory filters, correct misarticulations through optimal listening; central auditory treatment; second (foreign) language through listening/spoken language; relationship of concepts to conventional concepts/practice; student research reports. Prereq: Phonetics and Audiology of Speech, 473 and 494 or equivalent or consent of instructor.

600 Doctoral Research and Dissertation (1-15) Prerequisite: A Ph.D. degree or equivalent or consent of instructor.

601 Experimental Phonetics (3) Acoustical and perceptual analyses of speech production and overall oral communication. Prereq: 517 or consent of instructor.

602 Psychoacoustics (3) Auditory perception and reception of non-speech and speech stimuli. Prereq: 517.

603 Language Science (3) Seminar of theories and paradigms of research on acquisition and use of language: phonology, syntax, semantics and pragmatics. Prereq: Graduate standing and consent of instructor.


608 Seminar in Speech Science (2) Experimental areas: speech physiology, acoustic analysis, recognition, perception and intelligibility of speech, communication theory and psychoacoustic measures of speech and language. Topics vary. Prereq: 601 or consent of instructor. May be repeated. Maximum 6 hrs.

610 Seminar in Hearing Science (2) Advanced study of perception of non-speech acoustic signal, detectability, pitch, loudness, differential 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 theses and related journals. Generation of experimental designs. Prereq: Consent of instructor.

625 Advanced Seminar in Neurologically-based Communication Disorders (3) Topics vary. Prereq: 520, 539, and 524, or consent of instructor. May be repeated. Maximum 6 hrs.

650 Advanced Seminar in Audiology (2) Topics vary. Prereq: Consent of instructor. May be repeated. Maximum 8 hrs.

652 Advanced Seminar in Speech and Language (2) Topics vary: abstractions of voice, articulation, speaking time and rhythm, language development or use, and language symbolism. Prereq: Consent of instructor. May be repeated. Maximum 8 hrs.

659 Directed Study in Speech Science (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.

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

Aviation Systems
(UT Space Institute)

MAJOR

DEGREE

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. ............... Tennessee
Mason, A.A. (Emeritus), Ph.D. ................. Tennessee
Paludan, C.T. (Emeritus), Ph.D. .............. Denver
Wu, J.M. (Emeritus), Ph.D. .................. Cal Tech
Young, R.L. (Emeritus), Ph.D. ............... Northwestern

Associate Professors:

Lewis, William D., Ph.D. ...................... Georgia Tech
Solies, U.P., Ph.D. ........................... Tennessee

Research Assistant Professor:

Stellar, Frederick W., M.S. ................. Georgia Tech

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. Recent 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 program involves a minimum of 30 semester hours credit while the non-thesis program involves a minimum of 33 semester hours credit.

THESIS OPTION

The thesis program involves satisfactory completion of the following requirements:
GRADUATE COURSES

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

501 Aviation Systems: An Overview (3) Aviation systems, present and future. Socioeconomic base, aerospace and propulsion technology, meteorology, air traffic control, airport community interface, and technological trends and developments pertinent to present status and future development of air transportation.

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

503 Air Vehicles (3) Current capabilities and future requirements for civilian and military air vehicles. Parameters significant for air vehicle selection. Integration of air vehicle into aviation systems. Prereq: 501.


505 Governmental Policies for Aviation (3) Theoretical and legal basis for economic and governmental regulation of aviation. Historical and legislative development of aviation regulatory agencies, organizational structure, administrative and enforcement procedures. Prereq: 501.

506 Aircraft Design (3) Design process, compromise of conflicting requirements, economical, industrial, and legal aspects. Definition of mission requirements, synthesis and optimization techniques, safety and reliability. Systems integration, standards and regulations, teamwork and decision-making process.

510 Special Topics in Aviation Systems (3) Current problems. Prereq: Consent of instructor. May be repeated with consent.


650 Project in Aviation Systems (3) Enrollment limited to Aviation Systems students in non-thesis program. May be repeated. Maximum 3 hrs allowed toward degree.
Otherwise superior students, deficient in one or more of the above requirements, may be admitted at the discretion of the department's Graduate Recruiting Committee.

THE MASTER'S PROGRAM

1. Biochemistry and Cellular and Molecular Biology 511-12-13, 515-16, and 517.
2. Composition 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 three semesters.
5. Six hours of master’s research and a thesis.
6. A final examination that covers both the thesis endeavor and the subject matter of the course requirements.

THE DOCTORAL PROGRAM

1. Biochemistry and Cellular and Molecular Biology 511-12-13, 515-16, and 517.
2. At least two additional approved graduate courses in life sciences or chemistry, or physics, or other physical science to be determined upon consultation with the mentor and the dissertation committee. No survey courses will be accepted.
3. At least 6 hours of topics offered in 615 or its equivalent.
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.
6. A dissertation reporting the results of original and significant research carried out during the term of candidacy.
7. 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 Ph.D. 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.

GRADUATE COURSES

401-402 Biochemistry-Molecular Biology I, II (3, 3)
401—Amino acid structure and chemistry, protein structure and chemistry, protein folding, enzyme behavior and function, reaction mechanisms, catalysis and energy transfer, synthetic metabolism including photosynthesis, and protein transport. 402—Structure of DNA and RNA, experimental methods of analyzing nucleic acids, mechanisms of RNA and protein synthesis, mechanisms of DNA replication, repair and recombination, chromosome structure and function, regulation of gene expression, genome structure and function, and mechanisms of biological regulation. Prereq: Biochemistry 404 and Cellular and Molecular Biology 403.
410 Cellular and Comparative Biochemistry (4) Electrophoretic behavior, chemistry and structure of proteins; enzyme behavior and biological function; catalysis and energy capture; synthetic metabolism; nucleic acid functions; and biochemical genetics: regulation of biological processes. May not be counted if credit received for 401. Prereq: Biochemistry 350-360-369 Organic Chemistry and Lab. Biology 140 Organization and Function of the Cell, and Biology 240 General Genetics. 3 hrs and 1 discussion. Sp.
429 Cell Biology Laboratory (3) Series of open-ended, discovery-based exercises developed to design and test new methods in modern cell biology and computer technologies. Experimental modules: techniques used in cell isolation, purification, culturing, staining, karyotyping, receptor binding and signal transduction, apoptosis, cell cycle analysis, protein and steroid secretion, computer modeling, and state-of-the-art electron microscopy. Experiment design, execution, data analysis, and peer evaluation. Prereq or coreq: 401 or 410.
471-81 Biophysical Chemistry (3, 3) Physiochemical principles with biological applications. 471—Thermodynamics; chemical equilibrium; solution chemistry; transport; electrochemistry; kinetics; enzyme catalysis; 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. (Same as Chemistry 471-81.) F, Sp.
480 Physiology of Exercise (3) (Same as Exercise Science 480.) F.
500 Thesis (1-15) P/NP only. E
502 Registration for Use of Facilities (3-15) Required of the student registered during the summer 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 Advanced Protein Chemistry and Cellular Biology (3) Cellular structure and function at molecular and supramolecular level in progression: protein structure and function; membrane structure and function; metabolic pathways; protein and polynucleotide interactions. Prereq: Prior knowledge of cell biology and biochemistry and/or consent of instructor. F
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 cycle and cell growth. Prereq: 511 or consent of instructor. F
513 Advanced Protein Biochemistry and Cell Biology II (3) Advanced topics of cellular function and regulation of cell division and growth, and structure and function of macromolecules. Prereq: 511 and 512. F
514 Advanced Experimental Techniques 1 (4) Advanced experimental and instrumentation lab. cell growth, spectrophotometry; microscopy; nucleic acid purification and analysis; enzyme purification; electrophysiology; computer analysis of nucleic acid and protein sequences. Lecture on theory of laboratory equipment; lab. periods per week. Primarily for departmental graduate students. Prereq: Consent of instructor. F
517 Physical Biochemistry (3) Physics and chemistry of biological systems and molecules. Thermodynamics, diffusion and transport; chemical properties of macromolecules; enzymes; binding reactions; spectroscopy; electrophysiology. Prereq: 511 or consent of instructor. F
520 Special Topics (1-2) Selected directed readings or special course in topics of current interest. Consult departmental listing for offerings. May be repeated with consent of instructor. Maximum 6 hrs. S/NC only. E
525 Graduate Research Participation (3-12) Tutor laboratory experience. May be repeated. Maximum 12 hrs. F
530 Experimental Design and Analysis (3) Development of skills in strategies of experimental design and interpretation of experimental results. Critical discussion of research articles illustrating issues in experimental design. Preparation of a proposal in standard format to be read and discussed by class and by panel of faculty expert in area of proposal. Prereq: 511-12-13, 515-16-17. Sp.
550 Advanced Concepts in Neurobiology/Psychology (3) Concepts related to neurobiology and psychology 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: 450 or consent of instructor. Recommended prerequisite 2 hrs and 1 lab. Sp.
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.)
562 Introduction to Electron Microscopy - Transmission Electron Microscope (4) Practical application to techniques for preparation of biological samples for viewing in transmission electron microscopy. Use of microscope and ancillary equipment, darkroom techniques, preparation of materials for publication and special project. Admission limited only to departmentally approved graduate students. (Same as Botany 562.) 2 3-hr labs. Sp.
564 Introduction to Electron Microscopy—Scanning Electron Microscope (3) Practical introduction to techniques of electron microscopy and to scanning electron microscope. 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.
ADMISSION REQUIREMENTS

The Botany Department requires scores from the general portion of the Graduate Record Examination, at least three letters of recommendation or standard recommendations 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.

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 studies 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 pro-tem 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 600.
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 in French 302 or German 332.
5. Satisfactory completion of 6 hours at the 600 level (excluding dissertation).
7. Presentation of a departmental seminar near the end of the doctoral program.

Note: The listed requirements for the M.S. and Ph.D. degrees are intended as general requirements. Specific stipulations or requirements such as additional foreign languages or an additional oral comprehensive examination may be required by the student's faculty committee.

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, phycology, mycology, general and systematic botany, cryptogamic botany, cytology and cell biology. Weekly field trips. Consent of instructor. 2 hrs and 4 labs.
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 preparation of plasmids, PCR amplification of specific sequences, DNA sequencing and transformation. Prereq: Introduction to 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 various plant groups. Prereq: General Botany or Biodiversity; Organization and Function of the Cell or equivalent.
431 Plant Ecology (5) Interactions between individuals, species, communities and their environments. Circulation of energy and materials, development of 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.)
451 Plant Tissue Culture (4) Comparative study of major algal phyla, 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) macro- and photomicrography, drawing, graphics and video for recording and presentation 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 562.)
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.
544 Seminar in Botany (1) Readings and discussion of current literature and/or selected topics in botanical research. May be repeated. Maximum 9 hrs. SNC only.
558 Methods and Instrumentation in Field Investigation (1) Appropriate methods and instrumentation. Topics vary. May be repeated with consent of instructor. Maximum 5 hrs. SNC only.
599 Advanced Evolutionary Ecology (3) Advanced concepts in evolutionary and ecological genetics. Biogeography, climate, population genetics, evolution in plants, natural selection, population growth and regulation, competition, niche, experimental ecology, predation, phylogenetics in ecology, biodiversity and conservation. Prereq: General Botany and General Ecology, or more courses on organismal biology (ecology, evolution) at the upper undergraduate level or consent of instructor. Students cannot receive credit for both 499 and 599. (Same as Ecology and Evolutionary Biology 599.) Sp, A
600 Doctoral Research and Dissertation (3-15) P/ NP only. E
635 Environmental Assessment and Sustainable Development in Third World Countries (3) (Same as Ecology and Evolutionary Biology 635 and Planning 635.)
662 Seminar in the History of Botany (2) History of botanical exploration and advances from early civilization to modern periods. May be repeated. Maximum 4 hrs.

DEGREES

440 Corporate Video (3) Special requirements of business, industrial, educational, and medical uses of video. Management, budgeting, planning, producing, and evaluating projects. Prereq: 430 or consent of instructor.
460 Broadcast News Operations (3) Production of news programs for broadcast on television stations. Electronic news gathering, editing and writing news packages and studio production. Prereq: 410 or consent of instructor.
470 Cable Television and Emerging Technologies (3) History and structure of cable television industry. Cable regulations and programming. Entry of telephone companies in distribution video. Analysis of all relevant technologies: direct broadcast satellite, fiber optics cable, high definition television, and others. Prereq: Introduction to Radio and Television or consent of instructor.
550 International Broadcasting (3) Broadcasting systems in other countries. Analysis of international broadcasting organizations. Intercultural communication and international broadcasting. Development, communication and international broadcasting. Prereq: Consent of instructor.
560 Radio & Television Law and Regulations (3) Legal problems faced by broadcast managers. Legal and regulatory aspects of all broadcasting organizations. Prereq: Consent of instructor or admission to program.
570 Radio & Television Research (3) Various techniques used by stations and consultants in broadcast research. Applied audience research. Deciding which method to use, interpreting results, and applying research to management decision making. Prereq: Communications 512 or 612, or consent of instructor.
580 Seminar in Radio and Television (3) Salient issues in broadcasting. Topics vary. International broadcasting, cable television, new technologies, corporate television, educational and public broadcasting, broadcasting and society. Prereq: Consent of instructor or admission to program. May be repeated. Maximum 4 hrs. (Same as Information Sciences 581.) F
590 Advanced Radio & Television Management (3) Financial management of broadcast operations: budgeting, financial planning, accounting, and related techniques. Theoretical perspectives in broadcast management, organization and management of commercial
and non-commercial operations from perspective of general manager. Prereq: 490. Sp

597 Independent Study (3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

598 Internship (3) Full-time (30-40 hrs per week) work experience in news, production, or sales and management with non-university professional organization. Educational experience beyond that available at university. Final term paper. No retroactive credit for previous work experience. Prereq: Senior or graduate standing, completion of at least 15 hrs of broadcasting courses, GPA 3.0 or better, and consent of department head.

Business Administration

(College of Business Administration)

MAJOR DEGREES

Business Administration MBA, J.D.-MBA, M.S.-MBA, Ph.D

The College of Business Administration offers two college-wide programs, the MBA and the Ph.D., with a major in Business Administration. Two tracks are available for the MBA: the regular, full-time program and the executive program.

The full-time MBA is for students seeking a full-time, weekday program that follows the traditional academic format. The nature of this program precludes students from simultaneously working full-time outside of school. In addition to the regular full-time program, there are two full-time dual-degree programs: the J.D.-MBA with the College of Law and the M.S.-MBA with the College of Engineering. Descriptions of these dual-degree programs follow the description of the regular, full-time program.

For students who wish to continue working full-time while they earn their MBA degree, there are four programs within the executive track of the MBA. In these programs, students carry a full academic course load in addition to their full-time jobs. Each of these programs is designed to serve a different group of students. Descriptions of the MBA programs in the executive track follow the description of the dual-degree programs.

To obtain an MBA application, contact the MBA Program Office, 527 Stokely Management Center, College of Business Administration, The University of Tennessee, Knoxville, TN 37996-0592, Tel: (865) 974-5033, Email: mba@utk.edu. The application may also be downloaded from the website at http://mba.bus.utk.edu. For the executive or professional program, contact the Executive MBA Program Office, 704 Stokely Management Center, College of Business Administration, The University of Tennessee, Knoxville, TN 37996-0575, Tel: (865) 574-1560.

THE MBA PROGRAM

The full-time MBA program is designed for students with undergraduate degrees in a wide variety of fields, including the social and natural sciences, the humanities, and professional fields such as engineering, business, agriculture, and architecture. In addition, most students in this program should have two or more years of work experience beyond their undergraduate degree(s). The MBA program is a 17-month program with students beginning in early August of each year and graduating in December of the following year. During the summer between the second and third semesters, students must complete an internship with a company using those skills acquired during the first year of the MBA program.

The MBA program consists of a common core (15 hours) and a selection of concentration and elective courses (18 hours). The first-year core develops a general management foundation upon which specialization is developed in the concentration area. The objective of the 17-month program is to develop leaders able to enhance the success of their organizations. Specific emphasis is placed upon competency in the area of integrated value chain management. This managerial perspective acknowledges that an organization's success is strongly related to its ability to function effectively and efficiently within a larger network of allied businesses. Managers must understand how to integrate business functions within their organizations, as well as across the other organizations within their value chain. Integrated value chain management rests upon a foundation including: supply chain management, information management, resource management, and customer relationship management. In addition, students will pursue concentrations and careers in a variety of areas, including finance, logistics and transportation, marketing, and operations management.

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 not 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 collegiate work, the MBA program application, two completed application 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 that 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

There are no specific course prerequisites for admission. However, undergraduate courses and work experience should demonstrate ability with both qualitative and quantitative work.

MBA Core

The MBA core consists of a 9-hour, 300-level course period beginning with the beginning of fall semester, a 15-hour core course and a 1-hour career development course taken in the first semester (Fall 1), a 9-hour core course taken in the second semester (Spring 1), a 3-hour distance course taken during the internship (Summer), and a 1-hour capstone in the third semester (Fall 2). The topics introduced within these courses follow three major themes. The first theme covers "what every manager needs to know," and includes such functional topics as finance, strategy, decision tools, environment learning, and leadership skills development. The second theme focuses on functions involved in the flows of product, information, and finances within an integrated value chain, to include, but not limited to, operations management, logistics management, and shipping management. The third theme involves integrating the content of the other two themes using information technology in an experiential setting.

Throughout all three themes, significant emphasis is placed on the learning process in an integrated fashion. Students will understand how various business functions are integrated within an organization, as well as how integration should occur across organizations within the context of a value chain.

Students in the first-year core undertake active learning within a team-based environment. Many core requirements are experiential exercises in which self-discovery and learning through 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 in the MBA Program Application; however, this declaration may be deferred until after matriculation. In any event, selection should be made after the first semester and must be made after completion of the first year.

Requests for changes in concentration area must be submitted for approval to the MBA Program Office. Among the 15 credit hours in the concentration/electives block, 9 credit hours must be taken in one of the concentration areas. For specific courses required in concentration areas, see the appropriate field of instruction.

Finance

Logistics and Transportation

Marketing

Operations Management

The first course in each concentration is designed to provide a foundation upon which the concentration can be built. These
courses will be delivered in the latter part of the spring semester of the first year, after the Spring core course has been completed. They are intended to prepare students for their summer internships. However, these courses should not be thought of as simply the first three hours in a nine-hour elective. Rather, these courses are self-contained, intensive introductions to a specialty area of business. Students will choose two of these courses in the spring semester, which will permit them flexibility for choosing concentrations in their second year of the program. One of these two will count as an elective course. Two additional courses in the concentration area will be taken in the second fall semester to meet the 9-hour requirement for a concentration.

Elective courses may be chosen from any 500 level courses in the College of Business. Courses outside the College of Business Administration as well as courses listed in the Graduate Catalog numbered below 500 may be included as an elective only with written prior permission via formal petition to the MBA Program Office.

Transfer Credits
Graduate level courses taken at other institutions accredited by the American Assembly of Collegiate Schools of Business that otherwise conform to University policy may be credited toward MBA degree requirements within the following limits:

- Concentration Area: 3 hours (provided at least 6 hours of work at this institution are included in the concentration area).
- Elective Area: 3 hours.

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 petition to the Dean of the MBA Program and must meet all requirements of The Graduate School.

Other Requirements
The Application for Admission to Candidacy must be approved by three faculty members in the student's area of concentration and the Assistant Dean of the MBA Program. It should be submitted to the Graduate Student Services Office at least one full semester prior to the date the degree is conferred. (Admission to candidacy for the MBA degree must be submitted in the spring semester for graduation in the following fall 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.

THE EXECUTIVE MBA PROGRAMS

Each of the four programs of the executive track is designed to serve the needs of students in different industries. The programs share a common course structure of 36 credit hours of classroom learning (BA 551, 552, 553). Students carry a full, 15-credit-hour load each semester. In each program, all participants begin and complete the program together. The courses are functionally integrated, and the broad curriculum objectives are similar in each of the executive track programs. All are oriented toward applied learning and active, making extensive use of experiential learning techniques. Emphasis and depth of subject material vary from program to program based on the intended student group. All prerequisites are in the same Master of Business Administration degree as the full-time MBA.

Admissions Criteria: Primary consideration is given to the applicant's professional achievements and recommendations from the applicant's organization. Applicants must meet the minimum requirements of The Graduate School and submit transcripts of all undergraduate and graduate work. Applicants must also take the Graduate Management Admission Test (GMAT) (some exceptions are noted within the specific programs described). The cut-off score exists for either grade-point averages or GMAT scores; however, admission is competitive, and applicants will be evaluated on their ability to operate on a par with other high achieving participants. Students whose native language is not English must take the Test of English as a Foreign Language (TOEFL) unless they are U.S. citizens or have earned a degree from an accredited U.S. college or university within the past two years. A minimum TOEFL score of 213 on the computer-based test is required for admission to The Graduate School.

Prerequisites: Although there are no specific course prerequisites for admission, undergraduate studies and professional experience should demonstrate ability with both quantitative and qualitative work.

To be considered, because of the integrated nature of the executive track curriculum, no credit hours may be transferred as substitutes for program curriculum.

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

Professional MBA Program
The professional MBA is designed for fully-employed managers within commuting distance of the University of Tennessee. The group of students for whom this program is designed has at least five years of work experience. The emphasis in this program is to provide a good grounding in the quantitative and qualitative tools of business and management. The emphasis is expanded through application of these tools within the student's own organization through a structured project each semester. The professional MBA is the right choice for individuals who wish to enhance their position within their organization by broadening their business knowledge beyond the functional area in which they are currently employed.

The professional program is three consecutive semesters completed in 16 months. Classes meet all day on Saturdays and occasionally on Friday evening and Sunday afternoon. The program begins in August with an intensive week of classes, then continues with weekend classes. The final fall semester also includes an intensive week of courses in addition to weekend classes. Graduation is in December.

Applications are accepted for fall semester only. The application deadline is April 10.

Additional information on the professional MBA can be found at www.promba.utk.edu.

Executive MBA Program
The executive MBA is provided for a national audience of managers holding middle and upper level positions in organizations that support their attainment of an MBA degree. The students for whom this program is designed have at least 10 years of work experience and are currently in management positions. Typical students bring a greater knowledge of business fundamentals than is true of other MBA programs. The executive MBA places considerable emphasis on global business and on individual skills of leadership. The executive MBA also has a heavy emphasis on strategic thinking and leading-edge management concepts. The executive MBA is the right choice for individuals who are in positions of broad responsibility or who have been designated to fulfill such roles within their organizations in the future.

The executive MBA is three consecutive semesters completed in 12 months. The class meets in Knoxville for 11-day residencies in alternate months starting in January and ending in December. The May semester only. The application deadline is September 15. The GMAT may be waived on their ability to operate on a par with other high achieving participants. Students whose native language is not English must take the Test of English as a Foreign Language (TOEFL) unless they are U.S. citizens or have earned a degree from an accredited U.S. college or university within the past two years. A minimum TOEFL score of 213 on the computer-based test is required for admission to The Graduate School.

Prerequisites: Although there are no specific course prerequisites for admission, undergraduate studies and professional experience should demonstrate ability with both quantitative and qualitative work.

To be considered, because of the integrated nature of the executive track curriculum, no credit hours may be transferred as substitutes for program curriculum.

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

Professional MBA Program
The professional MBA is designed for fully-employed managers within commuting distance of the University of Tennessee. The group of students for whom this program is designed has at least five years of work experience. The emphasis in this program is to provide a good grounding in the quantitative and qualitative tools of business and management. The emphasis is expanded through application of these tools within the student's own organization through a structured project each semester. The professional MBA is the right choice for individuals who wish to enhance their position within their organization by broadening their business knowledge beyond the functional area in which they are currently employed.

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Prerequisites: Although there are no specific course prerequisites for admission, undergraduate studies and professional experience should demonstrate ability with both quantitative and qualitative work.

To be considered, because of the integrated nature of the executive track curriculum, no credit hours may be transferred as substitutes for program curriculum.

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

Professional MBA Program
The professional MBA is designed for fully-employed managers within commuting distance of the University of Tennessee. The group of students for whom this program is designed has at least five years of work experience. The emphasis in this program is to provide a good grounding in the quantitative and qualitative tools of business and management. The emphasis is expanded through application of these tools within the student's own organization through a structured project each semester. The professional MBA is the right choice for individuals who wish to enhance their position within their organization by broadening their business knowledge beyond the functional area in which they are currently employed.

The professional program is three consecutive semesters completed in 16 months. Classes meet all day on Saturdays and occasionally on Friday evening and Sunday afternoon. The program begins in August with an intensive week of classes, then continues with weekend classes. The final fall semester also includes an intensive week of courses in addition to weekend classes. Graduation is in December.

Applications are accepted for fall semester only. The application deadline is April 10.

Additional information on the professional MBA can be found at www.promba.utk.edu.

Executive MBA Program
The executive MBA is provided for a national audience of managers holding middle and upper level positions in organizations that support their attainment of an MBA degree. The students for whom this program is designed have at least 10 years of work experience and are currently in management positions. Typical students bring a greater knowledge of business fundamentals than is true of other MBA programs. The executive MBA places considerable emphasis on global business and on individual skills of leadership. The executive MBA also has a heavy emphasis on strategic thinking and leading-edge management concepts. The executive MBA is the right choice for individuals who are in positions of broad responsibility or who have been designated to fulfill such roles within their organizations in the future.

The executive MBA is three consecutive semesters completed in 12 months. The class meets in Knoxville for 11-day residencies in alternate months starting in January and ending in December. The May semester only. The application deadline is September 15. The GMAT may be waived on their ability to operate on a par with other high achieving participants. Students whose native language is not English must take the Test of English as a Foreign Language (TOEFL) unless they are U.S. citizens or have earned a degree from an accredited U.S. college or university within the past two years. A minimum TOEFL score of 213 on the computer-based test is required for admission to The Graduate School.

Prerequisites: Although there are no specific course prerequisites for admission, undergraduate studies and professional experience should demonstrate ability with both quantitative and qualitative work.

To be considered, because of the integrated nature of the executive track curriculum, no credit hours may be transferred as substitutes for program curriculum.

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

Professional MBA Program
The professional MBA is designed for fully-employed managers within commuting distance of the University of Tennessee. The group of students for whom this program is designed has at least five years of work experience. The emphasis in this program is to provide a good grounding in the quantitative and qualitative tools of business and management. The emphasis is expanded through application of these tools within the student's own organization through a structured project each semester. The professional MBA is the right choice for individuals who wish to enhance their position within their organization by broadening their business knowledge beyond the functional area in which they are currently employed.

The professional program is three consecutive semesters completed in 16 months. Classes meet all day on Saturdays and occasionally on Friday evening and Sunday afternoon. The program begins in August with an intensive week of classes, then continues with weekend classes. The final fall semester also includes an intensive week of courses in addition to weekend classes. Graduation is in December.

Applications are accepted for fall semester only. The application deadline is April 10.

Additional information on the professional MBA can be found at www.promba.utk.edu.
months. The class meets in Knoxville for 8-day residence periods in January, April, August and December. Between residence periods, synchronous distance learning classes are held each Saturday morning, and there are asynchronous internet learning sessions each week.

Applications are accepted for January entry only. The early application deadline is July 1, and the final application deadline is October 1. Applicants to the physician executive MBA are not required to take the GMAT test.

Additional information on the physician EMBA can be found at www.pemba.utk.edu.

Taiwan Executive MBA

The Taiwan executive MBA is provided for managers in Taiwan and East Asia holding middle and upper-level management positions. Classroom work and reading materials are in the English language. The students for whom this program is designed have a minimum of 10 years of work experience and are currently in management positions. The emphasis in the Taiwan executive MBA is to provide a good grounding in the fundamentals of various western business functions and a good basis in strategic thinking. Learning is expanded through applying these tools within the student's own organization through structured projects each semester. The Taiwan executive MBA is the right choice for individuals in positions of broad responsibility who wish to have a knowledge of Western business practices and to improve their ability to think and carry out business activities in English.

The Taiwan executive MBA is three semesters completed in 19 months. Teams of UT faculty travel to Taipei for five 8-day residence periods starting in May of the first year. The sixth and final residence period is two weeks in length and is held in Knoxville. Between residence periods students meet in regularly scheduled study classes to discuss project work and readings assigned for the next residence period.

Applications are accepted for May entry only. The application deadline is April 1. Taiwan executive MBA applicants are not required to take the GMAT. Students accepted into the program will receive materials for study preceding the May start date.

An applicant 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 213 or higher on the computer-based test. This test may be taken after enrolling in the program but must be successfully completed prior to the final residence period in Knoxville. To allow for registration, delivery of scores and receipt of the I-20 visa, participants should arrange to take the TOEFL at least 5 months before the Knoxville residence period.

DUAL J.D.-MBA PROGRAM

The College of Business Administration and the College of Law offer a coordinated dual program leading to the conferral of both the Doctor of Jurisprudence and the Master of Business Administration. The dual program saves the student approximately 15 hours (one semester) over the time that would be required to earn both degrees independently.

The establishment of the dual program recognizes the increasingly complex body of knowledge necessary to the creative conduct of business and business-related law practice, the complementary nature of many aspects of the graduate programs of the College of Law and the College of Business Administration, and the intellectual benefits inherent in the concurrent study of both business and business-related law. The program is designed to accommodate the interests of students who (a) contemplate a career in public service and want to acquire the skills and perspective of the lawyer and the business-oriented manager, (b) contemplate a career in business management and want to acquire the skills and perspective of a lawyer, or (c) contemplate a career as a lawyer specializing in business-related law and want to acquire the skills and perspective of the business-oriented manager.

Admission Requirements

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., 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 students are admitted prior to entry into the last 28 semester hours of J.D. coursework and prior to the third semester 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 the 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 6 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 the MBA program, but may 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. During the first year in the MBA program, students register as graduate students. After the first two years, any term in which students take law courses or a mixture of law and graduate courses, they are classified and registered as law students. If taking only graduate courses, they are classified and registered as graduate students.

Approved Dual Credit

MBA courses in which the student has earned a B grade or higher and are to be counted toward the J.D. program must include 9 semester hours approved by the College of Law. The 6 hours of law courses in which the student has earned a 2.3 or C+ grade or higher and are to be counted toward the MBA must be selected from those approved by the Asst. Dean of the MBA Program.

DUAL M.S.-MBA PROGRAM

The College of Business Administration and the College of Engineering offer an integrated program leading to the conferral of the Master of Business Administration degree with a major in Business Administration (concentration in operations management) and the Master of Science degree with a major in Engineering Science (concentration in product development and manufacturing), Industrial Engineering (concentration in manufacturing systems engineering or product development and manufacturing), or Mechanical Engineering (concentration in product development and manufacturing).

The Engineering Science program is intended to provide other engineering majors an opportunity to participate in this program with a flexible coursework plan based on their undergraduate degree. The Industrial Engineering program is also open to students with undergraduate engineering majors other than industrial engineering.

The establishment of the dual program addresses the critical need for personnel trained in both engineering and management who can integrate an increasingly complex body of knowledge for rapid introduction of new products to the marketplace. The objective of the dual degree program is to prepare graduates to take a leading management role in companies that must react quickly to a dynamic market where forces of competition require rapid changes in design and manufacturing and a short product development cycle.

Admission Requirements

Applications 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 Engineering Science, Industrial Engineering, or Mechanical Engineering, and by the Dual Program Committee.

Students will initially apply for the MBA program, indicating on their application the intent to pursue the dual M.S.-MBA program.
and the appropriate engineering major (refer to the MBA program for separate instructions). Students accepted for both the MBA and one of the engineering degree programs will be assigned to Dual Program Committee advisors, who will be responsible for course approval and supervision of the students' progress through the dual program.

Applications by U.S. citizens and permanent residents received after the MBA application deadline (March 1) will be considered as space allows. Additional information is required and different application dates are established by The Graduate School for international students.

Curriculum

All engineering students enrolled in the dual program must complete common coursework designed to provide them with an integrated, multidisciplinary teamwork experience. The MBA curriculum consists of 33 hours of common coursework in the College of Business Administration and 15 hours of common coursework in the College of Engineering. Engineering common coursework includes a culminating 3-hour integrated project course requiring a comprehensive report, and a final examination as required by the Dual Program Committee, to be taken during the first session of summer following the second year.

During the second year dual degree candidates will take courses in their engineering major. The coursework for each option is designed to provide students with a concentration in their major and advanced skills to accomplish their teamwork assignments.

Dual degree candidates enrolled in Engineering Science option are required to take 18 hours of graduate level engineering courses during the second year of the program. This option requires a coursework plan, approved by the Dual Program Committee, including a concentration such that the student can accomplish his/her teamwork assignments.

Curriculum for Dual M.S.-MBA Degree

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<tr>
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<th>Course Code</th>
<th>Course Name</th>
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<td>August - First Year</td>
<td>BA 511</td>
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<td>BA 512</td>
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<td>BA 513</td>
<td>MBA Core III</td>
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<td>IE/ME506</td>
<td>Product Selection and</td>
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<tr>
<td></td>
<td>IE/ME508</td>
<td>Integrated Product, Process,</td>
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<td>and Manufacturing System</td>
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<td>IE/ME509</td>
<td>Project Management</td>
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<td>Fall - Second Year</td>
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Summer (first session)

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*Students in manufacturing systems engineering concentration may substitute other selected IE courses for these courses.

For additional requirements for Master of Science degree with majors in Engineering Science, Industrial Engineering, or Mechanical Engineering, refer to program descriptions for those majors.

The dual degree candidate must satisfy the curriculum and graduation requirements of the engineering major being pursued and the College of Business Administration. Students withdrawing from the dual degree program before completing both degrees will not receive credit toward graduation in either degree program for courses taken in the other degree program, except as such courses qualify for credit without regard to the dual degree program. The M.S. and the MBA degrees will be awarded upon successful completion of the requirements of the dual program.

Approval Dual Credit

A maximum of 15 hours of the common program courses completed in the College of Engineering may be counted toward the MBA degree program.

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 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 before 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 undergraduate background that has been approved by their committee and the Dean of the MBA Program. The student must complete a minimum of 9 semester hours of graduate research methods course work by the time of application.

Program of Study

The Ph.D. normally requires four 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 and fourth years require completion of courses, the comprehensive exam, and completion of the dissertation. It is emphasized that the Ph.D. program of study 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 to an undergraduate business class or as a research assistant to a senior faculty member. Students with strong teaching skills may be assigned their own classes. 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 or by accessing the College of Business Administration web page.

Degree Requirements

Doctoral students must file a program of study that has been approved by their doctoral committee within one year of completing their 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 Dean of the MBA Program. 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...
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 must choose the cognate from one of the following: one of the six concentration 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 opt for the cognate area by completing a one-semester, four-hour examination or an equivalent 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 15 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.

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). Gradu-ate courses accepted from other institutions must be included. Under "Other Requirements," the date of acceptance of the research proposal by the doctor-al 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.

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 on an in-state basis. The Ph.D. in Business Administration is available to residents of Alabama, Florida, Kentucky, or West Virginia; the MBA is available to residents of Alabama, Florida, Kentucky, Louisiana, Texas, Virginia, or West Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Student Services.

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.

Business Administration

GRADUATE COURSES

501 MBA Career Development (1) Career opportunities available in each concentration. Prereq: admission to MBA program or consent of Assistant Dean of MBA Program.

502-03 Business Core for Master of Accountancy I (3-6) Development of roles and responsibilities of accountant as business advisor. Assessment and implementation of successive management information system improvement, statistical process control, human resource management, corporate strategy, financial statement analysis, entrepreneurship, supply chain analysis, lean manufacturing, and other current topics. Prereq: Admission to M.Acc. program.

506 Enterprise Resource Design (3) Enterprise Resource Planning (ERP) software as primary tool for redesigning business processes. Management methods required to facilitate redesign. Change manage-ment, consensus management, project management, and implementation methodologies. Configuration of ERP module and business process e-commerce tools. (Same as Information Management 501.)

510 Customer Responsive Management (3) Management methods that provide flexibility required to respond to diverse customer needs and to adapt to competitive, technological, and operational change. Mass customization, interactive marketing, capacity management economics, and relationship management for services, health care, temporary services, professional services, repair services, truck load transportation, emergency response organizations, customer service centers and other responsive organizations.

511 MBA Core I (3) Essential skills of manager: basic information technology skills, teambuilding, and written and oral communication skills. Finance and accounting fundamentals, management, marketing, and statistics. Prereq: Admission to MBA program or consent of Assistant Dean of MBA Program.

512 MBA Core II (15) Development of roles and responsibilities of business managers. Functional fundamentals: marketing, operations, human resource management, and logistics management. Continuous systems improvement and delivery of customer value. Role of firm in society: stakeholder value, economic, and ethical and legal environment of firm. Personal leadership skills, and assessment of students' leadership abilities. Integration of the two: decision management, operations management, process design, and management, and logistics management. Prereq: 511 or consent of Assistant Dean of MBA Program.

513 MBA Core III (9) Continuation of the functional fundamentals from 512. Integration of value chain: supply management and resource management. Capstone integrated experience using information technology. Prereq: 511 and 512 or consent of Assistant Dean of MBA Program.

514 Integrated Business Simulation (3) Computer simulation. Teams manage business within competitive marketplaces. Prereq: 511, 512, and 513 or consent of Assistant Dean of MBA Program.

551 Executive Core I (3) Continuation of integrated courses with substantial reading, study and analyses during off-site periods. Integration of major business functions through strategic and business process perspective. 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, Economic and regulatory environment, Human resource and organizational behavior topics in context of business systems and objectives. Personal development for leadership: individual styles of communication, negotiation, leadership and motivation, Customer value and systems management. Case simulations and exercises. Prereq: Admission to executive program of MBA.


561 Management Project I (3) Company project. Preliminary investigation of significant strategic issue (new initiative, program or significant organizational change). Emphasis on effectiveness in sponsoring organization. Work within firm under guidance of faculty to develop proposal which defines issues and scope of project. Proposal to be approved by company and faculty. Prereq: Admission to execu-
tive program of MBA and cooperation of sponsoring organization. Coreq: 551.


593 Directed Independent Study (3) Cross-disciplinary topic of mutual interest to student and faculty. Available only by prearrangement with supervising faculty member. May require approval of Dean of the MBA Program. May be repeated. Maximum 6 hrs. S/N/C 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.

611 Seminar in Theoretical Foundations (3) Theoretical foundations and frameworks common to business research. Historical and philosophical science perspectives.

612 Seminar in Research Methods (3) Research processes: philosophical foundations, problem formulation, grounded theory, qualitative methods and analysis, measurement, sources of error, experimental design and analysis, survey design and analysis.

699 Special Topics (3) Seminars that integrate content from various business functions: international business, management information systems.

Information Management

GRADUATE COURSES

431 Computer Mapping and Geographic Information Systems (3) (Same as Geography 411.)

501 Enterprise Process Redesign (3) (Same as Business Administration 508.)

511 Risk Management in Networked Business Environments (3) (Same as Accounting 514.)

512 Electronic Commerce (3) (Same as Accounting 542.)

521 Logistics and Supply Chain Analytical Techniques (3) (Same as Logistics and Transportation 509.)

522 Leveraging Information Through Descriptive and Prescriptive Modeling (3) (Same as Management Science 551.)

531 Geographic Software Design (3) (Same as Geography 510.)

532 Geographic Information Management and Processing (3) (Same as Geography 517.)

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., Ph.D. ............ Case Western Study


Associate Professors:

Bruns, Duane D., Ph.D. ............ Houston Petrovan, Simon (Research), Ph.D. ............ Iasi Tech Wang, Tse-Wel, Ph.D. ............ MIT Weber, Frederick E., Ph.D. ............ Minnesota

Assistant Professors:

Borole, Abhijeet P. (Research), Ph.D. .... Tulsa Edwards, Brian J., Ph.D. .......... Delaware Frymler, Paul D. (Liaison), Ph.D. .... Virginia Keffer, 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 15 hours in chemical engineering; 3 hours in other engineering, scientific, or business areas (as approved by the departmental faculty); and 3 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 800 series courses.

2. Supporting 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 comprehensive examination, 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 process design; unconstrained and equality constrained optimizations, linear programming, dynamic programming, and geometric programming. Prereq: Mathematics 241.


457 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 object oriented concepts; use to design automation solutions; human-machineInterfaces. Workstations with modern industrial equipment, interactive graphics and visualization environment. Prereq: Process Dynamics and Control and consent of instructor.

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: 550-51-52, 550-51-52, 570-72-73, 590-94-95, from 510-11-12-20. At least 14 hours of this graduate course 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, physical 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 600. 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 601.

5. Eighteen additional hours in courses at the 500 level or above including at least one course above 601 and one of the following courses: 510-11-12, 530-31-32, 550-51-52-53-54, 570-71-72-73, and 590-94-95.

6. A final oral examination.

The Ph.D. program with concentration in chemical physics is conducted jointly with the Department of Physics. Requirements depend on the choice of the major department. Chemistry doctoral requirements include passing the above degree requirements in chemistry with concentration in chemical physics plus 6 additional hours in physics at the 500 level or above. Three of the additional physics hours can be used to satisfy the 18 hours requirement in item 5.

GRADUATE COURSES

439 Advanced Inorganic Chemistry (3) Atomic and molecular structure, bonding theories, descriptive chemistry of elements, chemistry of inorganic reactions, applications of modern techniques for characterization of inorganic and organometallic chemistry. Prereq: 230 Inorganic Chemistry. Sp


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 483 and 480. 473 - Properties of gases; first, second and third laws of thermodynamics; chemical equilibrium; simple phase equilibria. 483 - Phase equilibria. 480 - Introduction to statistical thermodynamics; kinetics of chemical reactions; introduction to quantum mechanics and applications to electronic structure of atoms and molecules; molecular spectroscopy. Prereq: General Chemistry, Elements of Physics or Fundamentals of Physics: Electricity and Magnetism, and Calculus III. F, 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 (3-15) Required background: Two semesters of physical chemistry.

503 Special Problems (3) Satisfactory completion of certain special problems not covered in other courses. Prereq: Consent of department. May be repeated. Maximum 6 hrs. S/NC only.

510 Analytical Spectroscopy (3) Principles and practice of optical and mass spectrometric techniques in quantitative chemical analysis. Required background: Two semesters of physical chemistry.

511 Analytical Separations (3) Principles and practice of chemical separations based on extraction, chromatography, and electroanalytical techniques. Prereq: Background: Two semesters of physical chemistry.

512 Electroanalytical Chemistry (3) Fundamentals of electrode processes; principles and practice of electroanalytical techniques in quantitative chemical analysis and applied to study of chemical systems. Required background: Two semesters of physical chemistry.

530 Chemical Bonding (3) Wave mechanical atom, theory, covalent, ionic, and metallic bonding, ligand field theories, solid state. Required background: One semester of inorganic chemistry.

531 Characteristics of Inorganic Compounds (3) Descriptive chemistry of elements; structure, reactions, kinetics, mechanisms, equilibria, and spectra of coordination, organometallic, bioinorganic compounds. Required background: One semester of inorganic chemistry.

532 Experimental Methods of Inorganic Chemistry (3) Electronic, infrared, Raman, microwave, NMR, Mossbauer, mass, and photoelectron spectroscopies for characterization of inorganic compounds. Required background: One semester of inorganic chemistry.

540 Nuclear and Radiochemistry (3) Nuclear properties, radioactivity, radioactive decay processes, nuclear structure and models, nuclear reactions, radiations and matter, radiation detection. Required background: Two semesters of physical chemistry.

550 Structure and Reactivity in Organic Chemistry (3) Structure and bonding in organic compounds; molecular orbital theory, stereochemistry, conformational analysis, and molecular mechanics; solubility effects on acidity and reactivity; introduction to reaction mechanisms. Required background: Two semesters of organic chemistry.

551 Organic Reactions (3) Organic transformations of organic compounds; formation of organic compounds; reaction mechanisms. Required background: Two semesters of organic chemistry.

552 Organic Reaction Mechanisms (3) Techniques and principles in study of organic reaction mechanisms; applications and interpretations in polar, radical, and pericyclic reactions; reactive intermediates. Prereq: 550. Sp


554 Organic Spectroscopy Laboratory (1) Use of infrared, ultraviolet, and multinuclear FTNMR spectrometers. Development of problem-solving ability in area of spectroscopic characterization of organic molecules. Prereq: 360 or equivalent. Coreq: 553. F

570 Quantum Chemistry and Spectroscopy (3) Basic principles of quantum mechanics and their applications to molecular orbital theory, molecular structure, and spectroscopy. Introduction to group theory. Required background: Two semesters of physical chemistry.

571 Advanced Quantum Chemistry and Spectroscopy (3) Prereq: 570 or consent of instructor.

572 Thermodynamics and Statistical Mechanics (3) Macroscopic and microscopic description of equilibrium systems. Basic principles of thermodynamics and statistical mechanics, and application to selected chemical systems. Required background: Two semesters of physical chemistry.

573 Chemical Kinetics and Transport (3) Time-dependent phenomena in chemistry; chemical kinetics, dynamical transport, reaction rates. Required background: Two semesters of physical chemistry.

580 Polymer Chemistry (3) Fundamentals of polymer synthesis and characterization through application of organic and physical chemical principles. Required background: Two semesters each of organic and physical chemistry.


585 Physical Chemistry of Polymers (3) Conformation of macromolecules, solution and bulk properties, rubber elasticity, kinetics of polymerization, polymer thermodynamics. Prereq: 590 or equivalent.

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

601 Chemistry Research Proposal (2) Preparation and oral defense of original written research proposal based on thorough survey of chemical literature. Prereq: Consent of department head. S/NC only. E

610 Selected Topics in Analytical Chemistry (3) Topics of current and importance. Prereq: 550-11-12 or consent of instructor. May be repeated. Maximum 12 hrs.

630 Selected Topics in Inorganic Chemistry (3) Topics of current significance. Prereq: 530-31-32 or consent of instructor. May be repeated. Maximum 12 hrs.

650 Selected Topics in Organic Chemistry (3) Topics of current significance. Prereq: Two of 550-11-12 or consent of instructor. May be repeated. Maximum 12 hrs.

670 Selected Topics in Physical Chemistry (3) Topics of current significance. Prereq: 570-72-73 or consent of instructor. May be repeated. Maximum 12 hrs.

690 Selected Topics in Polymer Chemistry (3) Topics of current significance. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

Child and Family Studies

(College of Human Ecology)

MAJORS

DEGREES

Child and Family Studies ......................... M.S. in Human Ecology ......................................... Ph.D.

James D. Moran, III, Interim Head

Professors:

Blanden, Priscilla, Ed.D. ...................... Tennessee

Buehler, Cheryl, Ph.D. ...................... Minnesota

Cunningham, Jo Lynn, Ph.D. ... Michigan State
The Department of Child and Family Studies provides coursework in human development and family studies. Integration of these areas creates a unique perspective for the study of individuals and families. Each graduate student's program of study is carefully planned in conjunction with a faculty committee to establish a program consistent with program requirements and a student's individual goals. All programs are characterized by a broad array of coursework, varied research experiences, and opportunities for experiences in applied settings.

ADMISSION REQUIREMENTS

A completed file for review includes a departmental application, Graduate Record Examination (GRE) scores for the general section, and a completed file for review includes a preliminary statement of three Graduate School Rating Forms by individuals who can attest to the applicant's potential for graduate education. Forms may be obtained from the department.

Admission to the program is contingent upon the student's ability to complete specific coursework, undergraduate/graduate GPA, rating forms, work experience, and the match between student's goals and department's foci. Prerequisites for admission to the major's program are 9 semester hours of upper division undergraduate social science. Prerequisite program for a major's degree is a regionally accredited institution or equivalent, completion of the 18 hour core in the CFS major's program or appropriate substitutions, 3 hours of computationally-based, graduate-level statistics, 3 hours of graduate-level research methods, and completion of a thesis as part of the master's degree. The department provides a remedial mechanism for doctoral students who have earned a master's degree but have not met the other prerequisites.

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. The master's degree in child and family studies requires a minimum of 36 credits of coursework: 18 credits in core coursework and 18 credits in specialization. Core requirements are: 510, 511, 540, 550, 552, and 562. 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 are best served by selecting the non-thesis option. The non-thesis option requires 39 hours of coursework. In addition to the core and specialization courses, CFS 570 is required.

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). Master's students who have completed the child and family life practice specialization by taking an approved set of courses are eligible to make application for full or provisionally designated status as a Certified Family Life Educator (CFLE) through the National Council on Family Relations. Specific coursework within each specialisation is on file in the Department of Child and Family Studies. Interested students should contact the Graduate Coordinator in Child and Family Studies.

Students seeking the M.S. with a major in Child and Family Studies must file a plan of study with the department head after 12 hours of graduate credit.

The early childhood education concentration is designed for students seeking candidate status and initial teacher licensure in early childhood education (Pre-K through Grade 4). This program is based on an undergraduate degree in child development or equivalent coursework. A non-thesis option is also available. All students in the early childhood education licensure program must enroll in Human Ecology 574, 575, 591, and Child and Family Studies 569. Students select one course from 510, 511 or 512; three courses from 511, 520, 521, 522, 530, 540, 560; 3 hours of 500-level statistical methods or interpretation of research methods (requirement may be met with 569); and written comprehensive examination (36 credits).

THE PH.D. CONCENTRATION


Selection of one of the following specializations: teaching in higher education (requires UT GTA seminar, 3 credits of college teaching methods, and one semester of supervised teaching experience); administration in community settings (requires 566 or 563, 521 or HRD 512 or SW 541, and one semester of an administrative apprenticeship); research emphasis (requires 6 additional credits in research methods or statistics).

6. Minimum of 6 credits in a cognate area.
7. Minimum of 24 credits of 600 level.
8. Minimum of 96 credits beyond the bachelor's degree.

GRADUATE COURSES

500 Thesis (1-15) P/NP only, E.
502 Registration for Use of Facilities (3-15) Requires 502, 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.
505 Development of Interpersonal and Supervision Skills (3) Refinement of interpersonal skills needed to work with families and other professionals. Supervisory training in others' skill development, active listening, self-disclosure, relationship building, and negotiation. Skills adapted for use among family members.
510 Theory in Human Development (3) Theoretical models of human development: cognitive, social learning, psychoanalytic theory, analysis, synthesis, and discussion of historical and contemporary relevance of models; application of theory to research, prevention, intervention, and education; critical reading and evaluation of theory-based research on human development processes.
511 Survey of Research in Child Development (3) Survey of human development research from conception through adolescence. Classic and contemporary empirical literature in domains of physical, cognitive, language, social, emotional, and moral development; biological basis of development of cross-cultural perspectives.
512 Survey of Research in Early Childhood Education (3) Current literature and issues in early childhood education. Prereq 510 or equivalent or consent of instructor.
515 Children in Contemporary Society (3) Theory and research on environmental and developmental issues in contemporary family situations and educational environments for children from infancy through middle childhood. Implications for programs and policy.
521 Organizational Management in Early Childhood Education (3) Designing, implementing, and evaluating physical and human resources in educational environments. Development of skills in environmental organization, interpersonal leadership, budgeting and supervision of staff. Required background: 6 hrs graduate-level coursework in early childhood education or child development.
522 Naturalistic Interventions for Parents and Teachers of Young Children (3) Common problems faced by parents and teachers; methods available to modify problem behavior.
525 Seminar on Play (3) Comparison and contrast of theoretical frameworks and research methodologies on play. Developmental perspective on play.

530 Families of Children with Disabilities (3) Developmental nature of family's experiences in caring for handicapped children, especially during infancy and early childhood.


545 Family Resource Management and Instruction (3) Design and implementation of family resource management curriculum for family life education audiences based on theory and application of management functioning in family settings; analysis of goals, resource use, information systems, constraints within families. Observational and analysis of diverse family practices. Prereq: 563.

550 Theory and Research in Family Studies (3) Research and application of theoretical models to understanding research.


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


562 Families and Children Coping with Stress (3) Processes used by children and families during times of stress. Theoretical contributions to study of impact of developmental stressors and catastrophes on children and families.


564 Practicum in Human Development or Family Studies (3) Supervised community practicum in education for human development and family living. Prereq: Consent of instructor. S/NC only.

565 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. S/NC only.

566 Approaches to Family Intervention and Counseling (3) Various theoretical approaches for family intervention and counseling. Structural, strategic, experiential and social learning schools of practice. Effects of intervention from perspective of impact on counseling and communication. Prereq: 562. (Same as Counseling Education and Counseling Psychology 566.)

567 Family Violence (3) Theory and research on initiation, maintenance and cessation of violent behaviors in families, and assessment of responses to violent family behaviors, perpetrators, victims, and family systems. Prereq: 560.


571 Research Seminar (1) Presentation and critique of research projects. Prereq: Departmental major or consent of instructor. May be repeated. S/N only.

580 Special Topics in Human Development or Family Studies (3) Advanced study of theoretical and empirical issues in specific topics in human development and family studies. Prereq: 6 graduate hrs in major, or consent of instructor. May be repeated with different topics. Maximum 9 hrs.

581 Directed Study in Human Development or Family Studies (3) Individual learning experiences in specific topics in human development and early childhood education or family studies. Prereq: 6 graduate hrs or consent of instructor. May be repeated with different topics. Maximum 6 hrs.

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

610 Advanced Special Topics in Human Development or Family Studies (1-3) Study of theory and research related to current issues. Prereq: 12 graduate hrs in major or consent of instructor. May be repeated with different topics. Maximum 6 hrs.

620 Advanced Directed Study in Human Development or Family Studies (1-3) Advanced, in-depth individualized learning experiences in specific topics in human development and family studies. May be repeated with different topics. Maximum 6 hrs.


633 Survey Design and Analysis (3) (Same as Sociology 633.)

634 Advanced Survey of Family Theory and Research (3) Conceptualization, analysis, and critical assessment of pertinent conceptual and empirical literatures at advanced level for variety of contemporary family issues. Prereq: 570, master's core. Required background: 6 hrs graduate-level statistics.

640 Advanced Theory in Human Development (3) Original conceptualizations and current theoretical perspectives influencing field of human development and empirical evaluations of these perspectives. Prereq: 550, 510, 511, or consent of instructor.

650 Advanced Qualitative Research Methods (3) Theoretical and methodological analysis in qualitative research in human development and family studies. Use of methods: in-depth interviewing, participant observation, and case studies. Prereq: Communications 462 or Psychology 513.


670 Secondary Analysis of Survey Data (3) Applied seminar in secondary analysis of survey data. Identification of data sources, accessing data, evaluation, and analysis of social science survey data. Nationally representative data sets relevant to study of families, youth, or children. SPSS analytic software. Prereq: 570 or equivalent, Statistics 532 or 533 or equivalent.

691 Analytic Reasoning (3) Analysis of quantitative methodologies and measures used in human development and family research: validity, reliability, causality, and generalizability. Prereq: 570. Required background: 9 hrs graduate coursework in child and family studies, and 6 hrs graduate-level statistics.

Civil and Environmental Engineering (College of Engineering)

MAJORS

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

DEGREES

Gregory D. Reed, Head

Professors:

Bennett, R. M., Ph.D. .................. Illinois
Bursett, E. G. (Fred N. Peebles Prof.), PE, Ph.D. ................. Illinois
Chatterjee, A., Ph.D. .................. NC State
Davis, W. T., Ph.D. ...................... Tennessee
Deatherage, J. H., Ph.D. .............. Tennessee
Drum, E. O., PE, Ph.D. ............... Arizona
Goodpasture, D. W., PE, 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. (Emeritus), PE, Ph.D. .......... Arkansas
Reed, G. D. (Liaison), PE, Ph.D. ........... Pennsylvania
Robinson, R. B. (Fisher Prof.), PE, Ph.D. ................. Iowa State
Smoot, J. L., PE, Ph.D. .......... Virginia
Tschantz, B. A. (Condra Prof.), PE, Sc.D. ........... New Mexico State
Walker, C. R. (Emeritus), M.S. .......... Montana
Wegmann, F. J., Ph.D. .......... Northwestern

Associate Professors:

Chou, K. G., Ph.D. .................. Pennsylvania
Cox, D., PE, Ph.D. .................. California
Miller, T. L., Ph.D. .................. Tennessee
Richards, S. H., PE, Ph.D. .......... Tennessee
Robinson, K. G., Ph.D. .......... Virginia

Assistant Professor:

Jackson, N. M., PE, Ph.D. .......... Oregon State

The Department of Civil & 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.

The Doctoral Program

A graduate program leading to the Doctor of Philosophy is offered in Civil Engineering. Specific departmental requirements for the Ph.D. degree include the following:

1. A minimum of 72 semester hours beyond the Bachelor's degree, exclusive of credit for the M.S. thesis. Of this number, a minimum of 24 semester hours in 800 Doctoral Research and Dissertation will be required.
2. A minimum of 24 semester hours of graduate courses in civil engineering, exclusive of thesis or dissertation credit, at least 6 hours of which must be 600-level courses.
3. Supporting 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 such disciplines as mechanics, chemistry, mathematics, microbiology, physics, and other engineering fields. A minimum of 9 semester hours of mathematics will be required beyond the civil engineering undergraduate requirements.
4. 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.
5. Upon completion of at least one-half of all coursework, each student must pass a comprehensive examination administered by a faculty committee.

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.

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: 321. 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 processes 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 interrelationship; traffic studies; basic considerations of traffic circulation and control, lighting, capacity analysis, roadway safety analysis and design. Prereq: 210, 251, 352.

453 Airport/Railroad Planning and Design (3) Airport master planning and railroad engineering. Runway configuration, airfield geometry, and terminal layout and design. Railroad capacity, geometrics, and system layout and design. Prereq: 210, 251, 352.

461 Analysis of Framed Structures (3) Determination of dead, live, wind and earthquake loads for buildings; vertical and lateral load resisting systems; analysis of building frames. Prereq: Structural Analysis II.

472 Steel Design (3) Design of plate 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 and bending, footings; and design for torsion. Prereq: Introduction to Structural Design.

485 Principles of Hydrogeology (3) (Same as Geological Sciences 485).

490 Water Resources Project Development (3) Coherent development of multipurpose reservoir and dam project, data acquisition, aerial surveys, hydraulics and outlet works design, erosion and sediment control, civil engineering structure design, and analysis and design of dams and filters; maintenance and operation principles; and dam safety concepts, dam break analyses. Prereq: 390, 395.

495 Water Resources Development and Management (3) Principles of water resources project development planning and management. Institutional framework; water law, evaluation procedures for comparing and selecting among water resources development alternatives, multi-objective planning, principles of engineering economics, benefit-cost analysis, and cost allocation methods; environmental impact assessment procedures; decisions using risk-based methods; case studies. Prereq: Senior standing.

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 Urban Systems: Engineering and Management (3) Various urban systems usually under responsibility of city manager and/or city engineer: streets, lighting, water, sewerage, refuse collection. Personnel management, finance, planning and public relations. Prereq: Graduate standing or consent of instructor.

521 Pavement Design (3) Empirical and theoretical basis of pavement design and analysis, strengthening existing pavements, pavement distress and economic design alternatives. Prereq: 321 and 330.

522 Asphalt Concrete Mix Design and Analysis (3) Aggregate properties and tests, tests of asphalt and concrete mixes, mix design methods for asphalt concrete, production and placement of hot mix asphalt. Prereq: Materials of Construction. 2 hrs and 1 lab.


531 Soil Stabilization (3) Mechanical stabilization of soils by compaction, drainage, and blending; chemical stabilization of soils with admixtures, waterproofing and mixing organic soils and soil stabilization with geosynthetics. Prereq: Introduction to Soil Behavior.

532 Rock Mechanics and Rock Engineering (3) Engineering properties and characterization of rock and rock masses. Discontinuity analysis, stress and strain, keyblock theory. Applications to rock slopes, underground excavations, foundations, and groundwater flow. Prereq: Introduction to Soil Behavior or consent of instructor.

534 Geological Engineering (3) Influence of geologic origin and history on engineering characteristics of rocks and soils; applications of geology in planning, design and construction of civil engineering projects. Prereq: Introduction to Soil Behavior 2 hrs and 1 lab.


537 Issues in Geotechnical Engineering (1-3) Special readings, problems, discussions, and presentations in geotechnical engineering. Prereq: Graduate standing or consent of instructor. May be repeated.
Environmental Engineering

GRADUATE COURSES

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 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

508 Seminar (1-6) Reports on current research in environmental engineering at UT. Prereq: Graduate standing.

510 Environmental Protection (3) Managing of water resources, wastewaters, air quality, solid wastes, and hazardous materials to promote efficiency and comfort and to safeguard natural ecosystems. Prereq: Consent of instructor.

520 Open Channel Hydraulics (3) Open channel flow principles, properties, and classifications; uniform and nonuniform flow theory and applications; open channel design; unsteady flow theory and analysis; dynamic routing; spatially varied flow; non-linear alignment; microcomputer applications, using HEC-2 model. Prereq: Hydraulics.

522 Floodplain and Urban Flood Management (3) Review of national, regional, and local flood problems; state of the art flood damage reduction alternatives; structural and non-structural, institutional responses; policies, programs, organizations, regulations, and legal aspects; floodplain hydrology and hydraulics, HEC-1, HEC-2: floodway encroachment, flood hazard zone management potential. Prereq: Consent of instructor. E

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

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. Prereq: Consent of instructor. Prereq: Consent of instructor.

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 inlet structures, conveyance systems, detention/retention basins and appurtenances, and selected best management practices (BMP's); evaluation of land-use change of runoff quantity and quality; review, selection, and application of contemporary computer models. Prereq: Hydraulics, Hydrology.

535 Ground Water Hydrology (3) Dynamics of flow and contaminant transport in porous media; hydrodynamic dispersion, anisotropy, confined and unconfined systems; techniques for design of stormwater management systems; review, selection, and application of contemporary computer models. Prereq: Hydraulics, Hydrology.

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

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

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

551 Physiobioscience Unit Processes (3) Theory and design application in wastewater treatment. Prereq: Water and Waste Treatment, and Hydraulics.

552 Biological Treatment Theory (3) Theory and design applications of biological processes to treatment of wastewater and solid wastes. Prereq: Water and Waste Treatment, and Hydraulics.

553 Aquatic Chemistry (3) Theoretical, applied and analytical chemistry related to generation, measure-
ment and treatment of environmental contaminants. Prereq: Genel Chemistry. 2 hrs and 1 lab.

554 Environmental Engineering Chemistry (3) Application of chemical principles in analyzing physical, chemical, or biological interactions of chemical contaminants in various environmental compartments: atmosphere, hydrosphere, and lithosphere. Prereq: One year chemistry and consent of instructor.

558 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 regulations. Prereq: Senior standing.

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

571 Design of Air Pollution Control Systems (3) Design and evaluation of systems used to control emission of gaseous and particulate air pollutants. Comprehensive design of specific devices and systems. Prereq: 570.

572 Air Quality Dispersion Modeling (3) Diffusion in atmosphere; application of atmospheric dispersion models and evaluation of meteorological and air quality data. Prereq: 570.

573 Sampling of Air Pollutants (3) Standard sampling methods for particulate and gaseous air pollutants. Comprehensive design of specific devices and systems. Prereq: 570.

575 Applied Microbiology and Bioengineering (3) (Same as Chemical Engineering 575, Microbiology 575, and Biosystems Engineering 575.)

581 Industrial Pollution Prevention (3) (Same as Chemical Engineering 581 and Engineering Science 585.)

590 Special Problems in Environmental Engineering (1-6) Enrollment limited to environmental engineering students in non-thesis program. Prereq: Graduate standing. May be repeated. Maximum 6 hrs. S/N only.

595 Special Topics (1-4) Problems and topics related to current developments in field. May be repeated.

620 Advanced Surface Water Hydraulics (3) Advanced topics in surface water hydraulics; solutions to St. Venant equations of unsteady flow for complex channel situations; dam breach modeling. Prereq: 520.

651 Industrial Waste Unit Operations and Processes (3) Theoretical design and laboratory modeling of industrial waste treatment processes and operations. Prereq: 551, 553. Prereq or coreq: 522, 2 hrs and 1 lab.

653 Pollutant Fate Modeling and Risk Assessment (3) Application of scientific principles concerning movement and fate of chemicals at interfaces of air, water, and earth and solids in environment. Methods of assessing risk posed by presence of those chemicals. Prereq: 551.

691 Special Topics in Environmental Engineering (3) Selected advanced problems of current interest. Prereq: Consent of instructor. May be repeated.

The graduate courses in the Classics include the wider reading of Greek and Latin authors in a selected field, a more detailed study of one of the great genres of classical literature, and the development of background for the appreciation of Greek or Roman life and literature.

GRADUATE COURSES


405-406 Selected Readings from Greek Literature (3, 3) For advanced students in Greek, plays, historical writings, poetry of ancient Greece in original Greek. Prereq: 401-402 or consent of instructor. May be repeated. Maximum 9 hrs.

414 Cicero and Techniques of Latin Prose Composition (3) For advanced students in Latin, prose composition, writings of Cicero. Prereq: 351-352 or consent of instructor.

431-32 Selected Readings from Latin Literature (3, 3) For advanced students in Latin, oratory, historical writings, poetry of ancient Rome in original Latin. Prereq: 351-352 or consent of instructor. May be repeated. Maximum 9 hrs.

435 Medieval Latin (3) Selected readings from medieval Latin prose and poetry of medieval Europe. Prereq: Consent of instructor.

441 Special Topics in Classical Civilization (1-3) Art, literature, religion, and society of Greece and Rome. May be repeated with consent of department. Maximum 9 hrs.

461 Studies in Classical Archaeology (3) Variable content course offering subject matter not taught in an existing course, or concentrating on one aspect of existing survey. Prereq: ACCORDING TO TOPIC. May be repeated. Maximum 9 hrs.

561 Special Topics in Classical Civilization (1-3) Advanced tutorial work in Greek and Roman authors in English translation; problems in cultures of Greece and Rome. May be repeated. Maximum 9 hrs. Letter grade or S/N.

562 Problems in Old World Archaeology (3) Selected topics and research problems in European, Asian and African prehistory. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.
Degree Requirements

The M.S. program emphasizes communications management and industry in the areas of advertising, broadcasting, journalism (publications), public relations, and speech communication. For the thesis option, a minimum of 30 hours of approved graduate work is required. The non-thesis option requires 33 hours. Orientation attendance is required.

1. Six hours of core courses—Communications 512 and 540 to be taken during the first semester of graduate study. The student must also complete an internship, if needed, for 3 additional hours.

2. Three hours for the thesis option and 9 hours for the non-thesis option of electives from a list provided by the Department of Communications.

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

4. Six hours of thesis work (Communications 500) or a 3-hour project (Communications 590).

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 the 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. Orientation attendance is required.

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 professional colleagues;

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 87 hours of approved graduate work is required for the Ph.D.

1. Twenty-seven hours of core courses—Communications 612, 620, 640, 641; 6 hours of statistics; and three of the following courses: Communications 622, 632, 642, and 652.

2. Fifteen hours in a primary concentration in communications management and industry (publications), 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 after completion of the formal program of coursework and research for the thesis option. 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-binding) 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 in advance. This information is available from the Graduate Studies Office, 426 Communications Building, 974-6651. See also courses listed under Advertising, Broadcasting, Information Sciences, Journalism, and Speech Communication.

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 graduate 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. Exceptions to this policy may be made only with the approval of the Associate Dean for Graduate Studies of the College of Communications on the recommendation of the student's faculty committee.
Comparative and Experimental Medicine

(Office of the Provost)

MAJOR DEGREES

Comparative and Experimental Medicine .......... M.S., Ph.D.

L. N. D. Potgieter, Director

Joint Graduate Coordinating Committee:
Karlstad, M.D., Ph.D., Anesthesiology
Lawler, J. E., Ph.D., Psychology
Lozio, C., M.D., Medical Biology
Potgieter, L. N. D. (Liaison), B.V.Sc., Ph.D., Veterinary Teaching Hospital
Slauson, D. O., D.V.M., Ph.D., Veterinary Teaching Hospital

The Comparative and Experimental Medicine degree program (M.S. and Ph.D.) is a jointly-administered graduate program intended to prepare students for teaching and/or research careers in the health sciences. This program emphasizes the comparative approach to the study of experimental pathobiology, infectious diseases, pharmacokinetics, epidemiology, clinical medicine, immunopathology, hematology, aberrant metabolism, oncology, and genetic disorders. The Ph.D. program is open to approved graduate students seeking training in this area and is especially useful for individuals with professional degrees. For the student with undergraduate biological science background, the Comparative and Experimental Medicine program provides an unusual opportunity to study disease processes common in humans and animals from a multidisciplinary perspective. The scope of this intercollegiate program, which pools faculty resources from both veterinary and human medicine, is broadened by faculty members representing animal science and numerous areas of the life sciences. The interdisciplinary training environment includes such diverse support as facilities and personnel at the Veterinary Teaching Hospital, UT Medical Center at Knoxville, the Oak Ridge National Laboratory, Knoxville Zoo, Zoological Park, Hemophilia Clinic, Developmental and Genetic Center, Hematology and Oncology services, and departments of life sciences. For additional information, write to the Office of Research and Graduate Programs, or access the Website at http://cvm.utk.edu.

ADMISSION REQUIREMENTS

Admission requirements of The Graduate School of UT apply. In addition, all applicants must furnish three letters of recommendation from individuals who are familiar with their scholastic or professional records.

Master of Science Degree Program

Applicants must have a baccalaureate degree with a strong background in the physical and biological sciences. Students may be admitted upon presenting evidence of exemplary performance on the Graduate Record Examination.

Doctor of Philosophy Degree Program

Applicants generally will be expected to have a professional degree in one of the medical sciences (e.g., M.D., D.D.S., DVM) or a master's degree in one of the biomedical sciences and a Graduate Record Examination score of at least 1000 for the quantitative and verbal sections.

An individual having a baccalaureate degree with a strong background in the physical and biological sciences may be admitted upon presenting evidence of exemplary performance on the Graduate Record Examination.

Exceptional veterinary students at UT may be admitted to the Comparative and Experimental Medicine graduate program but will be enrolled officially as veterinary students. During summers such students may take advantage of registering for graduate courses to be counted as elective courses in the veterinary program.

THE MASTER'S PROGRAM

Core courses are required for the program. A basic science and/or applied science concentration must be selected at the first meeting of the student’s master's committee. For the basic science concentration, students must take at least 4 credit hours in 500- or 600-level courses in basic mechanisms of disease and at least 6 credit hours of 500-level biochemistry or cell biology. See listings under the Biochemistry and Cellular and Molecular Biology program for information on these courses. For the applied science concentration, students must take at least 6 credit hours of 600-level epidemiology and at least 5 credit hours of 500- or 600-level statistics. In addition, students must complete a minimum of 8 hours of coursework in a specified discipline, 5 or more hours of electives, and 6 hours of Thesis 500. 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

Core courses are required for the program. A basic science and/or applied science concentration must be selected at the first meeting of the student's doctoral committee. For the basic science concentra-
tion, students must take at least 4 credit hours in 500-600-level courses in basic mechanisms of disease and at least 6 credit hours of 500-level biochemistry or cell biology. See listings under the Biochemistry and Cellular and Molecular Biology program for information on these courses. For the applied science concentration, students must take at least 6 credit hours of 600-level epidemiology and at least 5 credit hours of 500-600-level statistics. 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, genetics, infectious disease or biochemistry of diseases. 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 on an in-state tuition basis. The M.S. program is available to residents of Georgia. The Ph.D. program is available to residents of the state of Florida. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Student Services.

Comparative and Experimental Medicine--Graduate School of Medicine

GRADUATE COURSES

Participating departments include: Anesthesia, Medicine, Medical Biology, Medical Genetics, 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 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

508 Graduate Research Participation (3) Advanced research techniques while conducting individual biomedical research projects under supervision of faculty. Open to all graduate students. Prereq: Consent of instructor. May be repeated with consent of instructor. Maximum 9 hrs. S/NC only. E

521 Principles of Oncology (3) Lectures, classroom discussion, and case reports surveying major topics of oncology. Prereq: Biology 220-30 or consent of instructor.

541 Molecular Basis for Human Diseases (4) Disease at molecular level. Changes in molecular events in cells that lead to disease and occur as result of disease. Correlation with clinical and pathological states. Prereq: Biochemistry and Cellular and Molecular Biology 410-419 or equivalent. F, A

545 Clinical Genetics (3) Human genetic disorders: new developments in cytogenetics, molecular genetics, clinical diagnoses and prevention. Prereq: Biology and genetics background or 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/NC only. F, Sp

611 Advanced Topics in Medical Science (1-3) New developments in recent research applicable to clinical medicine. Primarily for doctoral candidates in Comparative and Experimental Medicine. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. F, Sp

652 Special Topics in Pathology (1-3) Pathologic anatomy, biochemical pathology, and related areas. Primarily for doctoral candidates in Comparative and Experimental Medicine. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. F, Sp

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

604 Veterinary Pathology Seminar (1) Microscopic and gross visual evaluation of tissues from cases examined by pathologists, residents, and graduate students. Interpretation of observations. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. F, Sp

605 Pathobiology Seminar (1) Subject of current interest in veterinary medicine. Students present one seminar per term enrolled. Prereq: Consent of instructor. May be repeated. Maximum 4 hrs. Class meets once monthly. E

606 Clinical Epidemiology (3) Theory and principles of design implementation and analysis of clinical research. Lab: appraisal of biomedical literature and design of proposal for clinical research project. Prereq: Consent of instructor. F, Sp

607 Diagnosis and Pathogenesis of Virus Diseases of Domestic Animals (3) Advanced study of virus diseases important to domestic animals: virus biology, pathogenesis, pathology, and diagnosis. Technical training in virus diseases diagnosis. Prereq: Consent of instructor. 2 hrs and 1 lab. Sp

608 Descriptive and Applied Epidemiology (3) Principles of epidemiology and historic and modern application to diseases of animals. Host-agent relationships, measurement of disease frequency, animal production and disease monitoring and control, field investigations, animal health economics. Prereq: Consent of instructor. F, Sp

609 Mechanisms of Disease (4) Advanced topics in pathobiology and mechanisms of disease: pathophysiology, cellular degeneration, inflammation, immunopathology, hemostasis. Principal biochemical and morphologic responses of various cells, tissues, and organs to injury and other metabolic derangements. Selected contemporary topics from current literature and textbooks. Prereq: Consent of instructor. Sp, A

610 Advanced Topics in Comparative and Experimental Medicine (3-15) Advanced in-depth experience in various disciplines. Current and future research methods and techniques. Recent advances and instrumentation in analytical techniques for comparative medicine. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. F, Sp

651 Advanced Topics in Animal Anatomy (1-4) Same as Animal Science 651, E

652 Disorders of the Endocrine System (2) Same as Animal Science 652, Sp, A

Comparative Medicine

See College of Veterinary Medicine and Comparative and Experimental Medicine.
Computer Science
(College of Arts and Sciences)

MAJOR DEGREES

Computer Science ......................... M.S., Ph.D.

Robert C. Ward, Head

Professors:

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
Thomason, Michael G., Ph.D. .... Duke
Ward, Robert C., Ph.D. ............ Virginia

Associate Professors:

Berrv, Michael W., Ph.D. .......... Illinois
Gregor, Jens, Ph.D. ................. Aalborg (Denmark)
MacLennon, Bruce J., Ph.D. .... Purdue
Plank, James S., Ph.D. ............. Princeton
Raghavan, Padma, Ph.D. ....... Penn Slate
Vander Zanden, Bradley, Ph.D. ... Cornell
Vose, Michael D., Ph.D. .......... Texas

Assistant Professors:

Straight, David W., Ph.D. .......... Texas
Wolski, Richard, Ph.D. .......... UC Davis

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 courses has been taken before the student may schedule the examination. Information concerning the examination is available in the department 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 (530, 560, 590) 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 Grad School. The student should satisfy the same background requirements as for the master's program. See the departmental brochure for details.

Original research reported in a dissertation of high quality is emphasized. The minimum number required is 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. 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 UT. 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. Prereq: 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 communications. Faculty research. Prereq: 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, databases, computer languages, database systems, and programming languages. Faculty research. Prereq: 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. Prereq: 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. Prereq: Completion of core curriculum or consent of instructor. May be repeated. Maximum 9 hrs.

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

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

510 Thesis (1-15) P/NP only, E

520 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 Cybernetics (3) Various functions in living systems and their actual or potential realization in computers. Prereq: 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 serial and parallel machines. Required background: Architecture or machine organization.


541 Database Management Systems (3) Data model theory, optimization, and normalization; intelligent database systems; companion of implementations: analysis of distributed and networked databases. Techniques for evaluation of performances, integrity, security and reliability Prereq: 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. Prereq: 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. Prereq: One year calculus and discrete structures.

560 Software Systems (3) Design and implementation of compilers, software systems; optimization, run-time storage administration. Software system design issues; description, structuring and design of contemporary software systems. Prereq: Systems Programming.

571-72 Numerical Mathematics (3) (Same as Mathematics 571-72)

573 Finite Difference Methods for Partial Differential Equations (3) (Same as Mathematics 573)

574 Finite Element Methods (3) (Same as Mathematics 574)

575 Matrix Theory and Techniques in Numerical Analysis (3) (Same as Mathematics 575)

576 Sparse Matrix Computations (3) Solution of sparse linear systems: graph models, reordering techniques, symbolic factorization, data structures, numerical algorithms, complexity analysis, parallel algorithms. Prereq: Numerical linear algebra.

580 Foundations (3) Foundations of computer science, including computability, computational complexity, fundamental algorithms and algorithm analysis. Required background: Automata theory.

581 Advanced Design and Analysis of Algorithms (3) Analysis of algorithms and relevance of analysis to design of efficient computer algorithms. Sorting, searching, graph algorithms, pattern matching, dy-
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 file, 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 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.

Retail and Consumer Sciences (Thesis)
Major (Required RCS courses): 510, 511, 541, 550, 562, 590
Cognate Area 6
Statistics 3
Thesis 6
Total 34

Textile Science (Thesis Option)
RCS 552 3
Research Methods* 3
TS 590
Textile Science courses 12
Cognate Area 6
Statistics 3
Total 36

*Must include RCS 552 or equivalent; or 3 hours of laboratory techniques in materials analysis and characterization.

Textile Science (Non-Thesis Option)
Nonwovens Core (Required TS courses: 510, 521, 528, 528, 595) 15
Related Courses 9
Statistics 3
Professional Project, TS 501 3-6
Total 30-33

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:

HOSPITALITY MANAGEMENT
All students (28 hours): Hotel and Restaurant Administration 532, 537, 542; Nutrition 541; Hotel and Restaurant Administration/Nutrition electives (12 hours); related area (6 hours); management statistics (3 hours);
Thesis Option (6 hours): 500;
Non-Thesis Option (6 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 Management 512; statistics (3 hours);
research methods courses (3 hours);
Thesis Option (6 hours): 500;
Non-Thesis Option (9 hours): 590 (6 hours); elective (3 hours).

THEORETICAL RECREATION
All students (24 hours): 420 or 425, 510, 515, 520, 521, 522; statistics (3 hours);
research methods courses (3 hours);
Thesis Option (9 hours): 500; elective (3 hours);
Non-Thesis Option (12 hours); electives (6 hours); 590 (3-6 hours).
Tourism

All students (30 hours): 470, 510, 515; Hotel and Restaurant Administration 532, 542; Marketing 510; Hotel and Restaurant Administration 555 or Planning 540; Planning 546 or 550; statistics (3 hours); research methods (3 hours); Thesis Option (6 hours): RTM or HRA 500; Non-Thesis Option (9 hours): 590 (3-6 hours); elective (3-6 hours).

THE PH.D. CONCENTRATIONS

Retail and Consumer Sciences

Students enrolled in the Ph.D. program with a concentration in retail and consumer sciences are provided with a foundation in management and retail and consumer sciences to further theory and application in advanced study and research. Requirements are either 81 or 90 hours, depending upon whether students select a minor in statistics. Requirements include:

- RCS Required Courses: 614, 615, 625, 641, 651
- Research Methods: 590, 616
- Statistics
- Cognate Area
- Human Ecology 530
- Electives
- Dissertation
- Total

Note: (1) Statistics hours must include Statistics 537, 538, 579. (2) Cognate hours must include at least 3 hours at the 600 level. (3) Students choosing to take a minor in statistics will take a minimum of 15 hours of prescribed statistics courses and are not required to take a cognate area.

Textile Science

Students enrolled in the Ph.D. program in Human Ecology with a concentration in textile science take a common course which provides a foundation for the integration of textiles and apparel in the context of the near environment. A required departmental research seminar exposes students to research being conducted in all areas of study in the department. Requirements include:

- Textile Science Courses
- TS 552
- TS 590
- Cognate Area
- Statistics
- Research Methods
- Electives
- Dissertation
- Total

Note: Students must take a minimum of 9 hours at the 600 level in the College of Human Ecology, exclusive of dissertation. Transfer students with a master’s degree from another institution are required to complete at least 42 hours (including dissertation hours) from UT.

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 capability.

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 on an in-state tuition basis. The M.S. program in Recreation, Tourism, and Hospitality Management is available to residents of the state of Kentucky. Additional information on state residents can be obtained from the Graduate Student Services. 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, nutrient analysis, rooms management, and sales management. Prereq: Food and Lodging Cost Control or consent of instructor. F,A
- 531 Advanced Financial Management (3) Financial planning, operations and evaluation techniques used in foodservice and lodging management: developing budgets, 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 methods and models to optimize decisions. Prereq: Quantity Food Procurement, Production and Service or consent of instructor. F,A
- 534 Special Topics in Foodservice and Lodging Administration (1-3) Lecture/discussion format. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. 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 on 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 industry. Market research, sensory evaluation, production techniques, and microbiological evaluation of food. Prereq: Quantity Food Procurement. Production and Service with lab, or Observation, Hospitality Sales and Marketing, 542 and Nutrition 413, or equivalents. F,A
- 547 Field Experience (3-9) Experience in food- or lodging-related industry or agency under supervision of faculty member. 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 foodservice and lodging industry. Prereq: Hospitality Law or equivalent, or consent of instructor. Sp,A
- 600 Doctoral Research and Dissertation (3-15) P/NP only. E

Recreation and Tourism Management

GRADUATE COURSES

- 415 Development and Maintenance of Recreation, Tourism and Athletic Facilities (3) Principles of designing, planning, equipping, operating and maintaining various facilities. Elements of risk management and safety in design process. Prereq: 310 Development and Evaluation of Recreation and Tourism Programs 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. F
- 440 Dimensions of Commercial Recreation and Tourism Enterprises (3) Organizational structures, delivery systems, financing enterprises and operating selected profit centers in variety of settings. Market performance and economic impact. Prereq: 110 Recreation Foundations of Leadership, junior standing or consent of instructor. Sp
- 450 Special Topics in Leisure Education and Tourism (1-6) Development of special topics in recreation, therapeutic recreation and tourism. May be repeated. Maximum 6 hrs. E
- 470 Tourism and Leisure Industries (3) Symbolic 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 venues 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 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
- 515 Philosophical and Conceptual Foundations of Leisure (3) Philosophy of leisure and recreation; nature of philosophy, concepts of leisure, recreation, play, work and other factors, history of field, and relationship of ideas to contemporary society and to professional practice. F
Counseling, Deafness and Human Services

(College of Education)

MAJORS

Counseling................................. M.S.
Education................................. M.S., Ed.S., Ph.D.

Olga Welch, Head

Professors:

Davis, Kathleen L., Ed.D................ Georgia
DeRidder, Lawrence M. (Emeritus).
Ph.D. ........................................ Michigan
Dietz, Siegfried C. (Emeritus).
Ed.D. ..................................... Arizona State
Doll, E. E. (Emeritus), Ph.D. .......... Pennsylvania
Frey, Roger M. (Emeritus), Ed.D. ..... Illinois
Hector, Mark A., Ph.D. ................. Michigan State
Huck, Schuyler W., Ph.D. .............. Northwestern
Kronick, Robert F., Ph.D. .......... Tennessee
McClam, T., Ph.D. ......................... South Carolina
Miller, James H. (Emeritus), Ed.D. ....... Auburn
Paton, Martha P., Ph.D. ................. Ohio State
Poppon, William A. (Liaison), Ph.D. Ohio State
Thompson, Charles L., Ph.D. .......... Ohio State
Walch, Olga, Ed.D. ....................... Tennessee
Woodrick, William E. (Emeritus).
Ed.D. ....................................... Mississippi

Associate Professors:

Ashmore, D., M.S. ....................... Tennessee
Davis, J., Ph.D. ......................... New Mexico
Hutchens, Teresa A., Ph.D. .......... Georgia
Warden, K., Ph.D. ....................... Tennessee

Assistant Professors:

Conwill, William L., Ph.D. ........... Stanford
Diambrini, Joel F., Ed.D. .............. William & Mary
Skinner, Amy L., Ph.D. ............... Mississippi

Research Professors:

Cassell, Jack L., Ph.D. ................. Kansas
Colvin, Craig R., Ed.D. ............... Virginia
Mulkey, S., Wayne, Ph.D. .......... Florida State

The Department of Counseling, Deafness and Human Services participates in graduate programs leading to degrees, majors, and concentrations in:

Master of Science

Counseling

Mental health counseling
Rehabilitation counseling
School counseling

Education

Track 1-education of the deaf and hard of hearing
Track 2-education of the deaf and hard of hearing

Educational Specialist

Education

School counseling

Doctor of Philosophy

Education

Counseling psychology

Counselor education*

*Program is not currently accepting new students.

See Education under Fields of Instruction for full description of all degree requirements.

The M.S. in Counseling and Ed.S. degree program 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 concentration in counselor education is accredited by the Council for Accreditation of Counseling and Related Educational Programs.

The department includes several educational programs sponsored by the U.S. Department of Education, Office of Special Education and Rehabilitative Services, Rehabilitation Services Administration, including: Regional Rehabilitation Continuing Education Program, Orientation to Deafness, Southeastern Regional Interpreters Training Consortium, National Interpreter Training Center, and the Educational Interpreting program.

The department emphasizes research-based programs that address the growth and development of the whole person throughout the lifespan. In its counseling programs, it concentrates on maximizing development and adjustment of individuals through prevention and treatment models in schools, colleges, community agencies, businesses, and private-practice settings. In its rehabilitation programs, it pursues improvement in the quality of life for persons with disabilities and focuses research interests on the development of new knowledge and technology to meet the unique educational, social, and employment needs of this population. A major goal of the department is the preparation of graduates for future leadership and professional roles in business and industry, education, and community and government service.

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 for the major in Counseling, a departmental admissions application form and letters of rec-

ommendation. For the doctoral program, a writing sample is also required.

Counselor Education and Counseling Psychology

GRADUATE COURSES

410 Gender Roles 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, Su

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 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

503 Problems in Lieu of Thesis (2-3) May be repeated. Maximum 3 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) Conceptual and 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, Su

535 Ethical, Legal, and Professional Issues in Counseling (3) Professional practice issues in school and community counseling and related fields: education, research, standards of practice, credentialing, and policy. Prereq: Admission to counseling program or consent of instructor. Su

550 Introduction to Pupil Personnel Programs (3) History, philosophy, professional standards, counseling 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 and client self-awareness; counseling theory/techniques. F, Su

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: 650 or consent of instructor and Internet access account. Sp

554 Group Dynamics and Methods (3) Theory and types of groups, descriptions of group practices, methods, dynamics, and facilitative skills, supervision of leadership skills. F

555 Practicum in Counseling (3) Supervised practice and application of counseling skills with individual clients. Prereq: Admission to program, 625, 551 and consent of instructor. May be repeated. Minimum 9 hrs. E

556 Orientation to Mental Health Counseling (3) Mental health counseling as profession: professional
organizations, work settings, code of ethics, certification requirements, role identity, F, Sp

558 Internship in School Counseling (1-6) Supervised postpracticum employment at academic unit approved site. Prereq: 550 and consent of instructor. May be repeated. Maximum 12 hrs. S/NC only. F

559 Internship in Community Agency Counseling (1-6) Supervised postpracticum employment at academic unit approved human services agency. Prereq: Admission to community agency program, 555 and consent of 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 planning and development, identification, evaluation, 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 facilitation of 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) Variety and research on issues and problems 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: intelligence: proficiency in administrative scoring, interpretation for Wechsler, adults and children, Stanford-Binet. Prereq: 525 and 520 and admission to counseling program or consent of instructor. S/NC only. Sp, A

585 Seminar in Gerontology (1) (Same as Human Ecology 585, Educational Psychology 585, Exercise Science 585, Nursing 585, Public Health 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

604 Directed Research (1-3) Instructor- or student-initiated group investigation of empirical and theoretical problems in educational and counseling psychology. May be repeated. Maximum 12 hrs. S/NC only. E

606 Special Topics (1-3) Instructor-initiated courses offered at convenience of academic unit on topics of interest. May be repeated. Maximum 15 hrs. S/NC or letter grade. E

625 Advanced Study in Personality (3) Theory, research and conceptual analysis of studies with application to education and counseling. Prereq: 431 or equivalent. F

635 Ethical, Legal, and Professional Issues in Psychology (3) (Same as Psychology 635 and Educational Psychology 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 or letter grade. E

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

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 research on learning disabilities, atypical behavior and their behavioral and cognitive manifestations. Prereq: 516; and 541 or equivalent individual assessment course; or consent of instructor. Sp, A


671 Personality and Vocational Assessment (3) Use and interpretation of personality and vocational measures in assessment of clients. Prereq: 525, 552 or consent of instructor. A

672 Psychological Dysfunction (3) Classification methods, dynamics and treatment of dysfunctional individuals in counseling. Prereq: 525 and course in abnormal psychology, or consent of instructor. A

673 Advanced Theory and Practice in Group Counseling (3) Theories and supervised practice. Prereq: 554, 555, and consent of instructor. F

674 Practicum in Counseling Psychology (3) Supervised practice of individual counseling. Minimum 135 clock hrs required each semester. Prereq: Admission to counseling psychology doctoral program, 555, and consent of instructor. May be repeated. Maximum 6 hrs. E

678 Theory and Practice of Counseling Supervision (3) Theory and practice of supervision in counseling. Prereq: 555, or 674, or consent of instructor. S/NC only. Sp

679 Internship in Counseling Psychology (1-6) Supervised employment in departmentally approved counseling psychology internship sites. Prereq: Admission to counseling psychology doctoral program and consent of instructor. May be repeated. Maximum 12 hrs. S/NC only. E

693 Independent Study (1-3) May be repeated. S/NC or letter grade. E

696 Problematic Issues in Counseling (3) A review of critical problems in the field of counseling psychology. Prereq: Consent of instructor.

697 Research Seminar in Counseling (3) Research seminar in counseling psychology. Prereq: Consent of instructor.

698 Advanced Seminar in Counseling (3) Special topics, with consent of instructor. May be repeated. Maximum 12 hrs. S/NC only. E

699 Independent Study (1-3) May be repeated. S/NC only. E

700 Problems in Lieu of Thesis (2-3) May be repeated. Maximum 9 hrs. S/NC only. E

704 Clinical Experience in Teaching an Supervision of Exceptional Children (3-9) (Same as Special Education 624-9)

709 Vocational Guidance and Career Planning: With Hearing Impaired (3) Utilization of psychological, educational, social and vocational, diagnostic materials and resources appropriate for hearing impaired students. Prereq: Consent of instructor. May be repeated. S/NC only. E

718 Educational Specialist Research and Thesis (3) May be repeated. P/NP only. E

723 Practicum with Deaf/Hard of Hearing (3) Receptive and expressive language capabilities of hearing impaired student. Designing, teaching, and post-testing unit of instruction for remediation of specific language errors.


729 Teaching Reading to Deaf/Hard of Hearing (3) Specific methods necessary to teach the prelingually hearing impaired student. Practice in preparation of developmentally appropriate reading materials. Methods which assist in integrating hearing impaired students in regular reading curriculums and materials. Prereq: 415.

730 Orientation to Rehabilitation (3) History, philosophy, legal and economic issues, and practices in public and private rehabilitation programs. Qualifications of service providers. Assessment, plan development, and provision of services to people who have disabilities and vocational handicaps. Identification, mobilization, and utilization of rehabilitation resources.

732 Caseload Management in Rehabilitation (3) Techniques and procedures involved in management of caseloads in Federal-State vocational rehabilitation agencies, private rehabilitation companies, and public or private rehabilitation facilities. Analysis of appropriate industrial management models related to rehabilitation programs.

733 Job Analysis, Development, and Placement (3) Determining employment-readiness of people with disabilities, identifying appropriate jobs for selected clients, and assisting clients in seeking, obtaining, and retaining employment. Job analysis, job modification and re-engineering, marketing, and employer-serving techniques; legislation impacting job placement; supported work; and use of occupational information.

735 Vocational Evaluation: Statistical Methods (3) Process principles and techniques used to determine vocational assets and liabilities of people with disabilities. Functional analysis of behavior and view data; selection and application of relevant psychometric instruments; integration of statistical data into diagnostic reports; application of computer-generated reporting systems.

737 Vocational Evaluation: Clinical Methods (3) Process, principles, and techniques used to assist individuals in determining and understanding their own work behavior and interests. Selection and use of occupational exploration programs and work samples; application of situational tasks, job tryouts, and simulated work experiences in vocational evaluation. Clinical interpretation of data through formal staff conference, vocational counseling, and report writing.

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


Rehabilitation and Deafness

GRADUATE COURSES

415 Language Development of Deaf/Hard of Hearing I (3) Language problems of hearing impaired contrasted with scope and sequence of normal language development. Formal linguistic systems used to describe language development problems.

416 Language Development of Deaf/Hard of Hearing II (3) Developmental and remedial systems of teaching language to hearing impaired children. Comprehension and production differences, idiomatic and figurative structures. Prereq: 415 or consent of instructor.

419 Speech Development of Deaf/Hard of Hearing (4) Theories of speech development, approaches in training perception and production of speech, and aural habilitation. Practicum experiences.

424 Nature of Hearing Impairments (3) Basic principles of audiology: anatomy and physiology of hearing; effects of hearing loss; methods and instrumentation for assessment of hearing level; interpretation of audiologic services to medical and other rehabilitative disciplines.

425 Introduction to the Psychology and Education of the Deaf/Deafening (3) Primarily for those planning to teach hearing impaired. Overview of research related to psychology, social adjustment, communication methodology, language development, and education of hearing impaired. Inferences from evidence gathered. Prereq: Consent of instructor. F


500 Thesis (1-15) P/NP only. E
Ecology and Evolutionary Biology

(College of Arts and Sciences)

MAJOR

Ecology and Evolutionary Biology  M.S., Ph.D.

T. G. Hallam, Head
C. R. B. Boake, Associate Head

Professors:
Boake, C. R. B., Ph.D. ............ Cornell
Bunting, D. L., II, Ph.D. .......... Oklahoma State
Burghardt, G. M., Ph.D. .......... Chicago
Delcourt, H., Ph.D. ............... Minnesota
Delcourt, P. A., Ph.D. ............. Minnesota
Echternacht, A. C., Ph.D. ......... Kansas
Etnier, D. A., Ph.D. .............. Minnesota
Greenberg, N. B., Ph.D. .......... Rutgers
Gross, L. F., Ph.D. ............... Tennessee
Hallam, T. G., Ph.D. ............. Missouri
Harris, W. F., Ph.D. .............. Tennessee
McCormick, J. F. (Emeritus), Ph.D. ...... Emory
McCracken, G. F., Ph.D. .......... Cornell
Pan, M. L., Ph.D. ................. Pennsylvania
Riechert, S. E., Ph.D. .......... Wisconsin
Sayer, G. S., Ph.D. .............. Idaho
Schultz, T. W., Ph.D. .......... Tennessee
Simberloff, D. (Gore Hunger Chair of Excellence), Ph.D. .......... Harvard
Stacey, G., Ph.D. ................. Texas
Vaughan, G. L. (Emeritus), Ph.D. ...... Duke

Associate Professors:
Amundsen, C. C., Ph.D. .......... Colorado
Drake, J. A., Ph.D. .............. Purdue
Fox, D. J., Ph.D. ................ Johns Hopkins
Gavrilets, S., Ph.D. .............. Moscow State
Pigliucci, M., Ph.D. ............. Connecticut

Assistant Professors:
Cruzan, M. B. C., Ph.D. ... SUNY (Stony Brook)
Weltzin, J., Ph.D. .............. Arizona

Research Associate Professor:
Greismer, J. M., Ph.D. ............ Alaska

Shared faculty are drawn from other University departments, the Oak Ridge National Laboratory, the National Biological Service, and the Tennessee Valley Authority.

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 6 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 an academic background consistent with 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 including one year of general chemistry, one year of physics, 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 general 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 1650. Submission of scores on appropriate (e.g., biology, mathematics) advanced GRE examinations is 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 departmental application requires 3 letters of reference 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 Chair, Graduate Affairs Committee, Department of Ecology and Evolutionary Biology, 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

411-12 Minicourse in Ecology and Evolutionary Biology 2 hrs and 1 lab. 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 departmental 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, etc. 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: 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 physiochemical nature of inland waters with description of biotic communities and their interrelationships. Prereq: General Chemistry and General Ecology. 2 hrs and 1 lab.


484 Conservation Biology (3) Application of principles and techniques of ecological research to conservation of biological diversity at genetic, population, community, and ecosystem levels. Prereq: General Genetics and General Ecology.

500 Thesis (1-15) S/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 before degree is completed. May not be used toward degree requirements. May be repeated. S/NP 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/NP only.

504 Special Topics (1-3) Selected directed readings or special course in topics of current interest. Consult department listing for offerings. May be repeated with consent of instructor. Maximum 9 hrs. S/NP 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. Sp

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

509 Foundations: Readings in Ecology (1-2) Readings and discussion of classic papers in field.

511 Foundations: Readings in Evolution (1-2) Readings and discussion of classic papers in field.

513 Foundations: Readings in Behavior (1-2) Readings and discussion of classic papers in field.

515 Foundations: Readings in Environmental Toxicology (1-2) Readings and discussion of classic papers in field.

516 Population 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 Environment. 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 biotic environment. Prereq: Consent of instructor. Minimum 4 hrs. S/NP only.

535 Ecology and Development in the Amazon (3) Natural history, ecosystem diversity and function, and opportunities for sustainable economic development in the Amazon Basin. Includes field trip of 7-10 days to Manaus, Brazil. Prereq: Consent of instructor. Minimum 4 hrs. S/NP only.

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 physiology at tissue 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 freshwater 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 evolution, 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.)

553 Environmental Planning (3) (Same as Planning 553.)

556 Ice-Age Environments 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 Geology 556.)

557 Quaternary Ecology (3) Perturbation, process, and pattern within Quaternary ecosystems; climatic change and vegetational response during last 2.5 million years. Prereq: Consent of instructor. (Same as Geology 557.)

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; reproductive toxicology; mutagenesis, teratogenesis, carcinogenesis, 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, using both single-locus and quantitative genetic approaches. Prereq: Genetics or consent of instructor.

577 Landscape Ecology (3) Ecological structure, function and change through time of landscape mosaics: quantitative 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.)

583 Zoogeography (3) Processes determining geographic distribution of animals 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.

599 Advanced Evolutionary Ecology (3) (Same as Botany 599.)

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

601 Advanced Topics (1-3) Readings 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, biostatistics and epidemiology. Presentations by students, faculty and guest lecturers from academia and industry. May be repeated with consent of department. Maximum 4 hrs. (Same as Biochemistry and Cellular and Molecular Biology 504.) S/NP only. F-Sp.

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 635.)

681-682 Advanced Mathematical Ecology (3,3) (Same as Mathematics 681-682.)
Economics
(College of Business Administration)

MAJORS
Economics ........................................ M.A., Ph.D.

Matthew N. Murray, Head

Professors:
Bohm, Robert A., Ph.D. ........... Washington (St. Louis)
Bowny, Roger L. (Emeritus), Ph.D. .... Texas
Carroll, Sidney L., Ph.D. .......... Harvard
Chang, Hsiu S., Ph.D. .............. Vanderbilt
Clark, Don P., Ph.D. ............... Michigan State
Cole, William E. (Emeritus), Ph.D. .... Texas
Fox, William F., Ph.D. ............ Ohio State
Herzog, Henry W., Ph.D. .......... Maryland
Jensen, Hans E. (Emeritus), Ph.D. .... Texas
Lee, Feng-Yao (Emeritus), Ph.D. .......... Michigan State

Associate Professors:
Gauger, Jean A., Ph.D. .......... Iowa State
Gustoff, Errol, Ph.D. .......... Stanford

Assistant Professors:
Bruce, Donald, Ph.D. ............. Syracuse
Fallaschetti, Dino, Ph.D. ........ St. Mary's
Martens, David (Emeritus), Ph.D. .......... Texas State
Murray, M. N., Ph.D. .......... Syracuse
Neal, Walter C. (Emeritus), Ph.D. .......... London
Russell, Milton (Emeritus), Ph.D. ...... Oklahoma
Spiva, George A. (Emeritus), Ph.D. .......... Texas

The Department of Economics offers graduate programs leading to the M.A. and Ph.D. The M.A. may be completed by either a thesis or non-thesis option, while the Ph.D. requires successful completion of a dissertation. Applicants to these programs should contact the Director of Graduate Studies, Department of Economics, for further information.

ACADEMIC STANDARDS
A graduate student 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 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.

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 must be in economics) must be at the 500 level or above. Of the minimum of 18 hours in economics at the 500 level or above, 12 hours must consist of 511, 512, 531, 541, and the remaining 8 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 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, 531, and 541. 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 600 level or above. Of the remaining 18 hours at the 500 level or above, a policy-relevant dissertation may be pursued. Students ingood standing in one of the participating departments and 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 methods 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.

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 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 Student Services.

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 explanations of cycles, and 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.)
435 Industrial Organization Analysis (3) Monopoly and competition in United States economy; inter-

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 evaluation, 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 faculty time before degree is completed. May not be used toward degree requirements. May be repeated: S/U.

511-12 Microeconomic Theory (3,3) Theory of consumer choice and demand, theory of revealed preference, attributes of goods and implicit prices, market demand, labor supply, individual behavior under uncertainty, theory of production and market structures, derived demand and factor pricing, introduction to welfare economics, market failure and theory of second best, pure exchange.

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.

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 area of governmental-business interaction.

577 Environmental Economics and Policy Management (3) Interdisciplinary perspective on goals of sustainable economic development and environmental quality. Development of decision-making tools and conflict resolution.

579 Environmental Policy Research Workshop (1) Multidisciplinary analysis of advanced topics in environmental policy. Student participation. Major writing requirement. Prereq: Consent of instructor. May be repeated: Maximum 6 hrs.


583 Econometric Techniques (3) Multivariate time series, panel data, and limited dependent variable analysis applied to economic problems. Prereq: 582.

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

613 Advanced Macroeconomic Theory (3) Prereq: 514 or equivalent.


621 International Economics (3) Comparative advantage, trade migration, commodity composition of trade, protectionist theories, protectionist arguments, trade liberalization, U.S. trade policy, exchange rate determination, balance of payments adjustment, multinational corporations, and international capital flows. Prereq: 512 and 514.

623 Economic Development: Theories and Policies (3) Principal theories explaining economic behavior in developing countries and policies and strategies used to promote development. Prereq: Undergraduate degree in economics or consent of instructor.

624 Economic Development: Western Impact on Asia and Africa (3) Studies of consequences of contact between developed world and developing countries of Asia and Africa. Prereq: 21 hrs. of upper division undergraduate social science or consent of instructor.


842 Labor History and Legislation (3) Development of organized labor as important economic and political force in U.S. From Colonial times to present. Evolution of legal status of labor unions and of individual workers vis-a-vis their employers.

651 Monetary Theory (3) Study of money, credit, and liquidity as related to real output determination, interest rates, employment, and prices. Prereq: 513.

652 Topics in Monetary Theory (3) Advanced monetary models, issues in monetary policy, open economy monetary theory and policy. Student participation. Prereq: 651.

661 Regional and Urban Location and Development Theory (3) Theory of industrial and agricultural location and urban migration. Economic basis for land-use patterns, central places, and urban form. Spatial inequalities and urban problems. National policies for regional and urban assistance.

662 Methods of Regional and Urban Analysis (3) Theory of regional and urban economic structure and growth. Regional income and product accounts, shift and share analysis, regional base studies, and regional input-output models. Theory and problem solution.


672 Public Finance: Taxation and Intergovernmental Relations (3) Theory of taxation; tax incidence, tax efficiency, and tax equity; policy analysis of U.S. tax structure at federal, state, and local levels. Theory of fiscal federalism and intergovernmental relations.

677 Environmental and Natural Resource Economics (3) Developmental, empirical, and normative paradigms for resource and environmental exploration. Evaluation of issues related to market failure and differences between renewable and nonrenewable resources.

678 Economics of Environmental Policy (3) Topics in environmental policy. Confrontation of alternative policy instruments, defining policy objectives and role of risk in decision-making process.

882 Econometric Methods (3) Advanced topics in econometrics. Prereq: 583 or equivalent.

690 Workshop (3) Advanced topics in economics. Student participation. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

Education (College of Education)

MAJORS

DEGREES

College Student Personnel ......................... M.S.
Counseling ........................................... M.S.
Education ............................................ M.S., Ed.S., Ed.D., Ph.D.
Educational Administration and Policy Studies ........................................... M.S.
Educational Psychology ................................ M.S.
Human Performance and Sport Studies ........ M.S.

The College of Education offers the Master of Science, Educational Specialist, Doctor of Education, and Doctor of Philosophy degrees through six departments: Counseling, Deafness and Human Services, Educational Administration and Cultural Studies, Educational Psychology, Exercise Science and Sport Management, Instructional Technology, Curriculum and Evaluation.

Theory and Practice in Teacher Education The College also offers initial teacher licensure programs at the graduate level. The program features a professional year internship 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 departmental 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, Claxon Complex A332, The University of Tennessee, Knoxville, TN, 37996-3400, tel. (865) 974-0906, www.utk.edu/advising/advising.html.

THE MASTER'S PROGRAMS

College Student Personnel

Students who major in College Student Personnel 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 in: Mental health counseling Rehabilitation counseling School counseling

The major 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 and Deafness 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, or education of the deaf and hard of hearing. (Non-licensed applicants to Track 1 will be reviewed on a case-by-case basis and must have a strong disciplinary background and professional goals which can be fostered through participation in this non-licensure program.) Track 2 is designed for students seeking initial teacher licensure in the areas of elementary education, early childhood education, foreign language, English, mathematics, science, and special education.

The non-thesis option requires 32 hours beyond the master's degree. Both thesis and non-thesis options are available for both tracks.

Track 1 - Concentrations are available in:
- Art education
- Curriculum
- Education of the deaf and hard of hearing
- Elementary education
- English education
- Foreign language/ESL education
- Instructional technology
- Mathematics education
- Modified and comprehensive special education
- Reading education
- Science education
- Social foundations
- Social science education
- Special education: early childhood
- Sport
- Special education: secondary teaching
- Special education: educational psychology

Both options require a minimum of 12 hours in the major discipline (18 hours for special education concentration).

Track 2 - Concentrations are available in:
- Art education
- Education of the deaf and hard of hearing
- Elementary education
- Modified and comprehensive special education
- Secondary teaching
- Special education: early childhood

The thesis option requires completion of 36 hours, plus four of the six semesters 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 Administration and Policy Studies

The master's degree program with a major in Educational Administration and Policy Studies offers a concentration in educational administration and supervision, requiring a minimum of 36 hours, including 6 hours of Thesis 500 for the thesis option, or 36 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.

Educational Psychology

The master's degree with a major in Educational Psychology is offered with concentrations in:
- Adult education
- Individual & collaborative learning

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 in:
- Exercise science
- Sport management
- Sport studies

Applicants must submit an admission application and 3 letters of recommendation. Both thesis and non-thesis options are available. The non-thesis option requires 32 hours (sport management concentration requires 33 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.

THE SPECIALIST IN EDUCATION PROGRAM

The Educational Specialist degree program with a major in Education encompasses concentrations in:

- Curriculum
- Educational administration & supervision
- Elementary education
- English education
- Foreign language/ESL education
- Instructional technology
- Mathematics education
- Reading education
- School counseling
- School psychology
- Science education

Social science education

Special education

The instructional and curricular concentrations require completion of a minimum of 30 hours of coursework beyond the master's degree, including 6 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 the completion of a minimum of 30 hours beyond the master's degree. 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 degree. Refer to Degree Requirements for complete program requirements.

THE DOCTOR OF EDUCATION PROGRAM

The Ed.D. program with a major in Education is available in the following concentrations and specializations:

- Curriculum, educational research, and evaluation (curriculum, educational research, evaluation)
- Educational administration and policy studies (educational administration and supervision, higher education)
- Educational psychology (collaborative learning)
- Instructional technology (educational applications of technology)
- Literacy, language education, and ESL education (literacy, ESL education)
- Teacher education (elementary education, social science education, mathematics education, science education)

In addition to the requirements of The Graduate School, the hour requirements in the curricular and instructional concentration areas 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 with a specialization in 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 (EP630) 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 concentration in educational administration and policy studies 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 Policy Studies 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 Educational Administration and Policy Studies 606, Leadership Forum, is available for qualified students.

THE DOCTOR OF PHILOSOPHY PROGRAM

Faculty from all six departments participate in the delivery of the Ph.D. degree program with a major in Education. Concentrations and specializations are available in the following areas:

- Counseling psychology (gender and cultural issues in counseling, career development, group process, counseling service, assessment)
- Counselor education (school counseling, counseling services) (Not currently accepting new students)
- Cultural studies in education (social and cultural theory)
- Curriculum, educational research, and evaluation (curriculum, educational research, evaluation, educational applications of technology)
- Early childhood education (early childhood special education)
- Educational administration and policy studies (educational administration and supervision, higher education)
- Educational psychology (adult education, applied educational psychology)
- Exercise science (biomechanics/sports medicine, exercise physiology, physical activity and population health)
- Instructional technology (educational applications of technology)
- Literacy, language education, and ESL education (literacy, ESL education)
- School psychology
- Socio-cultural foundations of sport and education (history of education, history of sport, psychology of sport, philosophy of sport, sociology of education, sport sociology)
- Teacher education (elementary education, gifted and talented education, mathematics education, science education, social science education)

The program requirements are:

Requirements

<table>
<thead>
<tr>
<th>Research Area</th>
<th>Minimum Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Requirements</td>
<td>15</td>
</tr>
<tr>
<td>--Seminar in primary concentration</td>
<td>3</td>
</tr>
<tr>
<td>--Philosophy of science or history/philosophy of education (select one from Philosophy 446 or 546 or courses identified in addendum to Ph.D. guidelines or Cultural Studies in Education 607)</td>
<td>3</td>
</tr>
<tr>
<td>--Theoretical foundations and/or applications (select one)</td>
<td>3</td>
</tr>
<tr>
<td>--Learning and curriculum theory (Educational Psychology 605, 515, or Psychology 580)</td>
<td></td>
</tr>
<tr>
<td>--Administrative/leadership theory (Educational Administration and Supervision 513, 680 or Educational Administration and Policy Studies 514)</td>
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</tr>
<tr>
<td>--Group dynamics (Counselor Education and Counseling Psychology 554)</td>
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</tr>
<tr>
<td>--Instructional technology (Instructional Technology, Curriculum and Evaluation Education 573 or 575)</td>
<td></td>
</tr>
<tr>
<td>--Trans-college seminar: two consecutive semesters (Education 601)</td>
<td>2</td>
</tr>
<tr>
<td>Concentration</td>
<td>15</td>
</tr>
<tr>
<td>--A minimum of 15 hours selected from one concentration</td>
<td>15</td>
</tr>
<tr>
<td>Specialization</td>
<td>9</td>
</tr>
<tr>
<td>--A minimum of 9 hours selected from a specialization</td>
<td>9</td>
</tr>
<tr>
<td>Cognate</td>
<td>6</td>
</tr>
<tr>
<td>--A minimum of 6 hours selected from outside the college in addition to the designated research courses</td>
<td>6</td>
</tr>
<tr>
<td>Dissertation</td>
<td>24</td>
</tr>
</tbody>
</table>

The residence requirement consists of three consecutive semesters of full-time enrollment. Additional details are available through the College's Graduate Center, Claxton Complex A332, (865) 974-0907, or mlw@utk.edu.

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 prerequisites courses, gain admission to The Graduate School as a degree seeking student, and the following 24 hours of coursework:

**Fall Semester**

575 Internship ..... 4
--- Specialty Studies ..... 6
574 Analysis of Teaching for Professional Development ..... 2

**Spring Semester**

575 Internship ..... 8
591 Clinical Studies ..... 4
TOTAL ..... 24

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 Complex A332, (865) 974-8194, or idmorgan@utk.edu.

MINOR IN GERONTOLOGY

Graduate students with majors/concentrations in counseling, exercise science, or educational psychology 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 on an in-state tuition basis. The M.S. program in Counseling is available to residents of the state of Florida (concentration in rehabilitation counseling). The M.S. program in Education (concentration in education of the deaf and hard of hearing) is available to residents of the states of Alabama, Kentucky, Maryland, South Carolina, Virginia, or West Virginia. The M.S. program in Human Performance and Sport Studies is available to residents of Florida, Arkansas, Maryland, South Carolina, or Virginia. The Ed.D. program in Education (concentration in educational psychology) is available to residents of Kentucky. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Student Services.

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 persons in treatment of exceptional individuals. May be repeated. Maximum 6 hrs.

540 Topics in Improvement of Instruction (1-3) Special conferences, workshops, and in-service programs. May be repeated. Maximum 8 hrs. S/N Only.

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 programs; 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 (1-5) Intensive teaching and teaching-related experiences in professional settings in public schools. Enrollment limited to postbacalaureate students in professional year program. Prereq: Admission to Teacher Education program. May be repeated. Maximum 12 hrs. S/N Only.

576 Practicum in Classroom Teaching (1-8) Teaching and teaching-related experiences in elementary and secondary school settings. Specific hours and school level assignment determined by licensure 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.


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 academe and issues/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/NC only.

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

**Educational Administration and Cultural Studies**

*(College of Education)*

**MAJORS**

<table>
<thead>
<tr>
<th>College Student Personnel</th>
<th>...</th>
<th>M.S., Ed.S., Ed.D., Ph.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>...</td>
<td>Education Administration and Policy Studies</td>
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<tr>
<td></td>
<td>...</td>
<td>Human Performance and Sport Studies</td>
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<td></td>
<td>...</td>
<td>Sport studies</td>
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<td></td>
<td>...</td>
<td>Specialist in Education</td>
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<td></td>
<td>...</td>
<td>Education</td>
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<td></td>
<td>...</td>
<td>Educational administration and supervision</td>
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</tbody>
</table>

**DEGREES**

<table>
<thead>
<tr>
<th>Bachelor of Science</th>
<th>Cultural Studies in Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master of Science</td>
<td>Educational administration and policy studies</td>
</tr>
<tr>
<td>Doctor of Philosophy</td>
<td>Doctor of Education</td>
</tr>
<tr>
<td>Doctor of Education</td>
<td>Educational administration and policy studies</td>
</tr>
<tr>
<td>Doctor of Education</td>
<td>Social-cultural foundations of sport and education</td>
</tr>
</tbody>
</table>

See Education under Fields of Instruction for full description of all degree requirements. Programs in cultural studies, including those in the socio-cultural foundations of education and sport, derive their intellectual identity and orientation from disciplines such as anthropology, history, philosophy, psychology, and sociology, and from more specialized forms of inquiry such as ethno-igraphy, semiotics, literary theory, hermeneutics, linguistics, and feminist theory. The faculty are devoted to interdisciplinary inquiry and seek to bring their 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 faculty examine critically the social practices, institutions, "helping" agencies, and other social sites where disenfranchised and marginalized groups struggle for greater control over their futures.

Programs in educational administration and in higher education focus 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.

A cohort-based alternative approach to residence for the Doctor of Education degree program is offered. This alternative residence involves, among other requirements, a two-year, on-campus, continuous enrollment in Educational Administration and Policy Studies 606, Leadership Forum. Students should contact the department for further information.

The annual admission deadline is March 15 for the Ed.S. and doctoral programs, and March 15 for the master's programs.

### Cultural Studies in Education

**GRADUATE COURSES**

<table>
<thead>
<tr>
<th>500 Thesis (1-15)</th>
<th>P/NP only. E</th>
</tr>
</thead>
<tbody>
<tr>
<td>501 Special Project (3)</td>
<td>Culumnating experience for non-thesis major. Research study suitable for publication, or practicum requiring special written work. Prereq: 532. E</td>
</tr>
<tr>
<td>502 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. S/NC only. E</td>
</tr>
<tr>
<td>514 Advanced Philosophy of Sport (3)</td>
<td>Major philosophical theories of sport. Various conceptual, moral, aesthetic, and political issues. 515 Social Theories of Sport (3)</td>
</tr>
</tbody>
</table>
and development of skills needed for qualitative research proposals. Overview of qualitative research methodologies: research design, case study, historical case, ethnography, biography, oral and life history. Critical reading and evaluation of qualitative research studies. F, Su

500 Cultural Studies Seminar (1) Two semester sequence (Fall and Spring); ongoing discussion about cultural and historical perspectives on education, interdisciplinary work, social justice issues. Presentations, videos and readings. May be repeated. Maximum 4 hrs. S/NC only.

501 Issues in Cultural Studies (3) Combination of theoretical readings in cultural studies and service learning for social justice project. Discussion of interdisciplinary, social justice and activism. Links between theory and practice of cultural studies.

502 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 goods and benefits. Prereq: Admission to doctoral program with concentration in cultural studies in education.

503 Independent Study (1-3) May be repeated. S/NC or letter grade. E

504 Supervised Readings (1-3) May be repeated. S/NC or letter grade. E

505 Special Topics (1-3) Advanced study in selected aspects of cultural studies. May be repeated. Maximum 9 hrs. S/NC or letter grade.

600 Doctoral Research and Dissertation (3-15) May be repeated. S only.

607 Advanced Seminar in the Social Foundations of Education (3) Intensive, team-taught seminar. Readings selected by faculty and participants from classic studies and current periodical literature in anthropology, sociology, history, and philosophy of education. Part of general core for Ph.D. program. Prereq: Doctoral student in Education.

608 Seminar in Philosophy of Education (3) Selected philosophical issues in education. May be repeated. Prereq: Cons of instructor. Sp, Su


633 Advanced Sport Psychology (3) Analysis, synthesis, and discussion of contemporary theory and topics; research development and production in sport psychology. May be repeated. Maximum 9 hrs.

648 Topics in Sociology of Education (3) May be repeated. Sp

652 Advanced Studies in Educational Anthropology and/or Sociology (3) Ethnographic methods applied to formal and non-formal educational settings. Analysis of selected research in field. Prereq: 451, 2 courses in cultural anthropology, or consent of instructor. Sp.


681 Practicum (1-3) Intern experience in areas of major interest. May be repeated.

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) Study for doctoral students in selected aspects of cultural studies. May be repeated. Maximum 9 hrs. S/NC or letter grade.

516 Research for Educational Administration (3) Descriptive, experimental, and quasi-experimental designs to help students without quantitative background to read and understand technical professional literature. Introduction to inferential statistics, needs assessments, and evaluation procedures. Sp, Su

523 Administration of Special Services (3) Legislative, programmatic, and ethical responsibilities of educational administrators in design and implementation of special service programs within school settings. Special learner characteristics, program categories, service delivery models, and philosophical frameworks. Inclusion and full service delivery.

529 Politics and Public Relations in Education (3) School/community relations in political context of modern, complex society. Administrator and supervisory or policy roles: public, cultural, and racial environments in which schools operate. Prereq: M.S. introductory core or consent of instructor. F, Su

535 Administrative Applications of Micro Computers (3) DOS, word processing, data base management, spreadsheets, 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 logistical 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, surveillance, and operations of quality educational environments and facilities. Prereq: M.S. introductory core or consent of instructor. F, Su

548 Supervision and Personnel Administration (3) Basic supervisory and personnel concepts and related competencies; budgeting, personnel policies and practices, grievance procedures, collective bargaining, personnel management, recruitment, selection, interviewing, personnel planning, coordinating and maintaining employee information, supervision of instructional and non-instructional personnel, clinical supervision, staff evaluation, and staff development. Prereq: M.S. introductory 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: M.S. introductory core or consent of instructor. F, Su

554 Policy Issues in Educational Law, K-12 (3) Legislative and administrative aspects of educational law, including materials for public school administrators and teachers; problems concerning law and public education. Prereq: M.S. introductory core or consent of instructor. F, Su

580 Internship in Educational Administration (3) Field experience in applied educational setting, working directly with administrator. At end of planned course of study. Placement by department assignment. Some on-campus classes in conjunction with 563 or 566. Prereq: 21 hrs in educational administration and supervision or consent of instructor. F, Su

583 Educational Leadership--Principalship (3) Knowledge, skills, and relationships for principal to be effective educational leader. Simulation materials and field-based activities. Culminating course with internships at end of planned course of study. Prereq: 21 hours in educational administration and supervision or consent of instructor. E

590 Internship in School Leadership, K-12 (3) On-site study of quality school processes throughout region. Processes that make organizations "benchmarks of quality." Prereq: Consent of instructor. May be repeated. S/NC or letter grade. F, Su

605 Advanced Seminar in Administrative Theory (3) Interdisciplinary seminar. Readings selected by faculty for research and scholarly value. Current classic theoretical works and current periodical literature in administrative and organizational theory.

510 Internship in Educational Administration (3) Opportunity for contact with 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/NC only. E

514 Statistics for Educational Administrators (3) Descriptive and experimental research methods, parametric and non-parametric techniques used in research in educational settings. F

515 Research Designs (3) Statistical methods through multi-variate techniques and applications to various research designs. Prereq: 614 or consent of instructor. Sp

516 Research Methods (3) Overview of descriptive and experimental research designs: data collection, analysis, and interpretation for survey studies and school surveys. Conduct of survey. Prereq: Basic statistics and computer skills or consent of instructor. E

629 Seminar in Policy Issues in Education (3) Local, state, and federal education policy; theory analysis, development and implementation. Why education policy is changing, new ways to follow and influence education policy, and conceptual frameworks to use for future understanding. Prereq: 529, 616 or equivalent or consent of instructor. F

646 School Personnel Administration (3) Personnel administration functions for professional and supporting staff in educational organizations. 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, Su

650 Legal Issues in Education (3) School law; constitutional foundations as they relate to public education at state and local levels. F, Su

658 Conflict Management (3) Social 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

670 Values and Ethics in Educational Leadership (3) Examination of moral and ethical dimensions of work of educational administrators; assistance to current and prospective administrators to deal with dimensions in knowledgeable, reflective and principled ways. (Same as Higher Education 670.)

680 Administration of Complex Organizations (3) Concepts and theoretical formulations to understand, analyze, evaluate, and change complex educational programs and organizations. Prereq: 513 or consent of instructor. Sp, Su

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 Instructional Technology, Curriculum and Evaluation 535.)

536 Policy Issues in Higher Education Quality Assurance (3) Exposition of moral and ethical dimensions of work of educational administrators; assistance to current and prospective administrators to deal with dimensions in knowledgeable, reflective and principled ways. (Same as Higher Education 670.)

545 Seminar in Higher Education (3) Capstone experience for doctoral students. Examination of major philosophical concepts and policy principles distinctive to American higher education, review of significant and current policy reports and critiques, exploration of contemporary policy issues, and evaluation of recommendations for major public and private higher education. F

560 Fiscal Policy Issues in Higher Education (3) Revenue sources, appropriation process, budget procedures, cost analysis, and fiscal management in public and independent colleges and universities. Sp

570 Values and Ethics in Educational Leadership (3) (Same as Educational Administration and Supervision 670.)

589 Seminar in Higher Education (3) Capstone experience for doctoral students. Examination of major philosophical concepts and policy principles distinctive to American higher education, review of significant and current policy reports and critiques, exploration of contemporary policy issues, and evaluation of recommendations for major public and private higher education. F

590 Special Topics (1-3) May be repeated. E

Educational Psychology

(Graduate Program in Education)

MAJORS

DEGREES

Education .................................. Ed.D., Ed.D., Ph.D., Educational Psychology, M.S.

R. S. McCallum, Head

Professors:
Bellon, Jerry J. (Emeritus), Ed.D. UC Berkeley
Brockett, Ralph G., Ph.D. Syracuse
Dickinson, Donald J. (Emeritus), Ed.D. Oklahoma State

George, Thomas W., Ed.D. Tennessee
Greene, Katherine H., Ph.D. George Peabody
McCallum, R. S., Ph.D. Georgia
Peters, John M., Ed.D. NC State
Skinner, Christopher H., Ph.D. Lehigh
Williams, R. L. (Liaison), Ph.D. George Peabody

Associate Professors:
Bain, Sherry K., Ph.D. Southern Mississippi
Kindall, Luther M., Ed.D. Tennessee
Ziegler, Mary F., Ed.D. Columbia

The Department of Educational Psychology offers graduate programs leading to degrees, majors, and concentrations in:

- Master of Science in Educational Psychology
  - Adult education
  - Individual and collaborative learning
- Educational Specialist
  - School psychology
- Doctor of Education
  - Educational psychology
  - Doctor of Philosophy

Education

Educational psychology
School psychology

See Education under Fields of Instruction for full description of all degree requirements. The department brings together four areas of graduate study related to teaching and learning across the lifespan. The department is committed to the creation and study of environments that enhance learning potential and promote lifelong learning for people of all ages, abilities, and backgrounds within our programs and the professional practices that we address. Assistantships and fellowships are available for qualified applicants. For more detailed information about the department, see website at http://web.utk.edu/~epsych.

The adult education area is designed for individuals who seek to provide professional leadership in the education of adults. It offers two degree programs: Master of Science with a major in Educational Psychology, concentration in adult education, and Doctor of Philosophy with a major in Education, concentration in educational psychology, specialization in adult education. For details, see website at http://web.utk.edu/~adulted.

The applied educational psychology area is designed for individuals who seek to provide professional leadership in promoting and facilitating learning and/or its measurement. It offers two degree programs: Master of Science with a major in Educational Psychology, concentration in individual and collaborative learning, and Doctor of Philosophy with a major in Education, concentration in educational psychology, specialization in applied educational psychology. For details, see website at http://web.utk.edu/~appliedpsychology.

The collaborative learning area is designed for professional practitioners who seek to increase their understanding of the collaborative learning process and its facilitation in their interaction with learners of any age in a variety of educational situations.
It offers the Doctor of Education degree program with a major in Education, concentration in educational psychology, specialization in collaborative learning. For details, see website at http://web.utk.edu/~collab.

Admission Requirements

Admission requirements include completion of all items in the department’s admissions packet and three letters of recommendation (i.e., rating forms). Up-to-date GRE scores are required for application to all degree programs except the master’s program. For the doctoral programs, a writing sample is also required.

Application Deadlines

Applications are reviewed throughout the year for applicants to the master’s program. For applicants in the doctoral programs who wish to begin a program the next fall semester, the application deadline is January 15th. The adult education area also has a deadline of October 15th for applicants at the Ph.D. level who wish to begin the program spring semester.

Graduate Courses

432 The Disadvantaged Student: Psychoeducational Perspectives (3) Theory and research regarding etiology, psychosocial behavior and appropriate interventions. F

460 Self-Management in the Helping Professions (3) Application of self-management strategies to career, social, emotional, and health domains for both helping professionals and their clientele. Prereq: Introductory course in psychology or consent of instructor. S/N/C or letter grade. F, 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. S/N/C only. E

503 Problems in Lieu of Thesis (2-3) May be repeated. Maximum 9 hrs. S/N/C only. E

504 Special Topics (1-3) Instructor-initiated course offered at convenience of unit on topics of current interest. May be repeated. Maximum 16 hrs. S/N/C or letter grade. E

509 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 supporting instructor. 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 to apply to student motivation, discipline and learning. Su

516 Educational Applications of Cognitive Learning Theories (3) Cognitive theory and research, social learning, attribution, 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

521 Program Development and Operation in Adult Education (3) Theories and methods from research to practice in planning, directing, and implementing education programs. Prereq: Consent of instructor. Sp

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. Sp

523 Post-Secondary Education for Adults (3) History, evolution, philosophy, structure and functions of post-secondary, sub-university institutions, their programs and clientele. Prereq: Consent of instructor. F

524 Continuing Professional Education (3) Theories and concepts supporting design and management of educational programs for adults in professions. Prereq: 520 or equivalent. F

525 Characteristics of Adult Learners (3) Key characteristics of adult learners, current theory and research on adult learning, and implications for teaching and learning contexts. F

526 Informal Methods of Assessment (3) Development and use of rating scales, check-lists, observation, test scores and case reports in assessment and counseling of children and adults. Prereq: Counselor Education and Counseling Psychology 525. A

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 Psychology of Aging (3) Theory and research of aging and gerontology-related issues: psychological and related physiological 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. Su

530 Methods of Collaborative Inquiry (3) Philosophical and theoretical frameworks for designing and conducting collaborative inquiry projects. Practice in conducting such research. Sp

540 Seminar in School Psychology (3) Essentials of theory and practice of school psychology as professional specialty. Consideration of history and current issues in school psychology. F

541 Psychoeducational Assessment (3) Direct, psychodiagnostic and related methods in psychoeducational assessment. Cognitively appropriate major models of discipline and conflict resolution theories. 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. F, Sp

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. S/N/C only. F, Sp

543 Practice Teaching (1-12) Observation, counseling, or teaching experiences in schools. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. E, Su

544 Psychoeducational Consultation (3) Use of two and three-person models of consultation in educational and therapeutic settings based on behavioral, ecological, social learning and cognitive-behavioral theories. F

545 Practicum in Consultation (3) Application of consulting skills to educational settings. Prereq: 544. Sp

549 Internship in School Psychology (1-6) Supervised employment in a community setting. Prereq: Enrollment in school psychology program and consent of instructor. May be repeated. Maximum 12 hrs. S/N/C only. E

560 Discipline and Conflict Resolution (3) Applications of major models of discipline and conflict resolution theories. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. S/N/C only. F

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 organizational 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 who are not progressing 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 interaction with effective teaching and learning. Su

574 Facilitating Group Change (3) Practical issues of group change. Analyses of group and individual differences in all types of educational settings in relation to systems theory and collaborative learning theory. Needs of individuals and groups involved in change and roles of inside and outside change agents. F, Su


593 Independent Study (1-3) May be repeated. S/N/C or letter grade. E

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

602 Directed Research (1-3) Instructor- or student-initiated group investigation of a theoretical or practical problem in educational psychology program and consent of instructor. May be repeated. Maximum 15 hrs. S/N/C or letter grade. E

609 Advanced Seminar in Curriculum and Learning (3) Team-taught interdisciplinary seminar: trends, themes, and issues in curriculum and teaching. Reading and discussions based on significant research and scholarly publications. Sp

612 Modes of Inquiry (3) (Same as Educational Administration and Policy Studies 612.)

620 Seminar in Adult Education (3) Issues in adult education, theories and concepts, philosophical positions, research trends, and methodologies. Prereq: 520 or equivalent. Sp

621 Advanced Seminar in Program Planning (3) Concepts, principles, and theories related to program planning in adult education. Prereq: 521 or equivalent. A

622 Advanced Seminar in Adult Development and Learning (3) Adult development and adult learning theory and research. Prereq: 522, 525, or equivalent. A

630 Doctoral Seminar in Collaborative Learning (3) Issues in collaborative learning, research, and theory. Prereq: Admission to E.D. in Education, concentration in educational psychology collaborative learning. May be repeated. Maximum 12 hrs. S/N/C or letter grade. F, Sp
Electrical and Computer Engineering

(College of Engineering)

MAJOR DEGREES

Electrical Engineering................. M.S., Ph.D.

Marshall O. Pace, Acting Head

Professors:
Abidi, Mongi A., Ph.D. ................. Tennessee
Aleefx, Igor (Emeritus), PE, Ph.D. .. Wisconsin
Bailey, J. Milton (Emeritus), Ph.D. .
Birdwell, J. Douglas, Ph.D. ............ MIT
Bishop, A., Jr., (Emeritus), Ph.D. .
Bodendeinter, Robert E. (Emeritus),
Bose, Bimal K. (Condra Chair of Excellence),
Bouldin, Donald W., Ph.D. ............ Vanderbilt
Gonzalez, R. C., (Emeritus), Ph.D. .. Florida
Goode, Joseph M. (Emeritus), PE, Ph.D. ...... Georgia Tech
Green, Walter L. (Emeritus), Ph.D. ..
Hunaid, James C., (Emeritus), PE, Ph.D.
Karim, Mohammad A. (Liaison), Ph.D.
Kennedy, Eldredge J. (Emeritus), PE,
Lawler, J. S., Ph.D. ...................... Michigan State
Pace, Marshall O. (Liaison), PE, Ph.D.
Pierce, J. Frank (Emeritus), PE, Ph.D.
Pujol, Alfonso Jr. (UTSI), Ph.D. ...... Vanderbilt
Roth, J. Reese, Ph.D. .................. Cornell
Tillman, James D. (Emeritus), Ph.D. .... Auburn

Associate Professors:
Abdallah, C. T., Ph.D. ................. Georgia Tech
Bomer, Bruce W. (UTSI), Ph.D. ..... Tennessee
Brill, Paul B., Ph.D. ................. New Mexico State
Islam, Syed, Ph.D. ...................... Connecticut
Joseph, Roy D. (UTSI), Ph.D. ...... Case Western
Koch, Daniel, Ph.D. .................... Missouri (Rolla)
Newport, Danny, PE, Ph.D. .......... Tennessee

Assistant Professors:
Chissong, John, Ph.D. .................. Minnesota
Howlader, Mostofa, Ph.D. ........... Virginia Tech
Montoya, Tom P., Ph.D. .............. Georgia Tech
Peterson, Gregory, Ph.D. ............ Washington (St. Louis)
Qi, Haitong, Ph.D. ..................... NC State
Smith, L. Montgomery (UTSI), Ph.D.
Smith, Philip W. ....................... Virginia
Tolbert, Leon, Ph.D. .................. Georgia Tech

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, intelligent control, microelectronics, mixed-signal VLSI, monolithic sensors, plasma engineering, power electronics and systems, sensor fusion, and signal processing.

The department sustains a joint program in mixed-signal VLSI and monolithic sensors with the Oak Ridge National Laboratory, Instrumentation and Controls Division. This program provides students with unique opportunities to receive career-related training at ORNL while satisfying thesis or dissertation requirements of the graduate program. Departmental graduate programs are also available at the Space Institute, Tullahoma. Some of the electrical engineering courses are offered in the evening. Engineers working in industry are encouraged to participate in the department’s graduate program. Further information about these various programs is available from the department.

The Departmental Graduate Committee is responsible for administering, promoting, and advancing 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.

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 by two 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 exam to be considered for admission to the program.

Students who hold the bachelor’s degree in a field other than electrical engineering are also expected to have a minimum cumulative grade-point average of 3.0 and a minimum year average of 3.0 in that field. The department will require that selected undergraduate courses be taken to make the background of these students comparable to that of students who hold a bachelor’s degree in Electrical Engineering. These undergraduate courses may include electrical engineering courses from the sophomore and junior years and one senior electrical engineering sequence of the student’s choice. The specific set of undergraduate courses required will be chosen in view of the applicant’s prior education and experience. The student will be admitted under non-degree status until the required undergraduate courses are successfully completed with a 3.0 average.

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, a semester-by-semester schedule of the courses they intend to take, and the members of the student’s master’s commit-
TOEFL score of 550 is required for non-
engineering, power systems, solid-state
computers, electro-optics, communication
concentration areas of circuit theory,
Electrical Engineering may be pursued in the
THE DOCTORAL PROGRAM

approval. A written final report and oral
student's master's committee. A written
This course will be administered by the
work in each of two areas of electrical
Engineering approved by the student's
committee and the graduate
master's committee and the graduate
EE courses approved by the student's
semester hours of EE courses at the 500

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.

Master's thesis, totaling 6 semester
hours.

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 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.

THE DOCTORAL PROGRAM

The Ph.D. degree program with a major in Electrical Engineering may be pursued in the concentration areas of circuit theory, computers, electro-optics, communication theory, electromagnetic theory, plasma engineering, power systems, solid-state electronics, power electronics, and control systems.

Applicants are required to submit scores on the General 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.
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 9 semester hours of 600-level coursework. At least 3 hours of this work must be in an area other than the student's major area.
   c. A minimum of 18 semester 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 on a 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 retake and pass 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. In this department the comprehensive exam is administered by the student's committee; the exam results are reported to the graduate committee for approval; and the exam is filed in the department. 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. The student's committee may require additional written sections. The students must demonstrate 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.

GRADUATE COURSES

Note: Courses required in the Electrical Engineering undergraduate curriculum cannot be used in either the M.S. or Ph.D. programs. No 400-level course may be used toward a graduate degree in Electrical Engineering except when required by the program.

400 Senior Design (5) Major design project focusing student's attention on professional practice, accumulated background of curricular components, and recent developments in field. Directed to topics within field of electrical engineering. Level 3 design projects which require laboratory work. Prerequisite: Linear System Analysis, Electric Energy System Components, Electronic Circuits, Analog Communication Amplitude and Frequency Modulation, Introduction to Logic Design of Digital Systems.

411 Digital Signal Processing and Filter Design (3) Discrete-time signals and systems, sampling, discrete Fourier transforms, analog filter characteristics, non-recursive and recursive filter design, and CAD tools for filter design. Level 1 design projects which require laboratory work. Prerequisites: 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. Prerequisite: 411.

421 Electric Energy Systems (3) Structure and operation of electrical energy grid; load flow; economic loading; planning; control; reliability. Balanced and unbalanced faults; system protection; system stability. Level 1 design projects. Prerequisite: Transient Analysis, Electric Energy System Components, Systems and Power Laboratory.

422 Power System Operations and Planning (3) Dynamic phenomena in power systems. Transient stability assessment and enhancement; direct and indirect methods for stability determination in nonlinear systems. Operations planning (system load); economic dispatch, frequency regulation and automatic generation control. Volt-var control, load management, cogeneration; and other contemporary concerns. Level 2 design projects. Prerequisites: 421.

423 Electric Machines (3) Principles of electromechanical energy conversion. Design procedures for AC and DC machine windings; construction and performance characteristics. Effect of machine parameters on steady state and dynamic performances; the dq model; reference frames. Level 1 design projects. Prerequisite: Linear System Analysis, Electric Energy System Components.

431 Operational Amplifier Circuits (3) Linear and non-linear active circuits using commercial operational amplifiers. Operational, Instrumentation, isolation, bridge, rms and logarithmic converters, multipliers and function generators, rectifiers, references, active filters, modulation and demodulation, sinusoidal generators. Noise fundamentals and calculations in op-amp circuits. Design for specified zero-drift applications. Applications: transducer interfacing. Level 1 design projects which require laboratory work. Prerequisite: Linear System Analysis, Electric Energy System Components.

432 Electronic Amplifiers (4) Feedback amplifier principles; wideband linear amplifier design; low-noise preamplifier design; audio power amplifier design; linear and switched power design and switching regulator principles. Radio frequency amplifier design; oscillator principles. Laboratory experiments and design projects. Level 2 design projects which require laboratory work. Prerequisite: 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. Prerequisite: Analog Communication Amplitude and Frequency Modulation.

442 Communication System Design (4) Application of communication theory to system design. Development of communication systems specifications. System simulation utilizing graphical programming language. Hardware and software design and simulation. Construction and performance evaluation of complete analog or digital transmitter and receiver or significant subsystems. Level 2 design projects. Prerequisite: 441.


451 Microprocessors and Microcontrollers in Electrical Engineering (3) Project-oriented course using a microcomputer kit having monitor program and development system with cross-assemblers, file management, and emulation capability. Interfacing and hard-
452 Organization and Design of Digital Systems
and Computer Organization. Fundamental concepts of
hardware architecture of computer and digital devices;
ALU and CPU structures, control unit organization,
storage systems, and I/O channels. Microprogramming
control unit and different interrupt structures. Level 2
design projects which require laboratory work. Prereq:
451.

471 Introduction to Pattern Recognition (3) Design
of learning and adaptive machines. Elementary
decision theory, perceptrons, Bayes classification
rule, learning algorithms, elements of syntactic
pattern recognition, adaptive classifiers. Level 1
design projects. Prereq: Senior standing. Non-majors
required consent of instructor.

472 Digital Image Processing (4) Basic methods for
digitizing, storing, processing, and displaying images.
Computational procedures for image enhancement,
restoration, coding, and segmentation. Level 2 design
projects requiring laboratory work. Prereq: Senior
standing or consent of instructor.

481 Power Electronics (3) Principles and character-
pistics of power semiconductor devices, single-phase
and polyphase converters, converter control, converter
ac control, ac phase control, voltage-fed inverter and
dc-dc converter principles; industry applications. Level 1
design projects which require laboratory work. Prereq:
Frequency-domain analysis, Properties of Signals and Noise,
Transient Analysis, Electric Energy System Compon-
ents, Electronic Circuits, Systems and Power Labora-
tory.

482 Power Electronics Circuits (4) voltage-fed
inverters, PWM principles, control of inverters, dc-dc
converters, dc machine drives, resonance converters,
step motor drives, brushless dc machine principles.
Level 2 design projects which require laboratory work.
Prereq: 481.

491 Special Topics (3) Basic design and current
practice. May not be repeated to satisfy senior require-
ments for graduation. Level 1 or level 2 design projects
which may require laboratory work. Prereq: Completion
of all junior EE courses or consent of instructor.

495 Senior Seminar (1) Current topics. Prereq:
Completion of all Junior Electrical Engineering courses
or consent of instructor. S/N or letter grade.

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

501 Project in Lie of Thesis (3) Capstone course
taken under supervision of student's major professor
and master's committee. Project involving literature
survey, development of some software or hardware,
testing, writing a white paper or journal paper, or
other suitable project. Prereq: Consent of graduate
committee. May be taken for 0 to 6 hrs. Prereq: 500.

502 Registration for Use of Facilities (3-15) Re-
quired 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 major requirements. May be
repeated. S/N only. E

503 Modern Transform Methods (3) Frequency-
domain transform methods. Relevant fundamentals of
complex variable theory. Two-sided Laplace trans-
form, its inverse and applications to the Fourier
transform and series. Sampling theory. Two-
sided z-transform and its inversion by residues. The
discrete Fourier transform and fast Fourier transform.

504 Random Process Theory for Engineers (3)
Probability and random variables as approached by set
theory. Statistical averages and transformations of
random variables. Random processes, stationarity,
correlation functions, spectral analysis, power
spectrum and spectral analysis as applied to response
to systems and random signals.

505 Digital Signal Processing I (3) Discrete-time
signals and systems, sampling, fast Fourier transform
(FFT) and fast convolution, design of FIR filters and
IIR filters.

506 Digital Signal Processing II (3) Filter properties
in the Z and Fourier transform domains, structures for
digital filters, sampling and reconstruction, hardware
implementation of digital filters.

507 Application of Linear Algebra in Engineering
Systems (3) (Same as Chemical Engineering 507 and
Mechanical Engineering 507)

511 Linear Systems Theory (3) State space models
of linear dynamical systems, linear algebra, state
transition map, matrix exponential, controllability,
observability, realization theory, and stability theory.
Coreq.: 503.

512 Multivariable Linear Control System Design (3)
Design of controllers, for multivariable systems, which
satisfy constraints on robustness to plant uncertain-
ties, disturbance rejection, command following. Prereq:
511.

515 Adaptive Control and System Identification (3)
Adaptive control of linear deterministic and stochastic
systems, adaptive filtering and prediction, parameter
estimation for deterministic and stochastic systems.
Prereq: 511-2 or 516-9.

518 Control Systems Design I (3) Analysis and
design of continuous and discrete time control sys-
tems, feedback theory, stability, steady-state perfor-
mance, compensation. Engineering aspects of control
systems.

519 Control Systems Design II (3) Digital control,
variable structure control, state-space design of SISO
systems, use of estimators and observers, compar-
ison of classical and state-variable approaches to
methods of control system design, considerations for control
system instrumentation. Prereq: 518.

521 Power Systems Analysis I (3) Matrix-vector
representations of power networks, sequence modell-
ing of power system components, unbalanced singleand
double line faults. Formulating and solving problems in
matrix-vector form with application to large scale power
systems. Prereq: 421 or equivalent.

522 Power Systems Analysis II (3) Operation and
control of interconnected power systems, transient
dynamic stability. Formulating and solving prob-
lems in matrix-vector form with application to large
cscale power systems. Prereq: 521.

523 Power Electronics and Drives (3) Forcere-
motors, advanced PWM techniques, current-
fed inverters, drive system modeling, vector
current control and inversion. Prereq: Consent of
instructor.

524 High Voltage Systems (3) Phenomena, genera-
tion, measurement practices and insulation in high
voltage circuits. Testing, surge and arc control, shielding,
reliability. Prereq: 421.

531 Advanced Analog Electronics I (3) Physical
operation of modern semiconductor devices, amplifier
devices and circuits, bipolar transistors, J-FETs,
and MOS-FETs. Small-signal equivalent circuits and noise
models of active devices. Project laboratory. Prereq:
431, 432, or consent of instructor.

532 Advanced Analog Electronics II (3) Design and
analysis of wide linear band-low noise feedback amplifi-
cers and radio-frequency amplifiers using discrete,
monolithic and hybrid devices, voltage and current
amplifiers, switched regulation, use of specialized
electronic systems in analog signal processors. Ad-
dvanced topics from current literature. Project labora-
tory. Prereq: 531.

541 Electromagnetic Fields (3) Maxwell's equations,
special relativity, wave reflection and transmission,
generalized media, guided waves, radiation from cur-
tent elements. Prereq: Mathematics 404.

543 Digital Communication Systems I (3) Optimum
design and digital communication systems. Statistical
analysis of signals and systems. Baseband transmis-
sion in presence of noise. Coherent and non-coherent
communications systems. Classification of signals.
Coherent and non-coherent communication systems.
Prereq: 532.

544 Digital Communication Systems II (3) Continu-
aous- and discrete-time systems. Analysis of
digital communications systems. Multiple access systems for
telecommunication systems and local area networks.
Interference rejection techniques: spread spectrum. Source
coding issues: quantization and compressing. Data security
through encryption. Prereq: 543.

545 Introductory Microwave Networks and Com-
ponents (3) S-domain and R-domain analysis of
generalized media, guided waves, radiation from cur-
tent dipoles and waveguides. Component and system
parameter measurement by modern network analyz-
ers. Electromagnetic oscillators and amplifiers, frequency
swept oscillators, transit time devices, parametric
devices, mixers, switches.

551 Digital System Design I (3) Design consider-
ations for combinational and sequential circuits. Itera-
tive networks. Fault diagnostics of logic circuits.

552 Digital System Design II (3) State identification
and structure realizations of sequential machines.
Digital system architecture design: microprogramming
and interrupt control. Prereq: 551.

561 Plasma Diagnostics I (3) Principles of active,
passive, perturbing and nonperturbing diagnostic meth-
ods used in low temperature plasmas, and high tem-
perature plasmas of interest in fusion research. Labo-
atory safety and data reduction and presentation, micro-
processor based data handling and analysis, and
reduction of time series data. Prereq: 461, 463, or
consent of instructor.

562 Plasma Diagnostics II (3) Laboratory instruction
in operation of plasma diagnostic systems at plasma
science laboratory, experience with high voltage
vacuum, RF, and digital data handling techniques.
Prereq: 561.

565 Industrial Plasma Engineering I (3) Low tem-
perature plasma physics relevant to industrial applica-
tions: kinetic theory, particle dynamics in electric and
magnetic fields, gaseous discharges, and electron,
ion, and plasma sources. Prereq: Graduate standing or
consent of instructor.

566 Industrial Plasma Engineering II (3) Conti-
 nuation of 565 to industrial applications: ion im-
plantation in solids, plasma deposition and etching,
space propulsion systems, plasma chemistry, plasma
lighting devices, insulating dielectrics and breakdown,
materials processing with plasma arcs, and related
topics. Prereq: 565 or consent of instructor.

571 Pattern Recognition (3) Decision-theoretic and
structural approaches to pattern recognition. Deter-
ministic and statistical decision rules, feature extrac-
tion and representation, syntactic and semantic meth-
ods. Prereq: 571 or consent of instructor.

572 Digital Image Processing (3) Spatial and trans-
form processing of images, design of image operators, im-
age enhancement, restoration, and coding. Segmen-
tation techniques. Image representation and descrip-
tion. Prereq: 472 or consent of instructor.

573 3D Methods in Robot Sensing, Vision and
Visualization (3) Tools used in 3D data reduction,
visualization, and reconstruction. 3D recovery by non-
linear estimation. Projective geometry, analytic photogrammetry, range sens-
ing, lighting models, differential geometry, and 3D ren-
dering.

574 Advanced Computer Vision (3) Principles and
methods for analysis of time and space varying
imagery, Imaging physics and color theory, shape-
form-X, feature correspondence and tracking, stereo
Vision, structure from motion, optical flow, motion-
based segmentation, and selected topics from current
literature. Prereq: 573 or consent of instructor.

581 Quantum Electronics I (3) Interaction of electro-
magnetic radiation with atoms and molecules. Com-
parison of classical and quantum descriptions of
ionization and absorption. Oscillator spectral line, shape for
amplification by stimulated emission of radiation and
schemes for obtaining population inversion. Oscillator
resonant cavities, steady-state and Q-switched opera-

582 Quantum Electronics II (3) Laser modulation and
stabilization techniques. Laser power, spectral content and
noise considerations. Laser technology: dye, gas, and
doped lasers. Lasers in communication and instrumentation
systems. Plasma diagnostics, Raman emission spec-
troscopy, laser interferometry, and holography. Laser metal-working, and biological and medical uses. Prereq:
581.
623 Advanced Power Electronics and Drives (3)
Phase-controlled cycloconverters, cycloconverterfed 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 Insulation (3) Principles, testing, and case studies. Basic principles of aging, losses, charging, conduction, and breakdown in vacuum, gas, liquid, solid, and composite insulation systems. Testing with low-noise instrumentation, pulse height analysis, optics, acoustics, and bridges; associated statistics and distributed parameter effects. Case 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 I (3) Based on particular interests of students. Fundamental physical processes in instrumentation transducers: thermoelectric, magnetoelectric, electromechanical and semiconductor devices. Prereq: 531-32 and consent of instructor.


643 Detection and Estimation Theory (3) Detection theory, coding theory, system identification. Signals with unknown parameters; optimal filter synthesis; adaptive systems; 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.

51 Computer-Aided Design of VLSI Systems I (3) Fabrication of microelectronic devices, computer-architecture design, algorithmic state machines, partitioning, structured design methodology. Prereq: 551-12 or consent of instructor.

52 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: 551.

53 Advanced Plasma Physics I (3) Basic concepts of high temperature plasma, plasma physics, Magnetohydrodynamics and kinetic descriptions of plasma, plasma transport, plasma waves, equilibrium, and stability. Prereq: Physics 542-1, 461-2 or 563-4, or consent of instructor.


671 Image Processing and Robotics I (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) Stereo- vision, shape theory. Prereq: 571.

673 Image Processing and Robotics III (3) Time-varying imagery, path planning and navigation. Prereq: 672.

681 Advanced Graduate Seminar (1) Research in department. May be repeated. S/NC or letter grade.

682 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)

<table>
<thead>
<tr>
<th>MAJOR</th>
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<tbody>
<tr>
<td>English</td>
<td>M.A., Ph.D.</td>
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</tbody>
</table>

D. Allen Carroll, Head

Professors:


Trahern, Joseph B., Jr. (Alumni Distinguished Prof.), Ph.D. Princeton Wier, Allen (Distinguished Teaching Chair), M.F.A. Bowing Green Wheeler, Thomas V. (Emeritus), Ph.D. North Carolina White, Jon M. (Emeritus), M.A. Cambridge Wright, Nathalia (Emeritus), Ph.D. Yale Zomchick, John, Ph.D. Columbia

Associated Professors:


Assistant Professors:


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 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.artssci.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 595 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 at least a 3.0 G.P.A.

**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.
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 serving as 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 AEX 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 54 semester hours beyond the B.A. (of which at least 24 semester hours must be beyond the M.A.) to include at least 12 hours at the 600 level, at least 15 semester hours at the 500 level or above (only 3 hours of 693 Independent Study may be applied toward the M.A. and 3 after the M.A.); a 3-hour course in teaching composition; and 15 additional hours at any level approved for graduate credit. (Including a maximum of 12 hours at the 400 level if approved by the Director of Graduate Studies).

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. These represent the research and for 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 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 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.

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 and completion of two courses given in the foreign language at the 500 level or above, at least one course to 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) in option 1. 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 508 or 509 History of the English Language (offered in alternate years only). For the other 3 hours, the student may either complete the history of the language sequence or choose one other course in language 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 Canterbury Tales and Troilus and Criseyde in 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 after 1601. 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 1560 and 1640 through reading of representative plays by Shakespeare's contemporaries: Marlowe, Webster, Jonson.

409 Spenser and His Contemporary Poets (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-
Entomology and Plant Pathology

620 Studies in Medieval English Literature (3) Seminar in the literature and literary genres of Medieval English literature, read in Old and Middle English. Subject matter varies from year to year. May be repeated. Maximum 9 hrs.


650 Studies in English Romanticism (3) Seminar content varies: particular literary figure or figures, genres, theme, or other coherent focus. May be repeated. Maximum 9 hrs.

651-52 Studies in Victorian Literature (3,3) Seminar content varies: particular literary figure or figures, genres, theme, or other coherent focus. May be repeated. Maximum 9 hrs. each.

660-61-62 Studies in American Literature (3,3,3) Southern literature before 1850, frontier, regionalism, women's literature, Irving, Cooper, Poe, Emerson, Thoreau, Hawthorne, Melville, Whitman, Dickinson, James, and Twain. May be repeated. Maximum 9 hrs. each.

670-71-72 Studies in Twentieth-Century Literature (3,3,3) Seminar content varies: particular literary figure or figures, genres, theme, or other coherent focus. May be repeated. Maximum 9 hrs. each.

680 Topics in English Language (3) May be repeated with consent of director of graduate studies. Maximum 9 hrs.

682 Studies in Rhetoric and Composition (3) Content varies. Advanced work in theory and/or history of rhetoric and composition. Issues in invention, textuality, literacy, historiography, style and ethics. May be repeated. Maximum 9 hrs.

686 Studies in Creative Writing (3) Content varies. Connection between theory and practice in writing. May be repeated. Maximum 9 hrs.

688 Studies in Literary Criticism (3) Content varies. Advanced work in theory and/or history of literary criticism. May be repeated. Maximum 9 hrs.

690 Special Topics (3) Content varies. History of ideas, humor, biography, autobiography, extra-literary disciplines. May be repeated. Maximum 9 hrs.

694 Studies in Film (3) Content varies. Advanced work in film history and analyses. May be repeated. Maximum 6 hrs.

Entomology and Plant Pathology

College of Agricultural Sciences and Natural Resources

MAJOR DEGREE

Entomology and Plant Pathology M.S.

Carl J. Jones, Head

Professors:
Bernard, Ernest C., Ph.D. ............... Georgia
Boyle, Steven C., Ph.D. ............... NC State
Burgess, Edward E., Ph.D. ............. Tennessee
Gerhardt, Reid R. (Liaison), Ph.D. ....... NC State
Grant, Jerome F., Ph.D. ............... Clemson
Hilty, James W. (Emeritus), Ph.D. .... Ohio State
Johnson, Leander F. (Emeritus), Ph.D. .... Louisiana State
Jones, Carl W., Ph.D. ................. Wyoming
Lambdin, Paris L., Ph.D. ............. VPI
Newman, Melvin A., Ph.D. .......... Texas A & M
Patrick, Charles R., Ph.D. .......... Georgia
Piers, Charles D., Ph.D. .......... Clemson
Ownley, Bradford B., Ph.D. ........... NC State
Reddick, Joseph B., Ph.D. .......... Berkeley
Southards, Carroll J. (Emeritus), Ph.D. .......... NC State
Windham, Alan S., Ph.D. ............. NC State
Windham, Mark T., Ph.D. ............ North Carolina State

Assistant Professors:
Bost, Steven C., Ph.D. ............... NC State
Canaday, Craig H., Ph.D. ............ Ohio State
Gerhardt, Reid R. (Liaison), Ph.D. ....... NC State
Hale, Frank M., Ph.D. ............... Ohio State
Hawley, Barrett M., Ph.D. ............ NC State
Lentz, Gary L., Ph.D. ............... Iowa State
Owens, John M., Ph.D. .............. Oregon State
Reddick, Joseph B., Ph.D. .......... Berkeley
Veal, Karen M., Ph.D. ............... Florida

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, 6-8 hours; (4) organic chemistry, 3 hours. In addition, three completed rating forms and a written statement of career goals and interest 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 designating courses required for the minor.
Environmental Engineering

See Civil Engineering

Exercise Science and Sport Management

(College of Education)

MAJORS

<table>
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<th>DEGREES</th>
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<td>Education</td>
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<td>Human Performance and Sport Studies</td>
<td>M.S.</td>
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<td>Edward T. Howley, Head</td>
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Professors:

Beitel, Patricia A. (Emeritus), Ed.D. ........ North Carolina (Greensboro)
Howley, Edward T., Ph.D. ................. Wisconsin
Kozar, Andrew J. (University Prof.), Ph.D. .......... Michigan
Lay, Nancy E. (Emeritus), Ph.D. ....... Florida State
Lemnoh, W.P., Ph.D. ..................... Iowa
Namey, T.C., M.D. .......... Washington (St. Louis)
Rickett, Ian R., Ph.D. .................... Brown
Watson, Helen B. (Emeritus), Ph.D. ....... Michigan
Welch, Hugh (Emeritus), Ph.D. ............. Florida

Associate Professors:

Bassett, David R., Jr., Ph.D. .............. Wisconsin
Jones, Ralph E., Ph.D. ..................... Toledo
Kelley, Dennis R., Ph.D. .................. Georgia State
Thompson, Dixie L., Ph.D. ................ Virginia

Assistant Professors:

Le两端on, Martin, Pittsburgh
McCutchensi, M. G., Ed.D. .................. North Carolina (Greensboro)
Stratta, Teresse, Ph.D. .................... Southern Illinois
Zhang, Songning, Ph.D. .................... Oregon

The Department of Exercise Science and Sport Management offers graduate programs leading to degrees, majors, and concentrations in:

Master of Science

Human Performance and Sport Studies

Exercise science (exercise physiology; biomechanics/sports medicine)
Sport management

Doctor of Philosophy

Education

Exercise science

See Education under Fields of Instruction for full description of all degree requirements. The exercise science concentration promotes and integrates scientific research, education, and practical applications of exercise science to maintain and enhance health, fitness, performance, and quality of life. The department offers an undergraduate major in Exercise Science that will prepare students for careers in fitness and provide the science-based background needed for application to graduate programs in biomechanics, physical therapy, cardiac rehabilitation, public health, exercise physiology, athletic training, or public school teaching. Graduate students and faculty focus on research dealing with theoretical and applied aspects of exercise and sport.

The sport management concentration provides the opportunity for students to attain knowledge and to develop the essential skills to be successful sport managers. In addition, the department coordinates and provides instruction in many physical activities designed to improve physical fitness and encourage future participation in lifetime sports.

Effective courses are offered in dance. These courses are appropriate for students interested in management of dance studios, teaching dance, or dance performance.

ADMISSION REQUIREMENTS

Applicants are required to complete the departmental application which will be sent to all persons upon their initial inquiry about the program. This is in addition to The Graduate School application. Applications from persons who have less than a 3.0 GPA will not be considered.

The following retention policy applies to all graduate students seeking a degree in the department:

1. Graduate students are required to maintain an overall 3.0 GPA.
2. Any student who fails below this standard will be advised in writing by the department head 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 ASSISTSHIPS

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 and doctoral programs. Students interested in these opportunities should file their applications before February. Letters should be addressed to Graduate Assistantships Coordinator, Exercise Science and Sport Management Department, The University of Tennessee, Knoxville, TN 37996-2700.

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 culture 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. Preregister Upperclass or graduate standing and consent of instructor.
510 Ballet: Level IV (2) Instruction and practice in advanced classical ballet techniques. Prereq: Consent of instructor. May be repeated. Maximum 8 hrs.

520 Jazz: Level IV (2) Instruction and practice in advanced jazz styles and techniques. Prereq: Consent of instructor. May be repeated. Maximum 8 hrs.

530 Modern: Level IV (2) Instruction and practice in advanced modern techniques. Prereq: Consent of instructor. May be repeated. Maximum 8 hrs.

550 Dance Composition IV (3) Independent study applying choreographic and production skills, culminating in a presentation of two works. Prereq: 440 Composition I and II, or consent of instructor.

593 Independent Study (1-3) May be repeated. S/NC or letter grade.

Exercise Science

GRADUATE COURSES

480 Physiology of Exercise (3) Functions of body in muscular work: physiological aspects of fatigue, training and adaptation to environment. Prereq: Biochemistry and Cellular and Molecular Biology 230 Human Physiology or 440 General Physiology. (Same as Biochemistry and Cellular and Molecular Biology 480.)

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

501 Special Project (3) Culminating experience for non-thesis majors. Prereq: study suitable for publication, or practicum requiring special written work. 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 not be used toward degree requirements. May be repeated. S/NC only. E


508 Research in Exercise Science (3) Research for writing of thesis and institutional review board proposals; presentation of research through free communications and poster presentations; calculation and interpretation of statistics related to common research designs used in research; and use of computer software.

509 Graduate Seminar in Public Health (1) Same as Public Health 509, Nutrition 509, Nursing 509 and Social Work 509.


513 Biomechanics of Orthopedic Rehabilitation (3) Effect of physical activity on musculoskeletal tissue; flexibility development and measurement, surgical implications, and rehabilitation related research.

516 Therapeutic Exercise (3) Current research in therapeutic exercise: role of nervous system, soft tissue healing, proprioception, muscle activation patterns, and strength.

521 Analytic Epidemiology (3) Epidemiologic strategies for evaluating research questions concerning causes, prevention and treatment of morbidity and disability. Presentations by experts working with large population-based data. Research process: grant writing and protocol preparation. Prereq: Course in statistics or consent of instructor.

525 Epidemiology of Injury and Violence (3) Epidemiologic methods to describe magnitude and examine etiology of unintentional injuries. Alternative approaches for preventing or controlling occurrence of injury and violence in both general population and high risk sub-populations.


533 Exercise Physiology (3) Physiology of human performance: acute and chronic effects of exercise on metabolic, cardiac, pulmonary, and skeletal systems. Prereq: Human physiology or general physiology, general chemistry, 2 or 4 credit hours of laboratory experience. Prereq: 480 or 533.

541 Special Topics (1-3) Advanced study in selected areas of exercise science. May be repeated.

563 Laboratory Techniques in Exercise Physiology (3) Laboratory course in experimental methodology and instrumentation: respiratory and metabolic measurements, blood chemistry, and gas analysis. Prereq: 480 or 533.

565 Advanced Physiology of Exercise (3) Systematic study of skeletal muscle and metabolism related to acute exercise and physical training; lectures, discussions, and appropriate laboratory experiments. Prereq: 480 or 533.


569 Clinical Exercise Physiology (3) Cardiac structure and function, interpretation of 12-lead electrocardiograms, exercise prescriptions for cardiac and pulmonary patient. Prereq: 480 or 533, and 567. (Same as Public Health 569.)

570 Cardiac Rehabilitation Practicum (1-3) Supervised experience in hospital-based exercise programs for patients with cardiac and/or pulmonary disorders. Use of telemetry monitoring, leading safe exercise regimes counseling participants on safe exercise guidelines. Presenting educational class on topic applicable to participants. Prereq: 533 and 567, or consent of instructor. Coreq: 569. May be repeated. Maximum 6 hrs.

581 Biomechanics Instrumentation (1) Kinematic, kinetic and muscular activity measurement of human movements using computerized videography, force platform, electromyography and other relevant instruments. May be repeated. Maximum 3 hrs. S/NC only.

588 Seminar in Gerontology (1) (Same as Human Ecology 585, Counseling Education and Counseling Psychology 585, Nursing 585, Public Health 585, Educational Psychology 585, Social Work 585, and Sociology 585.)

593 Independent Study (1-3) May be repeated. S/NC or letter grade.

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

501 Special Project (3) Culminating experience for non-thesis major. Research study suitable for publication, or practicum requiring special written work. S/NC only.

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 Administration/Supervision in Sport (3) Development of knowledge and skills for managers/administrators in sport business/organization: organizational, administrative, and supervisory strategies related to sport in profit and non-profit settings.

512 Application of Legal Concepts to Sport Settings (3) Application of contract law, breach of contract, and monetary damages within sport settings: risk assessment and development of effective risk management strategies, development of contracts in sports; and analysis of cases involving discrimination based upon gender, race, and age as well as protection of rights at amateur and professional levels of sport.

530 Sport and Media Issues (3) Gender and race issues within context of media and sport. Development of sport media and media influence on sport.

532 Research Techniques in Sport (3) Evaluate, synthesize, analyze, and apply research techniques in sport with consideration for and experiences in appropriate review, design, analysis procedures, and proposal development.

535 Ethics in Sport Administration (3) Development of analytical skills and knowledge applicable to middle and upper level managers in sport business/organizations. Social issues and ethics in sport administration.

540 Sport Economics and Finance (3) Principles of economics and finance as applied to sport organizations. Market structures of sport finance and political economics that form those structures.

544 Theories of Leadership and Leader Behavior in Sport (3) Integration of various theoretical approaches to leadership styles in sport administration within cultural contexts, research, and field experiences.

553 Case Studies in Sport Administration (3) Current issues and problems in sport administration at all levels of amateur and professional sport. May be repeated under different topic. Maximum 9 hrs.

554 Readings in Sport Administration (3) Survey of pertinent literature in refereed and applied journals and texts.

555 Evaluation Techniques for Sport Managers (3) Review and application of techniques applicable to program evaluation for sport programs, facilities, and personnel.

570 Event Management (3) Review of current research related to theory and practice in event management and involvement in management capacity with one or more special events.

Sport Management

GRADUATE COURSES

415 Development and Management of Recreation, Tourism and Athletic Facilities (3) (Same as Recreation and Tourism Management 415.)

440 Sport Marketing (3) Application of fundamental marketing concepts to sport industry. Marketing research, promotions, fund raising, advertising, and assessment of marketing programs specific to sport. Historical development of sport marketing. Prereq: Marketing or consent of instructor.

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

501 Special Project (3) Culminating experience for non-thesis 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 not be used toward degree requirements. May be repeated. S/NC only. E


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Finance

(College of Business Administration)

MAJOR

FINANCE

MAJOR DEGREES

Business Administration ............ MBA, Ph.D.

James W. Wansley, Head

Professors:

Black, Harold A. (James F. Smith, Jr., Prof.), Ph.D. ................. Ohio State
Boehm, T. P., Ph.D. .... Washington (St. Louis)
DeGennaro, R. P., Ph.D. .............. Ohio State
Dotterweich, William W. (Emeritus.), Ph.D. ....................... Pennsylvania
Ehrhardt, M. C. (Castagna Prof.), Ph.D. .................................. Georgia Tech
Philippatos, G. C. (Distinguished Prof.), Ph.D. ..................... New York
Shrieve, Ronald E. (AmSouth Bank Prof.), Ph.D. ................. UCLA
Wachowicz, J. M., Jr., CPA, Ph.D. ............... Illinois
Wansley, James W. (Clayton Chair of Excellence) (Liaison), CFA, Ph.D. .................. South Carolina

Associate Professors:

Auxier, A. L., Ph.D. ....................... Iowa
Collins, M. Cary, Ph.D. .................... Georgia
Daves, Phillip R., Ph.D. .................... North Carolina
Murphy, Deborah L., Ph.D. ................... Florida

BUSINESS ADMINISTRATION CONCENTRATIONS

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

MBA Concentration: Finance.

The curriculum offers courses for those interested in careers in corporate financial management, security analysis and investments, banking and financial institutions, and real estate.

Minimum course requirements are three courses: 511 plus two from the following: 512, 522, 532, 551, and 599 (Torch Fund only).

Ph.D. Concentration: Finance.

Minimum course requirements are finance seminars 641, 642, 651, 652.

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/N/C only.

510 Contemporary Concepts and Methods in Finance (6) Analytical and broad-based valuation concepts in finance; integrative approach in investments, corporate finance, and institutions areas. Prereq: Business Administration 504 and 505 or consent of instructor.

511 Issues in Finance (3) Strategic issues: corporate finance, investments, and capital markets. How decision-making in finance affects corporate value. Prereq: Business Administration 501, 511, 512, and 513 or consent of instructor.

512 Problems in Financial Management (3) Readings and cases that apply finance theory to real-world investment, financing, and asset management problems. Prereq: Business Administration 504 and 505 or consent of instructor.

522 Portfolio Analysis and Management (3) Portfolio theory and evidence of behavior of security returns with view to determining rational investment policy. Structure, performance, and return of portfolios; portfolio evaluation and revision, capital market theory, and extensions of portfolio analysis. Prereq: Business Administration 504 and 505 or consent of instructor.


551 Financial Management of a New Enterprise (3) Financial issues associated with formation, control, and long-term planning of new enterprise. Acquisition of venture capital. Prereq: Business Administration 504 and 505 or consent of instructor.

581 Real Estate Investment and Finance (3) Financial and market analysis used to make real estate investment decisions. Effects of variety of financing options on rate of return on income-producing properties. Effect of variety of financing options on consumer's decisions to purchase. Relationship between primary and secondary mortgage markets and impact of those markets on cost and 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.

651 Special Topics in Finance (1-3) Topics vary. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. S/N/C or letter grade.

600 Doctoral Research and Dissertation (3-15) Pr. NP only: E

641 Seminar in Finance (1-3) Capital markets, utility theory, asset pricing, theory of the firm, capital structure, dividend policy. Prereq: Consent of instructor. S/N/C or letter grade.


653 Seminar in Financial Institutions (1-3) Theoretical and empirical studies of financial institutions. Topics: modeling banking firm, efficiencies in bank lending arrangements and asymmetric information, international competitiveness, and deposit insurance. Prereq: 641 and consent of instructor. May be repeated. Maximum 6 hrs. S/N/C or letter grade.

654 Special Topics (1-3) Recent developments in finance. Topics vary. Prereq: 641 and consent of instructor. May be repeated. Maximum 6 hrs. S/N/C or letter grade.
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 courses 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 501 Seminar in their program and are expected to attend courses and participate in discussions during their master's program. Completion of 510 or equivalent is also required.

2. In addition to the requirement 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.

3. All students are required to take 2 hours of 501 Seminar in their program and are expected to attend courses 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
410 Food Chemistry (4) Reactions of water, proteins, lipids, carbohydrates, minerals, enzymes, vitamins, and additives in foods. Prereq: Chemistry 110 Introduction to Organic and Biochemistry, Biochemistry and Cellular and Molecular Biology 310 Physiological Chemistry. 3 hrs and 1 lab.

420 Food Microbiology (2) Physical, chemical and environmental factors affecting growth and survival of foodborne microorganisms; pathogenic and spoilage microorganisms affecting quality of foods and their control. Prereq: Microbiology 210 General Microbiology. Coreq: 429. F

429 Food Microbiology Lab (3) Methods for examination, enumeration, cultivation and identification of foodborne microorganisms. Prereq: Microbiology 210 General Microbiology. Coreq: 429. F

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 Research Plan or consent of instructor. 2 hrs and 1 lab. Sp

460 Meat Science (3) Carcass characteristics of meat animals, muscle structure and composition, identification, curing, freezing and cooking. 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. 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, Food Microbiology and Lab, and Food Research Plan 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: Food Industry; consent of instructor for non-majors. Recommended prerequisite: Core courses in Food Science and Technology. F

495 Food Processing System Analysis and Evaluation (3) Design and evaluation of food processing operations 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. SNC only. F

503 Problems in Lieu of Thesis (2-3) May be repeated. SNC only. E

507 Professional Development Seminar (1) Same as Agriculture and Natural Resources 507, Animal Science 507, Biosystems Engineering 507, Biosystems Engineering Technology 507, Ornamental Horticulture and Landscape Design 507, and Plant and Soil Sciences 507. SNC only. F

509 Thesis Proposal Preparation (1) Same as Agriculture and Natural Resources 509, Animal Science 509, Ornamental Horticulture and Landscape Design 509, and Plant and Soil Sciences 509. SNC or letter grade. Sp

510 Instrumental Analysis of Food (3) Modern instrumental methods for control of food manufacturing processes. Prereq: Food Chemistry. 2 hrs and 1 lab. F

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 acceptable quality food products, and changes during processing and/or distribution of food products. Prereq: Food Chemistry or equivalent. 3 hrs and 1 lab. Sp, A

521 Advanced Food Microbiology (3) Extrinsic and intrinsic factors associated with foods and food processing that relate to growth, survival, inhibition, detection, and recovery of foodborne pathogens and spoilage microorganisms; traditional approaches to microbiological food safety and quality. Prereq: Food Microbiology and Lab and Research Plan. 2 hrs and 1 lab. Sp, A

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, A

550 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, A

590 Special Topics in Food Technology and Science (1-3) Critical reviews of current research and production concerns of food industry. 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 (3) Basic and applied concepts in food toxicology; toxicological aspects of processed foods. Mode of action, prevention and control of food toxicants in food supply. Prereq: Food Chemistry, 521, or consent of instructor. Sp, A

640 Advanced Food Processing (3) Role of processing treatments in modification of food properties: texture, flavor and color characteristics. Prereq: Food Preservation, 510, 511, 512 or consent of instructor. Sp, A

Forestry, Wildlife and Fisheries

(College of Agricultural Sciences and Natural Resources)

MAJORS DEGREES
Forestry .................................................... M.S.
Natural Resources ........................................ Ph.D.
Wildlife and Fisheries Science ......................... M.S.
Admission Requirements

1. Prior to research for the thesis, the student is required to develop a detailed written research proposal. Registration for 6 hours of Thesis (Forestry 500 or Wildlife and Fisheries Science 500) is required.

2. A graduate committee of no fewer than 3 faculty members must be selected by the second semester of residence. At least one member shall be from the outside department. In addition to the thesis requirement, a minimum of 24 hours of graduate coursework (300 level or above) must be approved by the student's committee and no more than 10 hours of the minimum 30 can be below the 500 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 512 or Wildlife and Fisheries Science 512, Seminar, in their programs. This is required of each graduate student in residence 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. Final comprehensive written and oral examinations shall be taken upon completion of no fewer than 28 hours of approved study.

The Doctoral Program

The doctoral program with a major in Natural Resources emphasizes interdisciplinary research approaches toward the understanding and management of natural resources in a broad context. Areas of study include forest, wildlife, and fisheries biology; ecosystem function and structure; natural resource economics and policy; human dimensions of natural resource management; natural resource organization administration and management; wood sciences; and multidisciplinary natural resources management.

Admission Requirements

Applicants to the Ph.D. program normally should have completed a master's degree prior to beginning the doctoral program. Specific admission requirements include:

1. A minimum grade-point average of 3.0 on a 4.0 scale.

2. A minimum composite score from the general Graduate Record Examination (GRE) on the verbal, quantitative, and analytical sections of 1650, with a minimum of 1100 on the verbal and quantitative sections.

3. A statement of professional goals, natural resource management philosophy, and reasons for applying to the program.

4. Three letters of reference from individuals capable of evaluating the applicant's potential for graduate work in interdisciplinary natural resource management.

Degree Requirements

A candidate for the doctoral degree must complete 72 semester hours of coursework beyond the bachelor's degree. Forty-eight hours must be in graduate coursework approved by the student's doctoral committee. Up to 24 hours of master's-level coursework may be applied to the 48-hour requirement. A minimum of 6 hours must be taken in UT courses at the 600-level, exclusive of dissertation hours. Specific requirements are:

1. Research Methods and Analysis (9 credits in at least two of the subject areas)
   - Research/Experimental Design
   - Statistics/Econometrics/Biometrics
   - GIS/Remote Sensing

2. Core Subject Areas (33 credits to be determined by Doctoral Committee)
   - GIS/Remote Sensing
   - Research Methods and Analysis
   - Natural Resource Management
   - Forest, Wildlife, and Fisheries Science

3. Professional Development (6 credits)
   - Teaching - All students will be expected to complete FWF 601 and assist in teaching a course during their tenure in the program.
   - Problem Solving - FWF 610 will be required of all doctoral students that will include participation in an interdisciplinary team to address a significant national or regional natural resource issue.

   Professional Communications - all students will be required to complete FWF 612 as part of their program of study. Part of the seminar requirement will consist of assisting in the development and conduct of FWF 612.

4. FWF 600 Doctoral Research and Dissertation (24 credits)
   - A doctoral committee consisting of at least four faculty members must be identified by the student and major professor. At least two of the committee members must be from the Department of Forestry, Wildlife, and Fisheries and one member must be from an academic unit other than Forestry, Wildlife, and Fisheries. Three of the committee members, including the major professor, must be approved by the Graduate School to direct doctoral research. The committee should be formed during the first year of the student's program.
   - All students are required to successfully complete an oral and written examination on all coursework completed as part of the Ph.D. requirements. The exam is scheduled when the student has completed all or nearly all of the coursework. The Ph.D. committee will determine the content, nature, and schedule of the comprehensive exam and certify the results.

   During the first year, the student should develop a research prospectus that outlines the research problem to be addressed as part of his/her doctoral research. The prospectus is presented to the student's committee and the committee will approve the research topic and approach.
   - All students are required to complete, present, and defend a dissertation. The student should provide each member of the committee a copy of the dissertation at least
**Forestry**

### GRADUATE COURSES

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
<th>Credits</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>421</td>
<td>Forest and Wildland Resource Economics (3)</td>
<td>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 product marketing.</td>
<td>3</td>
<td>May be repeated. Maximum 3 hrs. F,F,S.</td>
</tr>
<tr>
<td>520</td>
<td>Advanced Forest Ecology (3)</td>
<td>Physiological ecology and adaptations of trees; relationships between forest structures and processes, and the environment; competition and effects of natural and human disturbances at multiple scales; forest succession and stand dynamics.</td>
<td>3</td>
<td>Prerequisites: Graduate standing in forestry or biological science, or consent of instructor. F,F,S.</td>
</tr>
<tr>
<td>525</td>
<td>Woodlot Management (3)</td>
<td>Current technologies and management strategies concerning wise use of forest resources for home and small non-industrial forest landowners necessary for decision-making and implementation.</td>
<td>3</td>
<td>Prerequisites: 6 hrs of biological sciences or consent of instructor. Not available to students in forestry or wildlife and fisheries science. 6.5 hrs and 1 lab weekly for 6 weeks. F, A.</td>
</tr>
<tr>
<td>530</td>
<td>Advanced Forest Resource Management (3)</td>
<td>Analysis of forest management problems in public and private organizations. Classical forest regulation; linear and goal programs; applied planning and management problems; complex decision making analysis; decision making methods for primary forest management activities.</td>
<td>3</td>
<td>Prerequisites: Senior-level forest management or consent of instructor. F, A.</td>
</tr>
<tr>
<td>540</td>
<td>Genetics in Forestry (3)</td>
<td>Genetic improvement of forest trees, selection of experimental varieties; field testing for genetic variability; tree breeding; development of seed orchards; hybridization; tree cytology and tissue culture; biochemical variability; forest genetics planning and conducting forest genetics research.</td>
<td>3</td>
<td>Prerequisites: Silvicultural methods and Biology 220 or consent of instructor. F.</td>
</tr>
<tr>
<td>550</td>
<td>Recreation Planning for Forests and Associated Landscapes (3)</td>
<td>Forest resource development on forests and associated lands; analysis and critique of specific contemporary alternatives.</td>
<td>3</td>
<td>Prerequisites: Senior-level forest recreation or consent of instructor. F, A.</td>
</tr>
<tr>
<td>570</td>
<td>Management &amp; Policy of Forest Resource Organization (3)</td>
<td>Theory and application of policy as applied to natural resource organizations: institutional organization and direction, and strategic management. Development of policy as planning tool and as results from conflict resolution. Linkage between policy development and execution, and structure and management of organizations.</td>
<td>3</td>
<td>Prerequisites: 6 hrs of biological sciences or consent of instructor. Not available to students in forestry or wildlife and fisheries science. 4 hrs and 1 lab for 6 weeks. F, A.</td>
</tr>
<tr>
<td>580</td>
<td>Advanced Silviculture (3)</td>
<td>Silvicultural techniques, silvicultural systems and applied to commercially important hardwoods and softwoods. In-depth analysis of silvicultural principles involved in silviculture and tools used, prescribed fire, pesticides, in regeneration and management; computer modeling of stand dynamics, structure, growth, yield.</td>
<td>3</td>
<td>Prerequisites: Undergraduate silviculture course or consent of instructor. 2 hrs and 1 lab. F, A.</td>
</tr>
<tr>
<td>585</td>
<td>Advanced Forest Biometry (3)</td>
<td>Application of sampling techniques to forest inventory; fixed and variable plot sampling; list sampling; Poisson sampling; regression estimators; multistage and multi-phase sampling. Growth and yield predictors for uneven-aged and uneven-aged forests. Land Measurement Techniques and Forest Resource Inventory or consent of instructor. F, A.</td>
<td></td>
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</tr>
<tr>
<td>580</td>
<td>Advanced Topics in Forestry (1-3)</td>
<td>Recent advances and concepts; research techniques and analysis of current problems.</td>
<td>1-3</td>
<td>Prerequisites: Consent of instructor. May be repeated. Maximum 6 hrs.</td>
</tr>
<tr>
<td>590</td>
<td>Independent Study in Forestry (1-4)</td>
<td>May be repeated. Maximum 6 hrs.</td>
<td>1-4</td>
<td>Prerequisites: Consent of instructor. May be repeated. Maximum 6 hrs.</td>
</tr>
<tr>
<td>593</td>
<td>Independent Study in Forestry (1-4)</td>
<td>Recent advances and concepts; research techniques and analysis of current problems.</td>
<td>1-4</td>
<td>Prerequisites: Consent of instructor. May be repeated. Maximum 6 hrs.</td>
</tr>
</tbody>
</table>

**Note:** This course is not offered for credit beyond the degree requirements. It may be repeated. Consult the catalog for specific prerequisites and requirements.
**Wildlife and Fisheries Science**

**GRADUATE COURSES**

440 Wildlife Techniques (3) Methods of wildlife damage control, wetland wildlife habitat management, identification of wildlife field sign, wildlife capturing techniques and management plans preparation. Weekend field trips. Prereq: Principles of Wildlife and Fisheries Management or consent of instructor. 1 hr and 1 lab. F

442 Fisheries Techniques (3) Active and passive sampling techniques for fish and aquatic organisms; population estimation methods, fish handling and transport; taxonomic 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. F

443 Fisheries Science (3) Active and passive sampling techniques for fish and aquatic organisms; population estimation methods, fish handling and transport; taxonomic 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. 2 hrs and 1 lab. Sp

444 Ecology and Management of Wild Mammals (3) Biological and ecological characteristics of wild, domesticated, or feral mammals. Current principles and practices of mammal management. Prereq: Principles of Wildlife and Fisheries Management or consent of instructor. 2 hrs and 1 lab. Sp

445 Ecology and Management of Wild Birds (3) Biological and ecological characteristics of wild birds, endangered birds, and bird pets. Current principles and practices of wild bird management. Prereq: Principles of Wildlife and Fisheries Management or consent of instructor. 2 hrs and 1 lab. Sp

446 Ethics in Wildlife and Fisheries Management (1) Ethical bases for decision-making and application of methodologies in practice of wildlife and fisheries management. Seminars by ethicists, wildlife and fisheries scientists and managers, and foresters to acquaint students with diverse perspective of ethical practice in wildlife and fisheries management. Lectures, panel discussions, and case studies. Team taught. Prereq: Senior or graduate standing. Sp

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

502 Registration for Use of Facilities (3-15) Required for students or 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

512 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/N only. F

515 Seminar in Avian Ecology and Management (1-2) Readings and discussion based on current literature on contemporary topics in avian ecology and management. Additional credit awarded for writing review paper on contemporary topic of interest to student. Prereq: Consent of instructor. F, A

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. Sp, A

525 Endangered Species Management and Conservation of Biodiversity (2) Status, ecology, and management of endangered wildlife and plant species. Historic and current social, political, and legal 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. Identification 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). F, A

535 Floodplain Ecosystems (3) Ecology, restoration, and management of floodplain ecosystems: biotic and abiotic processes, social considerations, and wildlife and forest management. Lower Mississippi River Alluvial Valley. Prereq: Consent of instructor. F, A

540 Predator Ecology (2) Dynamics of terrestrial vertebrate predator populations in human-altered and relatively unaltered environments. Prereq: 444 or 445 or consent of instructor. F, A

545 Population and Habitat Analysis (2) Field techniques for fish and wildlife population analysis. Prereq: Principles of Wildlife and Fisheries Management or consent of instructor. 2 hrs. F

550 Fish Physiology (3) Mechanisms of gas transfer, circulation, excretion, osmoregulation, locomotion, and neural/hormonal control of these systems in fishes. 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 recirculating water systems. Techniques of solids removal, nitrification, and gas balance. Prerequisite experience with operating systems. Prereq: 443 or consent of instructor. Sp

560 Advanced Topics in Wildlife and Fisheries Science (1-3) 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.

Bruce Raulton, Head

Professors:

Aiken, Charles S., Ph.D. .................. Georgia

Bell, Thomas L., Ph.D. .................. Iowa

Foresti, Ronald, Ph.D. .................. Rutgers

Hammond, E. H. (Emeritus), Ph.D. ........ California

Harden, Carol P., Ph.D. .................. Colorado

Horn, Sally P., Ph.D. .................. California

Jumper, Sidney R. (Liaison), Ph.D. ....... Tennessee

Long, Robert G. (Emeritus), Ph.D. ........

Minkel, C. W., Ph.D. .................. Northwestern

Pulsipher, Lyda Ph.D. .................. Southern Illinois

Raulton, Bruce, Ph.D. .................. Northwestern

Rehder, John B., Ph.D. .................. Louisiana State

Schmudde, Theodore H. (Emeritus), Ph.D.

Associate Professors:

Brinkman, Leonard W., Jr., Ph.D. ........ Wisconsin

Orvis, Kenneth H., Ph.D. .............. California

Shaw, Shih-Lung, Ph.D. .................. Ohio State

Assistant Professor:

Grissino-Mayer, Henri, Ph.D. .......... Arizona

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 GIS-based.

**THE MASTER'S PROGRAM**

The department offers the thesis and non-thesis options for the Master of Science. Both options require a minimum of 30 semester hours beyond the completion of a sound undergraduate major program. At least two-thirds of the total hours in the degree 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 doctorate 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, and 9 hours of 600-level courses (at each offering during residency) and 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, and an oral examination on the student's program, the special fields and related areas, and the dissertation proposal. All parts of the written
116 Geography

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 of these states to enroll in certain programs at UT on an in-state tuition basis. The Ph.D. program in Geography is available to residents of the states of Alabama, Arkansas, Mississippi, Virginia, or West Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Student Services.

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 data to coordinate systems, datum issues, imaging and digitizing, cartographic standards, and uncertainly in Geographic Information Systems. 2 hrs and 1 2-lab.

411 Computer Mapping and Geographic Information Systems (3) Cartographic techniques and display techniques for reference and thematic maps. Basic principles and methods of map reproduction. Prereq: Introduction to Cartography or consent of instructor. 2 hrs and 2 labs.

413 Remote Sensing: Types and Applications (3) Principles and uses of remote sensing imagery, digital data, and spectral data; geographic interpretation and mapping techniques. Prereq: Introduction to Cartography or consent of instructor. 2 hrs and 2 labs.

415 Quantitative Methods in Geography (3) Geographic application of statistical techniques: point pattern analysis, and analysis of aerial units. Prereq: Statistical Reasoning or two semesters of calculus or consent of instructor.

421 Geography of Folk Societies (3) Geographical study of folk culture, traditional material culture and rural settlement, examples from eastern North America and selected foreign areas. Prereq: World Geography or consent of instructor. 2 hrs and 2 labs.

423 Geography of American Popular Culture (3) Geographical study of regional variation in popular cultures, youth cultures in United States. Prereq: Cultural Geography: Core Concepts or consent of instructor. (Same as American Studies 423.)

433 The Land-Surface System (3) Characteristics of surface forms, weather, and surface materials; and their regional interrelationships. People as evaluators and agents of change. Prereq: Geography of the Natural Environment or consent of instructor.

434 Climatology (3) General circulation system leading to weather patterns. Climatic change and modification, and interrelationships of climate and human activity. Prereq: Geography of the Natural Environment or Meteorology or consent of instructor.

435 Biogeography (3) Changing distribution patterns of plants and animals on a variety of spatial and temporal scales. Effects of continental drift, Pleistocene climatic change, and human activity on world biota. Prereq: Geography of the Natural Environment or consent of instructor.

436 Water Resources (3) Global water resources and hydrologic processes; water availability, flooding, and water quality issues from physical and economic geographical perspectives. Prereq: Geography of the Natural Environment or consent of instructor.

439 Plant Geography of North America (3) Characteristics and distribution of major plant communities of Canada, the U.S., Mexico, and Central America. Relationships to climate, soil, fire, and human disturbance. Long-term and future prospects. Prereq: Coursework in geography or botany or consent of instructor.

441 Urban Geography of the United States (3) Concepts and theories concerning development and significance of systems of urban places, and internal morphology of cities in United States. Prereq: World Geography or Economic Geography: Core Concepts or consent of instructor. Writing intensive. (Same as Urban Studies 441.)

443 Rural Geography of the United States (3) Geographical appraisal of rural areas of United States: small towns and urban fringes. Problems and potentials of rural America. Prereq: World Geography or Economic Geography: Core Concepts or consent of instructor. Writing intensive.

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) Process in geomorphology. Prereq: 421 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

451 Colloquium in Geography (1) Discussion of current research literature, and general topics. Prereq: Consent of instructor. Writing intensive. (Same as Urban Studies 451.)

452 Research for Use of Facilities (3) Prereq: Consent of instructor. Writing intensive. (Same as Graduate Research 452.)

453 Topics in Cultural Geography (3) Applied research using imagery for interpretation of mapping of geographic data. Prereq: 411 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

454 Topics in Quantitative Geography (3) Multivariate analysis applied to problems in geography: research problems using appropriate computer programs; usefulness to geographic research of techniques developed by other disciplines. Prereq: 411 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

517 Geographic Information Management and Processing Concepts and methods in management of geographic information. Database design, manipulation, sampling and analysis. Prereq: Consent of instructor. (Same as Information Management 532.)

518 GIS Project Management (3) Interactions between management, technical, and application aspects of Geographic Information Systems project through simulated environment of real-world GIS sites. Prereq: Computer Mapping and Geographic Information Systems or consent of instructor.

519 Graduate Practicum in Cartography/Remote Sensing/GIS (2-6) Prereq: Written consent of department 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.

522 Topics in Physical Geography (3) Trends, problems, and methods in area of physical geography. Prereq: 434 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

523 Topics in Biogeography (3) Trends, problems, and methods in area of biogeography. Prereq: 434 or 435 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

524 Topics in Climatology (3) Trends, problems, and methods in area of climatology. Prereq: 434 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

525 Topics in Biogeography (3) Examination of trends, problems, and methods in biogeography. Prereq: 434 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

526 Topics in Watershed Dynamics (3) Trends, problems, and methods in study of watershed processes. Prereq: Consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

527 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.

528 Topics in Hydrology (3) Examination of trends, problems, and methods in study of hydrologic processes. Prereq: Consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

529 Independent Study (1-15) Prereq: Written consent of department prior to registration. S/NC or letter grade.

530 Seminar in Geography (2-3) Topics vary. Prereq: Written consent of department prior to registration. S/NC or letter grade.

531 Seminar in Physical Geography (3) Prereq: Consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

532 Seminar in Physical Geography (3) Prereq: Consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

533 Seminar in Climates (3) Prereq: Consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

534 Seminar in Biogeography (3) Prereq: Consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

535 Seminar in Hydrology (3) Prereq: Consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

536 Seminar in Watershed Dynamics (3) Prereq: Consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

537 Seminar in Climates (3) Prereq: Consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

538 Seminar in Physical Geography (3) Prereq: Consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

539 Seminar in Cultural Geography (3) Prereq: Consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

540 Process Geomorphology (3) Process in geomorphology. Prereq: 421 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.
635 Seminar in Biogeography (3) Prereq: 535 or consent of instructor. May be repeated. Maximum 6 hrs.

641 Seminar in Urban Geography (3) Prereq: 541 or consent of instructor. May be repeated. Maximum 6 hrs.

643 Seminar in Rural Geography (3) Prereq: 443 or consent of instructor. May be repeated. Maximum 6 hrs.

649 Seminar in Geography of Transportation (3) Prereq: 549 or consent of instructor. May be repeated. Maximum 6 hrs.

663 Seminar in Geography of the American South (3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

677 Seminar in Biological Conservation (3) 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 ........................................ M.S., Ph.D.

William M. Dunne, Head

Professors:
Broadhead, Thomas W., Ph.D. ............. Iowa
Byerly, Don W. (Emeritus), Ph.D. ............ Tennessee
Driege, Steven G. (Liaison), Ph.D. ............ Wisconsin
Dunne, William M., Ph.D. ..................... Bristol
Hatcher, Robert D., Jr. (Distinguished Scientist), Ph.D. ..................... Tennessee
Kopp, Otto C. (Emeritus), Ph.D. ............. Columbia
Lobertka, Theodore C., Ph.D. ............... Caltech
McSween, Harry Y., Ph.D. ................. Harvard
Miller, Kula C., Ph.D. ......................... Western Ontario
Taylor, Lawrence A., Ph.D. ................. Lehigh
Walker, Kenneth R. (Carden Prof.), Ph.D. .......... Yale

Associate Professors:
Clark, G. Michael, Ph.D. ............. Penn State
McKay, Larry D. (Jones Prof.), Ph.D. ........... Waterloo
McKinney, Michael L., Ph.D. .............. Yale
Mora, Claudia I., Ph.D. ................. Wisconsin
Williams, Richard T. II., Ph.D. .......... Virginia Tech

Assistant Professors:
Kah, Linda C., Ph.D. ..................... Harvard
Uhle, Maria (Jones Prof.), 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 undergraduate work, two rating forms or letters of recommendation, and GRE scores (general). Students are not normally admitted under non-degree status.

Prerequisite for both degrees is a Bachelor’s degree, including coursework in mineralogy, optical petrology, petrology, stratigraphy, paleoecology, 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 595 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 three of the following five groups:
   - Group 1: 410, 460, 480, 530, 563, 565.
   - Group 2: 420, 545, 546, 556.
   - Group 3: 470, 570, 575, 576.
   - Group 5: Any 400-500-level courses with graduate credit from related departments (applied science, 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 related fields. The candidate 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 600. 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 coursework. Substitution of 500 or 600-level coursework is encouraged.

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 Geology (3) Applications of calculus and differential equations to problems in earth sciences. Examines diffusion equation in hydrogeology, wave equation in geophysics, mechanical modeling and boundary conditions in structural geology and tectonics. Prereq: The Dynamic Earth or Earth, Life, and Time, 2 semesters of Calculus.


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. Prereq: Mineralogy.

412 Elements of X-ray Diffraction (2) Laboratory course on principles and applications of X-ray diffraction. Phase identification, quantitative determination of mineral abundances in mixtures, and crystal structure determination. Prereq: Mineralogy.

420 Paleocology (4) Principles of ecological analysis as applied to fossils and fossil assemblages: data collection and interpretation. Laboratory designed around preparation of scientific reports based 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, paleoecology, and stratigraphic distribution. Prereq: Paleobiology or consent of instructor. 2 hrs and 2 lab hrs.

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 of student. Synthesis of major aspects of geological sciences in societal context. Field techniques demonstrated, practiced, and applied to solution of geologic problems. Prereq: Completion of major core courses and consent of instructor.

450 Process Geomorphology (3) Integrative approach to development of surface of earth based upon case histories, maps, remote sensing imagery. Prereq: 101-02. (Same as Geography 450.) 2 hrs and 1 2-hr lab.

455 Basic Environmental Geology (3) Applications of geological sciences toward comprehension of effects of geological processes on humans and effects of human activities on earth environments. Prereq: The Dynamic Earth. 2 hrs and 1 3-hr lab or field period.

460 Principles of Geochemistry (4) Applications of chemical principles to geologic systems: problem-solving techniques. Phase diagrams, partitioning of trace elements, equilibrium principles for evaluating stabilities of mineral assemblages, aqueous solutions, and applications of radiogenic and stable isotope geologic systems. Prereq: Chemistry 120-130 General Chemistry, Mathematics 141-142 Calculus I, II. Recommended prerequisites: Geology 330 Igneous and Metamorphic Petrology or consent of instructor. 3 hrs and 1 lab.


471 Fieldwork in Geophysics (2) Geophysical investigations applied to solution of problems in tectonics, hydrogeology, or environment. Summer field course off-campus. Requires full time for 2 or more weeks. Prereq: 470 or consent of instructor.

475 Physical and Chemical Systems of the Earth (3) Development of physical earth from solar nebula to present. Formation, composition and evolution of hydrosphere, crust, mantle, and core. Interdisciplinary approach to topics in geology, physics, and chemistry of the earth. Prereq: Calculus and 1 semester of physical geology.
geomagnetism, chemical and isotopic processes of interior, and earth's temperature. Historical perspective on major controversies of past, and problems unresolved today. Prereq: 16 hrs of geology courses numbered 300 and above. 2 hrs and 1 discussion.

480 Principles of Economic Geology (4) Ore-forming processes, mineral deposits, survey of different types of mineral deposits with examples, and metallogenssis. Prereq: 310 and 330 or equivalents. Recommended prereq: 460. 1 fss and 1 2-hr lab.

485 Principles of Hydrogeology (3) Physical principles of flow, flow equations, geologic controls, aquifer analysis, water well design/hydraulics, introduction to transport processes. Prereq: The Dynamic Earth; Calculations Fundamentals of Physics or equivalent, or consent of instructor. (Same as Civil Engineering 485).

486 Hydrogeology Laboratory (1) Application and demonstration of hydrogeological principles in field and laboratory. Prereq or coreq: 485 or Environmental Engineering 535 or consent of instructor.

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 is committed. May not be used toward degree requirements. May be repeated. S/NC only. E

505 Structure of the Southern and Central Appalachianians (2) Structural development of Southern and Central Appalachianians. Late Proterozoic--early Paleozoic rift-drift-platform margin through processes related to compressional events producing accretionary elements that formed Appalachianians throughout the Paleozoic. Comparisons to similar orogens. Prereq: Structural Geology.

510 Clay Mineralogy (3) Origin, chemistry, structures, and properties of clay minerals; application of mineralogy to sedimentary processes. Prereq: 310 and 568 or equivalent. 2 hrs and 1 lab.

521 Data Analysis in Geology and Environmental Science (3) Application of statistical and computer quantitive techniques using computers to analyze geological data: environmental problems.

530 Petrogenesis of Crystalline Rocks (4) Origin and properties of igneous and metamorphic rocks, magmatic and sedimentary processes and physical conditions. Laboratory involves petrographic study of crystalline rocks in thin section. Prereq: 410. 3 hrs and 1 lab.

535 Ground Water Hydrology (3) (Same as Environmental Engineering 535). The use of mathematical models to predict the movement of water in ground. Coordinated with 430. 1 lab.

540 Seminar in Geology (1) Introduction of geology of Southern Appalachians. 1 hr plus fieldtrips.

544 Paleopedology (3) Field, microscopic, and geochemical analysis of fossil soils (paleosols) and comparison with modern analog soils: interpretation of changes in paleopedological processes, paleoclimate, and paleoatmospheric chemistry over 4.6 billion years of earth history based on paleosols. Prereq: 340 Stratigraphy and Sedimentation or equivalent, general chemistry, or consent of instructor.

545 Sandstone Petrology/Physical Sedimentology (4) Field and microscopic analysis of arenaceous clastic rock types; physical processes of sedimentation, transport of sediment, and formation of sedimentary structures. Prereq: 340 or equivalent. 3 hrs and 1 lab.

546 Carbonate Sedimentology (4) Environments of deposition of modern and ancient carbonate sediments and diagenesis of resultant rocks; field and laboratory analysis of sample material and preparation of scientific reports. 3 hrs and 1 lab.

550 Regional Geomorphology (3) Integrative approach to study of natural geomorphological regions stressing links and similarities across boundaries, unique characteristics of major divisions, provinces, sections, and districts. May be repeated with consent of instructor. Maximum 6 hrs.

556 Ice-Age Environments and Global Climate Change (3) (Same as Ecology and Evolutionary Biology 556).

557 Quaternary Ecology (3) (Same as Ecology and Evolutionary Biology 557).

563 Stable Isotope Geochemistry (3) (Same as Biogeochemistry 563). Theoretical aspects of stable isotope fractionation and applications to geologic systems. Stable isotope exchange, variations in natural waters, diagenetic, hydrothermal and metamorphic processes. Prereq: General Chemistry or equivalent.


568 Geochemical Analysis (3) Collection and treatment of geochemical data using electron microprobe, x-ray fluorescence, and atomic absorption spectrophotometry techniques. Prereq: 310 or consent of instructor. 2 hrs and 1 lab.

570 Advanced Structural Geology (4) Current topics in structural geology and tectonics of mountain belts; recent literature. Prereq: 370 or equivalent, or consent of instructor. 3 hrs and 1 lab or seminar.

572 Fracture Analysis (3) Field and subsurface characterization, and mechanical development of natural fractures in ground water flow. Prereq: Structural Geology or equivalent, or consent of instructor. (Same as Civil Engineering 572).

575 Tectonics (4) Evolution of Earth's lithosphere in context of plate tectonics theory. Formation of continents through comparative anatomy of mountain belts, including Appalachian, Alps, Urals, Caledonians, Cordillera, Andes, and Himalayas. Prereq: Structural Geology or consent of instructor. 3 hrs and 1 seminar.

576 Reflection Seismology (3) Imaging subsurface features using reflected seismic waves. Energy sources, modes of wave propagation, field procedures, computer data processing, and pitfalls. Applications to tectonic and environmental problems. Prereq: 470 or consent of instructor.

585 Contaminant Hydrogeology (3) Physical transport processes, isotopes and groundwater age dating, processes influencing inorganic, organic and microbial contaminants, sampling and monitoring methods, remediation of contaminated groundwater, aquifer protection. Prereq: 465 or 535; 460 or 561; or Environmental Engineering 553 or equivalent; and consent of instructor.

586 Field and Laboratory Methods in Hydrogeology (3) Research methods. Measurement of hydraulic properties, drilling, sampling and instrumentation, tracer experiments. Formulation, hypothesis and research plans. Prereq or coreq: 465 of Environmental Engineering 535; and consent of instructor.

590 Special Problems in Geology (1-3) Directed study or special topics. Prereq: Consent of instructor. May be repeated. Maximum 10 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.

595 Selected Topics in Geology (1) Presentation of research by faculty and visiting scientists. Registration required each semester for resident full-time graduate students, except in summer and when registered for 596. S/NC only.

596 Geology Colloquium (1) Special topics. Prereq: consent of instructor. 2 hrs and 1 lab. May be repeated with consent of department. Maximum 9 hrs.

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

620 Seminar in Paleontology (3) May be repeated with consent of department. Maximum 9 hrs.

630 Seminar in Petrology (3) May be repeated with consent of department. Maximum 9 hrs.

640 Seminar in Sedimentary Geology (3) May be repeated with consent of department. Maximum 9 hrs.

650 Seminar in Geomorphology and Quaternary Geology (3) May be repeated with consent of department. Maximum 9 hrs.

660 Seminar in Geochemistry (3) May be repeated with consent of department. Maximum 9 hrs.

670 Seminar in Structural Geology (3) May be repeated with consent of department. Maximum 9 hrs.

675 Seminar in Geophysics (3) Advanced treatment of selected topics in geophysics. Prereq: 470 or consent of instructor.

685 Seminar in Hyrogeology (3) May be repeated with consent of department. Maximum 9 hrs.

German

See Modern Foreign Languages and Literatures.

Health and Safety Sciences

Health and Safety Sciences (College of Human Ecology)

MAJORS

DEGREES

Health Promotion and Health Education ...... M.S. Human Ecology ........................................ Ph.D. Public Health ........................................ M.P.H., M.S.-M.P.H. Safety ................................................. M.S.

Delores Smith, Internim Head


Associate Professors: Puraley, R. Jack, Ph.D. ............. Iowa Zemel, Paula (Liaison), Ph.D. ......... Wayne State

Assistant Professor: 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 in Safety, 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 UT thematic areas of strength, health
Health

A graduate program is available leading to the Master of Science with a major in Political Science. The 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 activity.

The Doctor of Philosophy with a major in Political Science offers a concentration in political science. Perspectives of social, behavioral and biomedical sciences are incorporated with educational models appropriate for addressing community health needs.

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. Causes and how to cope. (Same as Safety 405.) F

406 Death, Dying and Bereavement (3) Aspects of death and dying, death and the dying process. (Same as Safety 406.) F, Sp

420 Sex Education As It Relates to Human Sexuality (3) Exploration of science of human sexuality. Issues, trends, and content of sex education. E

423 Women's Health (3) Factors influencing women's health and women consumers in nation's health service delivery systems. Health problems/concerns of women and techniques for prevention, maintenance, and correction. (Same as Women's Studies 423.) E

430 Suicide and Crisis Intervention (3) Factors which make suicide a health problem. Assessment, intervention, and prevention techniques.

435 Substance Use and Abuse (3) Drug and alcohol abuse problems and suspected causes; pharmacology of drugs and effects on society; strategies for intervention and education. F, Sp

465 Aging and Health (3) Aging process in health perspective as related to health promotion and wellness of aged. F, 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

520 Sex Education and Human Sexuality (3) Advancing in-depth discussion of educational and health counseling theory, materials used in school, community, or health care facility. Sp

530 Health Promotion and Health Education Program Development (3) Theories and principles of health promotion program development: methodology, marketing, public relations. Health education as vehicle for health promotion. F

540 Evaluation in Health Promotion and Health Education (3) Evaluating principles and methodologies as related to health promotion programs and programs. Construction of instruments for use in assessing health education outcomes. Sp

570 Special Topics (1-3) For graduate students, in-service teachers and other health professionals. Health/wellness or health promotion issues. May be repeated. Maximum 12 hrs.

590 Research Methods in Health (3) Basic research techniques in health settings. Development of research skills and problem identification for research topic. (Same as Public Health 590.) F

593 Directed Independent Studies (1-3) Individual identification and study of health/wellness or health promotion problem/issue. Specific proposal to instructor before registration. May be repeated. Maximum 12 hrs.

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

601 Internship/Research in Safety and Health (3-6) (Same as Safety 601.)

610 Critical Analysis of Writing and Research (3) Analysis of writing and research in selected areas. F

620 Advanced Research Techniques in Health (3) Advanced theory and techniques of research design and methodologies in health discipline. Prereq: 590, 610, Sp.

650 Health Aspects of Gerontology (3) Knowledge and understanding of biological, psychological and sociological aspects of aging as related to health and wellness of individual. (Same as Public Health 650.) F

665 Seminar in Nation's Health (3) Comprehensive study of definition, determinants, resources and health status of nation. (Same as Public Health 665.) F

690 International Health (3) Study of quality of health, health promotion and health services in countries throughout world. (Same as Public Health 690.) Sp


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. Preparation 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 minor in statistics is available to interested M.P.H. students due to 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 MASTER'S PROGRAM

The M.P.H. is not 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, 554.
2. Internship (6 hours): 567, 588.
3. Concentration of Study (16 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.

For more information, refer to the website: http://hss.he.utk.edu/pubhealth.

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 the courses 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 Safety Sciences (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 Nutrition 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 experience incorporates public health nutrition and the student's public health concentration. Dual degree students 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 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), Biostatistics (PH 530), and Epidemiology (PH 540).

MINOR IN GEROONTLOGY
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 on an in-state tuition basis. The M.P.H. program in Public Health is available to residents of the state of Arkansas. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Student Services.

COURSE REGISTRATION
Non-degree students must obtain permission from the M.P.H. program director to register for 500-level public health courses. Prerequisite coursework assigned as a condition to 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 worksite environments and programs delivered around issues relevant to employees and management: theory, program design, implementation and evaluation from the perspective of health promotion specialists. Prereq: Health Education, Promotion, and Behavior Sp.
493 Directed Independent Study (1-3) Individual in-depth study of selected issues. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. 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.
509 Graduate Seminar in Public Health (1) In-depth discussion of timely topics reflecting scope of public health as discipline and its interaction with many other academic and professional disciplines. Speakers both internal and external. May be repeated. Maximum 4 hrs. (Same as Nutrition 509, NURS 509, Exercise Science 509 and Social Work 509). S/N only. F,Sp.
600 Techniques and Theory in Health Planning (4) Overview of health planning concepts and methodologies; systems-oriented planning process. Major elements of planning: formulation and conceptualization of problem, plan design, evaluation and implementation. Health problems of institutions, communities and selected population groups, appropriate diagnoses, and programs for addressing needs. Sp.
568 Physical Activity and Positive Health (3) (Same as Exercise Science 568)
569 ClinicalExercisePhysiology(3)(SameasExerciseScience569.)
580 Special Topics (3) Prereq: Consent of instructor. May be repeated under different topic. Maximum 4 hrs.
585 Seminar in Gerontology (1) (Same as Human Ecology 585, Counselor Education and Counseling Psychology 585, Exercise Science 585, Nursing 585, Psychological and Counseling Studies 585, Social Work 585, and Sociology 585.)
587-88-89 Internship (3,3,3) Internship (community health education, gerontology, or health planning/administration) in either approved organization or research setting under supervision of designated preceptor. Prereq: M.P.H. major, one semester advance notice and consent of major advisor. 587: available only for approved extended placements. S/N only. E.
590 Research Methods in Health (3) (Same as Health 590.).
Safety

Graduate study with a major in Safety (thesis and non-thesis options) leads to the Master of Science degree. Graduate students may concentrate in safety management or in emergency management. The M.S. degree program requires completion of 33 semester hours. Degree requirements include completion of the 18-hour core curriculum and completion of a concentration area (15 hrs.). Concentration course options include specific courses offered by the Departments of Human Resource Development, Industrial Engineering, Civil and Environmental Engineering, and Political Science (Public Administration) in addition to those offered by the Department of Health and Safety Sciences. A list of courses is available for each concentration. Students may elect an internship experience with private industry or non-profit organizations to fulfill part of their course requirements. Curricular experiences will assist graduates in preparation for certified safety professional (CSP) 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 human environments in the workplace (industrial and commercial), home, school, and community. The offering of all core classes and required concentration courses 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 on a part-time basis.

For more information, refer to the website: http://hss.he.utk.edu/safety/

Graduate Courses

443 Sports & Recreational Safety (3) Accident prevention and injury control in sports activities; philosophy of sports safety; human environmental factors and interrelationship in sports injury and control; risk-taking and decision solution strategies; and contributions of sports medicine to safety. 3 hrs. and 2 labs. Sp

532 Behavioral Problems in Safety Education & Accident Prevention (3) Problems of behavior, causes of accidents, and application of principles of psychology in development of safe behavior in all segments of environment. 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. Sp

534 Organization, Administration and Supervision of Safety Programs (3) National, state and local level programs; administrative, instructional, and supervisory aspects. Implementation of relevant programs. Sp

535 Emergency Management (3) Civil and defense problems: tornadoes, floods, fires, mass civil disorders, and nuclear and personnel attack by alien countries. F

536 Safety Instrumentation (3) Selection, calibration, maintenance, and use of sampling instruments available to safety practitioner for evaluating exposures of workers to physical stresses and airborne contaminants. F

537 Advanced Emergency Management (3) Advanced study in emergency and hazard mitigation, planning, response and recovery. Theory and practice in identification of appropriate emergency warning systems, hazard assessment, facility inspection, plan development and implementation. Prereq: 535. Sp

572 Graduate Workshop in Safety (3) Special safety education problems. For advanced graduate students, teachers, supervisors, and administrators. May be repeated. Maximum 12 hrs.

590 Special Topics (1-3) Advanced study in selected disciplinary or professional area of safety education/management. May be repeated. Maximum 12 hrs.

593 Directed Independent Study (1-3) Individual study and research problem area in safety. Extensive reading and critical analysis of safety literature. Specific proposal to instructor before registration. May be repeated. Maximum 12 hrs. E

601 Internship/Research in Safety and Health (3-6) Field experience. Significant problem identified, researched, and reported in acceptable form. May be repeated. Maximum 6 hrs. (Same as Health 601.) E

History

(College of Arts and Sciences)

MAJOR DEGREES

History.....................................................M.A., Ph.D.

William B. Wheeler, Head

Professors:

Bergeron, Paul H., Ph.D. Vanderbilt
Chmielewski, Edward V. (Emeritus), Ph.D.
Cutter, E. Wayne, Ph.D. Harvard
Farris, W. Wayne, Ph.D. Texas
Finger, John R. (Emeritus), Ph.D. Washington
Haas, Arthur G., Ph.D. Chicago
H. Yen-Ping (Lindsay Young Prof.), Ph.D. Harvard
Haskins, Ralph W. (Emeritus), Ph.D.
Klein, Milton M. (Emeritus) (Distinguished Prof.), Ph.D.
Moser, Harold, Ph.D. Columbia
Norrell, R. Jeff (Barnadotte Schmitt Prof.), Ph.D.

History.....................................................California

Klein, Milton M. (Emeritus) (Distinguished Prof.), Ph.D. Columbia
Moser, Harold, Ph.D. Wisconsin
Norrell, R. Jeff (Barnadotte Schmitt Prof.), Ph.D.

Virginia

Ratner, Lorman A. (Emeritus), Ph.D. ....... Illinois
Utle, Jonathan G. (Emeritus) .............. Illinois
Wheeler, W. Bruce, Ph.D.................. Virginia

Associate Professors:

Ash, Stephen V., Ph.D. .................... Tennessee
Bast, Robert J., Ph.D. ....................... Arizona
Bohstedt, John, Ph.D. ...................... Harvard
Bradley, Owen P., Ph.D. ..................... Cornell
Brummett, Pamlira R., Ph.D. ............. Chicago
Burman, Thomas E., Ph.D. ............... Toronto
Diacion, Todd A., Ph.D. ........ .......... Wisconsin
Higgs, Catherine A., Ph.D. ............... Yale
Pinoney, Paul J., Ph.D. ................. Vanderbilt

Assistant Professors:

Appier, Janis, Ph.D. ............ California (Riverside)
Brosnan, Kathleen, Ph.D. .......... Chicago
Dessel, J. P., Ph.D. ....................... Arizona
Glover, Lorll, Ph.D. ....................... Kentucky
Liuveauisic, Vegas G., Ph.D. ....... Pennsylvania
Pfeifer, G. Kurt, Ph.D. ............... Rutgers
Sahadeo, Jeff, Ph.D. ................. Illinois

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.

Detailed information may be obtained from the Director of Graduate Studies in History who also advises all incoming students.

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 is required. At least 8 hours must be completed in each of two M.A. fields. The primary field is examined by a two-hour written followed by a one-hour oral examination with the single grade of pass/fail.
given at the conclusion of the oral examination. No examination is given on the secondary field.

M.A. Fields
United States (colonial to present)
Premodern Europe
Modern Europe
Asia

Retention and Termination
A 3.0 overall grade-point average is required to remain in good standing. M.A. students must take the M.A. examination no later than the semester following the completion of 30 hours. A student who fails the M.A. examination must repeat the examination no later than the following semester. A student who fails the examination a second time or does not take the examination when required will be dropped from the graduate program.

THE DOCTORAL PROGRAM

Admission Requirements
1. Successful completion of the M.A. degree from an accredited institution.
2. Acceptable scores on the Graduate Record Examination (general).

Residence and Coursework
Before being admitted to doctoral candidacy, a student must:
1. Complete History 510 at UT (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 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.) Students who have completed a master's thesis need complete only one research seminar (must be taken at UT), and History 621.
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 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 exam, 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. A general oral exam will be taken following the successful completion of the two written portions. The two written and one oral exams are separate examinations, and Group I must be passed before taking Group II, and the letter 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
- Intellectual 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-level coursework each semester and must complete 24 hours of dissertation credit. A final oral defense is given on the dissertation in its historical context. The dissertation 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 doctoral history. Origins and evolution of major doctrines; classical and neoclassical economics, economics of Keynes and his followers, principal developments of second half of 20th century. Major writing requirement. May be used toward graduate degree in History or Political Economy 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 the student uses University facilities and/or if the student is on leave. 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. E.

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 United States 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 intra-national 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.

544 Topics in U.S. Environmental History (3) Reading seminar: secondary sources on U.S. environmental history. 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, social impact of war and naval strategy in foreign policy. May be repeated. Maximum 15 hrs.

555 Topics in United States Social and Economic History (3) Reading seminar: secondary sources on
Human Ecology

(College of Human Ecology)

**MAJOR**

<table>
<thead>
<tr>
<th>COURSE</th>
<th>DEGREE</th>
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<td>Human Ecology</td>
<td>Ph.D.</td>
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The College of Human Ecology offers the Doctor of Philosophy degrees with a major in Human Ecology.

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**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; and 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, and humanities, 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 course of study is given under the individual academic departments that administer the Ph.D. concentrations.

**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 in gerontology is a required course. The degree contributing programs 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 from outside the major department. Coursework needs to comply with the following framework:

1. Coursework, 9 hours required. A variety of coursework is taken toward satisfaction of this requirement. Courses which are offered on a regular basis include: Health 406, 465, Health/Public Health 650, Nutrition 518, Public Health 523, Retail and Consumer Studies 560, Social Work 566, Sociology 415, Psychosocial Development Studies 504, 522, 525, 526.

2. Applied practicum, 2 hours required. Students should register under practicum experiences in the "home" department of the supervising faculty.

3. Human Ecology 585, 1 hour required. Cross-listed with participating departments.

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 committee of each student who declares a gerontology minor. Contact Dr. Billie Collier, 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 on an in-state tuition basis. The Ph.D. program in Human Ecology is available to residents of Alabama, Kentucky, Mississippi, or West Virginia. Additional information may be obtained from the Graduate Studies Office, Graduate Student Services.

**GRADUATE COURSES**

450 Special Topics: Human Ecology (1-3) Study in selected professional area within College of Human Ecology. Topics vary. 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 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 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

525 Practicum in Human Ecology (1-6) Field based experiences. Prerequisite: Consent of instructor. E

545 Evaluation in Home Economics Education (3) Assessment of programs and pupil progress; techniques, methods and purposes. Prerequisite: 540, Coreq: 575, F,Sp,A

574 Analysis of Teaching for Professional Development (2) Strategies to document and analyze effec-
Human Resource Development

MAJORS DEGREES
Human Ecology .................................................. Ph.D.
Human Resource Development ......................... M.S.
Billie J. Collier, Interim Head

Professors:
Brewer, Ernest W. (Lielson), Ed.D. ................. Tennessee
Campbell, Clifton P. (Emeritus), Ed.D. Maryland
Cheek, Garland D. (Emeritus), Ph.D. .......... Kansas State
Coakley, Carroll B. (Emeritus), Ph.D. .......... Wisconsin
Craig, David G. (Emeritus), Ed.D. .......... Cornell
DeJonge, Jacqueline O., Ph.D. ............... Iowa State
Haskell, Roger W. (Emeritus), Ph.D. ........ Purdue
Mathews, John I. (Emeritus), Ph.D. .......... Arizona State
Petty, Gregory C., Ph.D. ................. Missouri

Associate Professor:
Stout, Vickie J., Ed.D. ..................................... Tennessee

Assistant Professors:
Bartley, Sharon, Ph.D. ................................ Tennessee
Kupritz, Virginia, Ph.D. ......................... Virginia Tech
Lim, Doo, Ph.D. .......................................... Illinois
Pierce, Randal, Ph.D. ................................ Ohio State

The Department of Human Resource Development advances economic development through the integration of occupational education, training, career development, and organizational development. HRD required (core) courses and HRD electives are offered in evening/online/workshop for workforce formats enabling working professionals to obtain the master's or doctoral degree.

THE MASTER'S PROGRAM

The Master of Science degree requires a major in Human Resource Development provides a flexible graduate program for professionals wishing to pursue in-depth 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 potential.

The M.S. degree with a major in Human Resource Development offers two concentrations, each providing opportunities for specialized interests. Both concentrations require a thesis. The training and development concentration is designed to meet the needs of professionals who work in programs encompassing all areas of human resource development.

Admission Requirements
Training and Development Concentration applicants are to submit an application for admission to The Graduate School, three letters of reference, a statement describing personal career objectives, and a sample of written work directly to the Department of Human Resource Development.

Applicants must hold a bachelor's degree from an accredited institution and present evidence of ability to do graduate 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 reference letter should also be provided by the work supervisor.

Graduate Record Examination scores are required of all applicants.

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 Resource Development requires a thesis and a dissertation. The thesis must be a new contribution to human resource development. The dissertation must be a comprehensive study of a topic in human resource development. The dissertation must be written under the supervision of a faculty member. The dissertation must be approved by the Department of Human Resource Development.

THE PH.D. CONCENTRATION

Admission Requirements
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, a statement describing personal career objectives, and a sample of written work directly to the Department of Human Resource Development.

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 reference letter should also be provided by the work supervisor.

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Graduate Record Examination scores are required of all applicants.

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.
Departmental Core (27 hours): Must include 510, 511, 512, 557, 559 or equivalents and 12 hours of 600. Specialization (12 hours): Must support a career path of 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. Research and Statistics (15 hours): Must include basic and 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 paths. Dissertation (24 hours): Must be original research project. The department offers an alternative approach to residence for the Ph.D. degree. This alternative residence involves, among other requirements, a two-year, continuous enrollment in the ADEA Research Forum in Human Resource Development. Detailed information regarding the Ph.D. concentration program of study may be obtained from the departmental liaison for graduate studies. 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 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 Student Services.

GRADUATE COURSES

455 Learner and Program Evaluation (3) Assessing effectiveness of training or educational programs; development of evaluation criteria, measures; evaluation job performance, and measuring learner progress. Prereq: 210 Microcomputer Applications or equivalent and 320 Program Planning for Training, Development and Education.

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


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 travel. Prereq: Consent of instructor. May be repeated. Maximum 15 hrs. E

503 Problems in Lieu of Thesis (3) May be repeated. Maximum 6 hrs. S/NC only. E


505 Selection, Placement, and Follow-up Procedures in Human Resource Development (3) Methods and procedures utilized in establishing criteria for trainee selection and placement in instructional programs and in jobs. Collecting, analyzing, and reporting follow-up data 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. Sp

507 Internship in Human Resource Development (3) Practical field experiences in selected settings under supervision of practitioner and departmental representative. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. S/NC only. E

510 Foundations of Human Resource Development (3) Historical, philosophical, economical, social, and psychological foundations of vocational, technical and adult education and human resource development; fundamental principles and contemporary objectives. F,Sp


512 Human Resource Management (3) Processes approaches in human resource management; interdependent human resource activities (planning, work design, staff development, training and development, cost, transition, and organizational goals). Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E

513 Special Topics in Human Resource Development (1-3) Specific objectives, activities, and evaluation. Prereq: Consent of instructor. May be repeated. Maximum 9 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 BASIC programming for education and training applications. Hands-on experience in operating and programming microcomputers, word processing, and running educational programs using sequential data files. Prereq: Teaching, administrative, or related experience in education or training, or consent of instructor.

516 Microcomputer Software Development (3) Advanced software design in BASIC, random access and binary files, search and sort algorithms, and bitmapped graphic applications for educational education and training programming and program 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 classroom and educational purposes. Prereq: 515 or consent of instructor. May be repeated. Maximum 9 hrs. E

522 Professional Practices for Educators (3) Topics essential to effective classroom teaching; evaluation of students, peer teaching, in-service training, methods for evaluation, and personnel development. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E

523 Leadership Development for Business Education and Marketing Education Professionals (3) Change management with implications for continuous quality improvement of self and one's work and work place.

550 Administration of Industrial Education Programs (3) Developing, staffing, administering and evaluating programs involving exercise in instructional analysis, design, implementation, and evaluation. Prereq: Consent of instructor. Sp,Su

551 Supervision of Industrial Education Programs (3) Techniques used to improve instructional programs. Staff development, curriculum improvement, and program updating techniques. Prereq: 455 or equivalent. F,Sp

552 History and Philosophy of Industrial Education (3) Social, political, and economic events that impact development of industrial education. Philosophical problems: justification, values, principles and concepts of industrial education. Prereq: Consent of instructor. F,Sp

553 Planning Technical Education Facilities (3) Preparation of educational specifications, site selection, and working relationships with other professionals involved in process of technical-education facilities. Prereq: Consent of instructor. Sp, Su

554 Program Planning (3) Instructional systems analysis, development, implementation, and evaluation of technology, training, and work-related training. Prereq: Curriculum development course and consent of instructor.

555 Curriculum Planning (3) Developing performance-based, criterion-referenced instructional programs. Su

556 Organizational Development (3) Strategies and interventions for organizational development: training and development of staff, models, assessment, organizational change and consultation. Prereq: 512 or consent of instructor. F

557 Methods of Teaching Conceptual Content (3) Proper selection and effective application of methods for teaching and learning conceptual content. Communication strategies for conceptual content comprehension, retention, and application.

558 Seminar in Educational Administration (1-3) Current issues, innovations, problems associated with technical programs. Prereq: 12 hrs of graduate courses. May be repeated. Maximum 9 hrs. E

559 Program Evaluation (3) Concepts, principles, practices, theories, and trends related to program evaluation. Planning and conducting a comprehensive program evaluation in a variety of settings. Fundamentals of design, measurement, return-on-investment (ROI), and presentation and dissemination of results to stakeholders.

560 International Perspective of Workforce Training (3) Examination and comparison of workforce systems in highly industrialized countries. In-school training programs, out-of-school training systems, update training of incumbent workers, retraining displaced workers, transfer of new technologies, and role and responsibilities of businesses, private sector organizations/ agencies, and state and federal government agencies.

562 Grant Writing and Project Implementation (3) Writing grant proposals, negotiating with funding sources, implementing and maintaining funded programs, and closing out projects at end of funding periods.

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.

604 Research Forum in Human Resource Development (2) Development of theoretical framework, research design, evaluation techniques, and qualitative and quantitative strategies for investigations of problems and issues in human resource development. Prereq: Consent of instructor. E

610 Research Development in Human Resource Development (3) Proposal development, theoretical basis, proposal design, and statistical and qualitative strategies for investigations of problems and issues in human resource development. Prereq: 6 hrs of advanced statistics courses and consent of instructor.

611 Internship in Human Resource Development (3) Field experience in an internship with other professors. Prereq: Consent of instructor. May be repeated. Maximum 8 hrs. E

613 Special Topics in Human Resource Development (3) Prereq: Consent of instructor. May be repeated. Maximum 8 hrs. 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
Rentsch, Joan R., Management
Rush, Michael C., Management
Schumann, David W., Marketing, Logistics & Transportation
Woehr, David J., Management

The doctoral program is designed to prepare students for personnel, managerial, 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 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 Student Services (218 Student Services Building) and the Director, Industrial and Organizational Psychology Program, 408 Stickle 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 Student Services 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 3.7 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, these students admitted to the program have performed at or above the 69-79th 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 Research 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 9
567, 568, & 569
Research Core 12
Statistical Principles (Statistics 537 & 538 or equivalents)
Multivariate Statistics (Statistics 575, 679 or equivalent)
Advanced Research Methods (605 or equivalent)

General Psychology Core 9
One course in each of the following areas: biological bases of behavior, cognitive bases of behavior, history and systems of psychology.

I/O Psychology Seminars 9
600 level IOPSY courses, from a program committee approved list.

Approved Electives 9
Courses supporting the student's course of study.

Supervised Practicum, Internship, or field training (690) 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 on an in-state tuition basis. The Ph.D. program is available to residents of Kentucky, Virginia, or West Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Student Services.

GRADUATE COURSES

552 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/N or I 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/N 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.

659 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) Prerequisite: E or NP only. E

605 Advanced Research Methods in Psychology (3) Critical analysis of new and evolving techniques for psychological research; new statistical and psychometric methods.

101 Individuals in Organizations Seminar (3) Bridging principles and processes which link individual attributes with more macro organization concerns: 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 Organizational Psychology (3) Topics vary. May be repeated. Maximum 9 hrs.

626 Topics in Industrial Psychology (3) Topics vary. May be repeated. Maximum 9 hrs.

627 Structural Equation Models in Organizational Research (3) Issues related to analysis of organizational data using structural equation and related techniques.

628 Personality Assessment (3) Review of key domains of social cognition: measurement systems which use individual differences in social-cognitive biases as basis for measuring personality.

635 Ethical and Professional Issues in Industrial/Organizational Psychology (3) Issues involved with ethical practice in research, academic, organizational, and consulting situations.

690 Supervised Practicum, Internship or Field Training in Industrial/Organizational Psychology (1-15) One credit hour per 30 hours of practice. S/N or letter grade.

Industrial Engineering

(College of Engineering)

MAJOR DEGREES

Industrial Engineering .............. M.S., M.S.-MBA

A. B. Badiru, Head

Professors:
Badiru, A. B., Ph.D. ............... Central Florida
Bontadelli, J. A. (Emeritus), Ph.D. ............... Ohio State
concentration is fully supported off-campus. The concentration has an additional admission requirement for students majoring in industrial engineering, maintenance and reliability engineering, and information systems engineering.

Select an area of specialization from industrial engineering to enable the student to pursue career objectives, graduate work in engineering management, and the Master of Science degree with a major in industrial engineering.

The engineering management concentration is available to students majoring in manufacturing systems engineering and manufacturing, and product development and manufacturing. The dual degree program is available to students majoring in manufacturing systems engineering and management, and the Master of Science degree with a major in management.

THE MASTER'S PROGRAM

Students who enroll in the Master of Science degree may select a concentration in industrial engineering, engineering management, product development and manufacturing, or manufacturing systems engineering. Each of these concentrations, with the exception of the product development and manufacturing concentration, allows a student to select either a thesis or non-thesis option. Students who select the manufacturing systems engineering concentration of the dual degree program must select the non-thesis option. The thesis option requires 27 hours of coursework and 6 hours of research. The non-thesis option requires 30 hours of coursework and a 3-hour design project; the engineering management concentration requires an additional 3 hours.

Industrial Engineering

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 for two years' U.S. industrial experience as a practicing engineer or scientist. This concentration is fully supported off-campus utilizing electronic media for videotaping and interactive distance teaching methods.

Manufacturing Systems Engineering

Under the manufacturing systems engineering concentration, students learn strategies for improving product quality, implementing various production strategies, analysis of production planning and scheduling systems, and supplier and distribution integration. Dual degree students can select manufacturing systems engineering as an option.

Product Development and Manufacturing

The product development and manufacturing concentration is a non-thesis option, available only to students taking the dual M.S.-MBA program.

DUAL M.S.-MBA PROGRAM

The College of Business Administration and the College of Engineering offer an integrated program leading to the conferral of the Master of Business Administration degree with a major in Business Administration (concentration in operations management) and the Master of Science degree with a major in Industrial Engineering (concentration in manufacturing systems engineering or product development and manufacturing). The Industrial Engineering program is open to students with undergraduate engineering majors other than industrial engineering.

The establishment of the dual program addresses the critical need for personnel trained in both engineering and management who can integrate an increasingly complex body of knowledge for rapid introduction of new products to the marketplace. The objective of the dual degree program is to prepare graduates to take a leading management role in companies that must react quickly to a dynamic market where forces of competition require rapid changes in design and manufacturing and a short product development cycle.

Admission Requirements

Applications are accepted for fall semester only. Applicants for the M.S.-MBA program must make separate application to both programs. The thesis option requires 27 hours of coursework and 6 hours of research. The non-thesis option requires 30 hours of coursework and a 3-hour design project; the engineering management concentration requires an additional 3 hours.

Curriculum for Dual M.S.-MBA Degree

August - First Year

BA 511 MBA Core I
3

Fall - First Year

BA 512 MBA Core II
15
IE 504 Product Development Process
1

Spring

BA 513 MBA Core III
9
IE 506 Product Selection and Evaluation
2
IE 508 Integrated Product, Process, and Manufacturing System Design
3

Summer

Internship
-
IE 509 Project Management
1

Fall - Second Year

IE 503* Survey of Manufacturing Systems Engineering
1-3
IE 511** Advanced Topics in Business Planning and Commercialization
3
IE 509 Project Management
1
IE 510 Advanced Topics in Manufacturing Systems
3
IE 524 Advanced Integrated Manufacturing Systems
3
- Elective (IE 514, 519, or 523)
3

Spring

MBA "hub" course elective
- 3
IE 509 Project Management
1
IE 522 Optimization Methods in Industrial Engineering
3
IE 512* Process Development and Market Feasibility
3
- Elective (IE 514, 519, or 523)
3

Summer (first session)

IE 594 Culminating Integrated Project Report
3

TOTAL
66-69

*The IE503 class is required for students enrolling in this option with undergraduate degrees in disciplines other than industrial engineering.

**Students in manufacturing systems engineering concentration may substitute other selected IE courses for these courses.

The dual degree candidate must satisfy the curriculum and graduation requirements of the engineering major being pursued and the College of Business Administration.

Students withdrawing from the dual degree program before completing both degrees will not receive credit toward graduation in either degree program for courses taken in the...
6. Knowledge of theoretical and practical evolution of information sciences and technologies and their relationship with other disciplines.
7. Competence in creating, managing and accessing information in a variety of formats.
8. To provide services to the state, region, and nation in association, consulting and continuing education activities which will promote the development and improvement of information systems and services such that the school's contributions reach beyond its immediate academic programs. The school will provide:
   1. Continuing education for information professionals and, on a selective basis, to persons outside the information field.
   2. Advisory services to information organizations.
   3. Leadership for professional associations.
   4. To conduct basic and applied research which promotes the generation of new knowledge, services and technology. The school will encourage:
      1. Research which strengthens its instructional and public service programs.
      2. The use of a variety of research methods.
      3. Sharing the results of its research.
      4. Increased research quality and productivity.

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 MS 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 including 5 required courses 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.

Required Courses

Five courses are required of all students: 490, 520, 530, 560 and 580. (Students seeking licensure see track requirements below.) These courses address the evolving information environment; organization and representation of information; information access and retrieval; developing and managing collections; and principles and concepts of the information sciences. Three courses, 490, 520 and 530, are prerequisite to all courses for students enrolled in the M.S. degree program.

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, records manager/archivist, webpage designer, indexer/abstractor, online information retrieval specialist, medical or law librarian, reference librarian, youth services specialist, and many others. 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 Tennessee Department of Education licensure as a school library information specialist, stipulated requirements apply. See following section.

Tennessee State Department of Education School Library Information Specialist Requirements

The Tennessee State Department of Education requires School Library Information Specialists to hold the master's degree. The School of Information Sciences offers four tracks for School Library Information specialist endorsement.

Initial Endorsement for Non-Licensed Teachers with a Master's Degree in Library or Information Sciences: For those students who do not hold the master's degree, the requirements for initial endorsement include the 5 required courses plus 551, 567, 571, 572, 573, 585, and 595. In addition, students must complete two corequisite courses from the College of Education (5 credit hours) which do not count toward the master's degree requirements. Students pursuing the initial endorsement must follow the non-thesis option. Upon completion of the requirements, students will earn a master's degree in Information Sciences and a Tennessee State Department of Education license as a School Library Information Specialist.

Additional Endorsement for Licensed Teachers with a Master's Degree in Library or Information Sciences: For those students who hold an ALA-accredited master's degree and have approval of the faculty advisor, the requirements are a maximum of 24 hours within the School's program, including the required 595. In addition, students must complete two corequisite courses from the College of Education (5 credit hours) beyond the required 24 hours. Upon completion of the requirements, students will earn a Tennessee State Department of Education license as a School Library Information Specialist.

Additional Endorsement for Licensed Teachers without a Master's Degree: The requirements include the 5 required courses plus 551, 567, 571, 572, 585 and 596 (which must be taken twice). Upon completion of the requirements, students will earn a Tennessee State Department of Education additional endorsement as a School Library Information Specialist.

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 hours required for graduation. (Students may register for more than 6 hours of 500, but only 6 hours will count toward graduation.) 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.

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 culminating experience is also required which must be completed in one of the student's last two terms with a grade of B or better (except as noted) selected from the following and approved by the student's advisor:
590 Problems in Information Sciences,
591 Supervised Readings in Information Sciences,
592 Seminar in Information Sciences,
593 Independent Study,
594 Graduate Research Participation (SNC only),
595 Student Teaching in School Library Information Center (SNC only),
596 Student Teaching Observation in School Library Information Center (SNC only),
597 Practicum (SNC only).

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...
525 Systems Modelling and Simulation (3) Modeling of discrete and continuous systems, using simulation software and Monte Carlo simulation. Problem definition, input distributions, output data analysis, model validation and verification, and combined systems, using current simulation software. Development of flexible simulation models to enhance accessibility of simulation models for experimental testing. Development of distributed simulation models to represent and test production and supply chain systems. Prereq: 306 Simulation or 526. (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: line balancing, set-up time reduction, cost management, maintenance support and other selected topics. Application at enterprise level to achieve strategic competitive goals. Prereq: 515 or consent of instructor.

531 Motivation and Culture in Engineering Management (3) Methodologies for capabilities, and/or faculty time before degree is completed. May not be used toward degree requirements. Not for credit for students with undergraduate degrees, production and inventory control, facility layout, and performance of mass and lean production systems. Lean production concepts and principles. Planning, designing, and implementing lean production systems: line balancing, set-up time reduction, cost management, maintenance support and other selected topics. Application at enterprise level to achieve strategic competitive goals. Prereq: 515 or consent of instructor.

532 Productivity and Quality Engineering (3) Productivity and quality measures defined and used to analyze current competitive position of important sectors of American industry with respect to national and international competition. Study of management theorists and systems which promote or inhibit productivity or quality improvements.

533 Theory and Practice of Engineering Management (3) Manager's perspective; business definition; strategic planning and management; marketing and competition in global economy; finance; organization; systems thinking; team building; corporate culture and leadership in new organization; and quality, empowerment, and learning organizations. Principle application to work settings and case studies.


535 Management of Technology (3) Creativity and innovation; incorporation of advanced technology equipment; application of systems thinking; new methods in business and manufacturing organizations; justifying technology; assimilating and managing changing management roles; and impacts of new technologies. Prereq: 539 and Industrial Engineering 518.

536 Project Management (3) Development and management of engineering and technology projects. Project proposal preparation; resource and cost estimating, and project planning, organizing, and controlling; network diagrams and other techniques. Role of project manager: team building, conflict resolution, and contract negotiations. Discussion of typical problems and alternative solutions. Case studies and student projects. Prereq: 537 or consent of instructor.

537 Analytical Methods for Engineering Managers (3) Survey of management analysis and control systems through IE techniques. Qualitative and quantitative methods: methods analysis, work measurement, incentive systems, wage and salary development, production and inventory control, facility layout, linear programming, and applied operations research techniques. Not for credit for students with undergraduate degrees in industrial engineering.

538 New Venture Formation (3) Factors other than management or characteristics which enter into successful establishment of manufacturing or service enterprise. Organizational and financial planning and evaluation. Cost and location of operations. Market analysis to determine commercial feasibility of new ventures. Prereq: 539.

539 Strategic Management in Technical Organizations (3) Strategic planning process and strategic management in practice, corporate vision and mission, product, market, organizational, and financial strategies; external factors; commercialization of new technologies; and competition and beyond. Prereq: 533 and Industrial Engineering 518 or consent of instructor.


541 Total Quality Management and Beyond (3) Continuous improvement in capabilities, competitiveness, and productivity of organizations. Principles of total quality management; systems theory and analysis; performance 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.

Engineering Management

GRADUATE COURSES

501 Capstone Project (3-6) Application-oriented project to show consistency with academic area. Prereq: Enrollment in engineering management. May be repeated. Maximum 6 hrs. S/NC only.

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

531 Motivation and Culture in Engineering Management (3) Motivation and cultural theories and practice to improve individual and organizational capabilities. Success in meeting goals, improving creativity/innovation, and leadership and personal interpersonal skills. Improvements through organizational structure, policies, and work design. Prereq: 533 or consent of instructor.

532 Productivity and Quality Engineering (3) Productivity and quality measures defined and used to analyze current competitive position of important sectors of American industry with respect to national and international competition. Study of management theorists and systems which promote or inhibit productivity or quality improvements.

533 Theory and Practice of Engineering Management (3) Manager's perspective; business definition; strategic planning and management; marketing and competition in global economy; finance; organization; systems thinking; team building; corporate culture and leadership in new organization; and quality, empowerment, and learning organizations. Principle application to work settings and case studies.


535 Management of Technology (3) Creativity and innovation; incorporation of advanced technology equipment; application of systems thinking; new methods in business and manufacturing organizations; justifying technology; assimilating and managing changing management roles; and impacts of new technologies. Prereq: 539 and Industrial Engineering 518.

536 Project Management (3) Development and management of engineering and technology projects. Project proposal preparation; resource and cost estimating, and project planning, organizing, and controlling; network diagrams and other techniques. Role of project manager: team building, conflict resolution, and contract negotiations. Discussion of typical problems and alternative solutions. Case studies and student projects. Prereq: 537 or consent of instructor.

537 Analytical Methods for Engineering Managers (3) Survey of management analysis and control systems through IE techniques. Qualitative and quantitative methods: methods analysis, work measurement, incentive systems, wage and salary development, production and inventory control, facility layout, linear programming, and applied operations research techniques. Not for credit for students with undergraduate degrees in industrial engineering.

538 New Venture Formation (3) Factors other than management or characteristics which enter into successful establishment of manufacturing or service enterprise. Organizational and financial planning and evaluation. Cost and location of operations. Market analysis to determine commercial feasibility of new ventures. Prereq: 539.

539 Strategic Management in Technical Organizations (3) Strategic planning process and strategic management in practice, corporate vision and mission, product, market, organizational, and financial strategies; external factors; commercialization of new technologies; and competition and beyond. Prereq: 533 and Industrial Engineering 518 or consent of instructor.


541 Total Quality Management and Beyond (3) Continuous improvement in capabilities, competitiveness, and productivity of organizations. Principles of total quality management; systems theory and analysis; performance 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.
access and retrieval; developing and seeking licensure

490, 520, 530, 560 and 580. (Students outside the school with a maximum of 6 from thesis or a non-thesis option is available, Science involves a total of 42 semester hours.

THE MASTER'S DEGREE

The program leading to the Master of Science involves a total of 42 semester hours of graduate courses including 5 courses 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 University.

Required Courses
Five courses are required of all students: 490, 530, 530, 560 and 580. (Students seeking licensure see track requirements below. These requirements address the evolving information environment; organization and representation of information; information access and retrieval; developing and managing collections; and principles and concepts of the information sciences. Three courses, 490, 520 and 560, are prerequisite to all courses for students enrolled in the M.S. degree program.

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 library records manager/archivist, web page designer, information/literature specialist, medical or law librarian, reference librarian, youth services specialist, and many others. Students are encouraged to take advantage of the individualized curricular approach.

Whatever individualized curriculum is chosen, all students must complete the program receive an M.S. degree accredited by the American Library Association (ALA). For those pursuing Tennessee Department of Education licenses as a school library information specialist, stipulated requirements apply. See following section.

Tennessee State Department of Education School Library Information Specialist Requirements

The Tennessee State Department of Education requires School Library Information Specialists to hold the master’s degree. The School of Information Sciences offers four tracks for School Library Information Specialist endorsement.

Endorsement for Non-Licensed Teachers with no Master's Degree
For those students who do not hold the master’s degree, the requirements for initial endorsement include the 5 required courses plus 551, 567, 571, 572, 573, 585, and 595. In addition, students must complete two corequisite courses from the College of Education. (5 credit hours required) (Note: The student must have at least one additional course at the master’s degree level, and study must follow the non-thesis option. Upon completion of the requirements, students will earn a master’s degree in Information Sciences and a Tennessee State Department of Education license as a School Library Information Specialist.

Endorsement for Non-Licensed Teachers with a Master’s Degree in Library or Information Sciences:
For those students who hold an ALA-accredited master’s degree and have approval of the faculty advisor, the requirements are a maximum of 24 hours within the School’s program, including the required 566. In addition, students must complete two corequisite courses from the College of Education (5 credit hours beyond the required 24 hours). Upon completion of the requirements, students will earn a Tennessee State Department of Education license as a School Library Information Specialist.

Endorsement for Non-Licensed Teachers with a Master’s Degree:
The requirements include the 5 required courses plus 551, 567, 571, 572, 585 and 595 (which must be taken twice). Upon completion of the requirements, students will earn a Tennessee State Department of Education additional endorsement as a School Library Information Specialist.

Additional Endorsement for Licensed Teachers with a Master’s Degree:
The requirements include the 5 required courses plus 551, 567, 571, 572, 585 and 595 (which must be taken twice). Upon completion of the requirements, students will earn a Tennessee State Department of Education additional endorsement as a School Library Information Specialist.

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 after 42 hours required for graduation. (Students may register for more than 6 hours of 500, but only 6 hours will count toward graduation.) 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.

Non-Thesis Option: Upon completion of the program, all students who elect the non-thesis option must take a written comprehensive examination. A culminating examination in a major area of study must be completed in one of the student's last two courses at a grade of B or better (except as noted) selected from the following and approved by the student's advisor:

- 590 Problems in Information Sciences,
- 591 Supervised Readings in Information Sciences,
- 592 Individual Study, 593 Independent Study,
- 594 Graduate Research (non-Thesis Option)
- 595 Student Teaching in School Library Information Science

The oral examination will substitute for the comprehensive examination.

FINANCIAL ASSISTANCE OPPORTUNITIES

Employment with the University of Tennessee Libraries may provide a work-study position for selected students who wish to obtain experience in academic libraries and pursue the degree. Such students usually work at least 20 hours per week and 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 subcontracting with Oak Ridge National Laboratory and Oak Ridge National Laboratory, Oak Ridge, Tennessee.

A limited number of graduate teaching assistantships are available through the school. Assistantships of this type carry a weekly stipend 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. 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 non-resident students from a specified set of states to enroll in graduate programs at UT on an in-state tuition basis. The M.S. program in Information Sciences is available to residents of the states of Arkansas, Georgia, Kentucky, Mississippi, South Carolina, Tennessee, and Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Student Services.

GRADUATE COURSES

456 History of the Book (3) History of writing and various methods of bookmaking.

474 Writing About Science, Technology and Medi- cine (3) Same as Journalism 474.

485 Introduction to Electronic Communications and Information Resources on the Internet (3) Exploration of websites and internet communications; teaching and learning in and through electronic media; copyright, privacy, and access.

486 Advanced Electronic Communications and Information Resources on the Internet (3) Exploration of advanced information and communication tools, resources and forms, scripting and search engines. Prereq: 485 or consent of instructor.

487 Information (3) Principles of distinguishing, describing, and retrieving information. S/NC only. E

500 Thesis (1-15) EPP only. E

502 Registration and use of Facilities (1-15) Required for the student to be registered and using library facilities. One credit if student and/or faculty faculty before degree completed. May not be used toward degree requirements. May be repeated. SNC only. E

503 Organization and Representation of Information (3) Descriptive cataloging, authority, subject cataloging, general classification, authority control, bibliographic utilities, online cataloging.

521 Cataloging and Classification (3) Basic library cataloging and classification techniques, tools, and supporting operations. Descriptive cataloging, cataloging microform, special libraries, special subject, microform, serials, and mixed materials; cataloging and classification of microform, visual, auditory, and electronic (including Internet) resources.

523 Abstracting and Indexing (3) Philosophical, standard, and practical principles and procedures of description and access to information resources. Use of traditional and non-traditional methods; legal issues; copyright, control, resources construction, and advertising.

530 Information Access and Retrieval (3) Media for information access and retrieval, including microform and automated library systems. Use of various types of databases including multi-media, full-text, and abstracts. E

531 Sources and Services for the Social Sciences (3) Information sources in political science, sociology, psychology, geography, history, archeology, business, and education.

532 Sources and the Role of Science and Engi- neering (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 of library collections; description, cataloging, preservation, digital libraries.

534 Government Information Sources (3) Selection, acquisition, organization, and utilization of government information in various forms: legislative, judicial, and executive branches of federal, state, local, and international government and intergovernmental agencies. Sp

535 Advanced Information Retrieval (3) Bibliographic, non-bibliographic, full-text databases, e.g., computer databases, text corpora, government information, public opinion, organizations, pages, content-page web database, patents, academic, databases. E

537 Information Industry (3) Issues and trends in information industry: products and services. Standards, enabling technologies, choice of distribution media, entrepreneurial opportunities. Ga, ethical, and quality concerns. F

538 Economics of Information (3) Costing and pricing of information, value of information and value added services; cost-benefit analysis and productivity; policy issues related to economic aspects of information exchange and transfer.

539 Information Policy (3) Role of government in creation and exchange of information; views of key national and international policy areas. Information creation, production, and distribution; development of information policy for organizations. F

540 Research Methods (3) Research methods in various fields of information studies. Collection and analysis of data; descriptive and inferential statistics. E

541 Library Information Utilities (3) Mission, status, and functions of libraries in academic and research institutions; role of library service providers; trends in higher education; information technology, and the impact of emerging technologies on the library.
Instructional Technology, Curriculum, and Evaluation

MAJOR
Education M.S., Ed.S., Ed.D., Ph.D.
M. Everett Myer, Head

Professors:
Desart, Donald J., Ph.D. .......... Maryland
Doak, E. Dale (Emeritus), Ed.D. .......... Colorado
French, Russell, Ph.D. .......... Ohio State

Hipple, Theodore W., Ph.D. .......... Illinois
Myer, M. E. (Liaison), Ed.D. .......... Florida
Roeske, Edward L. (Emeritus), Ed.D. .......... Ohio State

Asst Professors:
Connelly, Mary Jane, Ed.D. .......... VPI
Grant, A. D., Ph.D. .......... Wisconsin
O'Bannon, Blanche, Ed.D. .......... Memorial

Assistant Professor:
Norris, Allen, Ph.D. .......... Virginia

The Department of Instructional Technology, Curriculum and Evaluation offers graduate programs leading to degrees, majors, and concentrations in:

- Master of Science

Education
Track 1-curriculum
Track 1-instructional technology
Educational Specialist

Education
Curriculum
Instructional technology
Doctor of Education

Education
Curriculum, educational research, and evaluation
Instructional technology
Doctor of Philosophy

Education
Curriculum, educational research, and evaluation
Instructional technology

See Education under Fields of Instruction for full description of all degree requirements.

The mission of department focuses on the preparation of teachers and instructors in curriculum and in the preparation of various other professionals who desire to utilize educational research and instructional technology.

GRADUATE COURSES

475 Utilization of Instructional Media (3) Basic concepts of communication and instructional development for improving instruction through the use of media.

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

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester.

503 Problems in Lieu of Thesis (2-3) May be repeated. Maximum 9 hrs. P/NP only.

518 Educational Specialist Research and Thesis (3) May be repeated. P/NP only.

520 Techniques of Research in Education (3)

521 Computer Applications in Education (3)

532 Instructional Research: Analysis and Application (3)

535 Program Evaluation in Education (3)

541 The High School Curriculum (3) Identification of problems associated with curriculum study.

550 School Law for Educators (3)

555 Curriculum Planning and Development (3) Foundations and principles of curriculum planning and development.

560 Student Assessment (3)

566 Administering Instructional Media Programs (3)

569 Media and Technology Production Techniques (3) Workshop strategy: basic photography, audio production, multi-media, single-camera TV production, basic digital video editing, and other media/technology techniques important for improving communication in various presentations or instructional settings.

570 Instructional Systems Design (3)

571 Desktop Publishing for Educators (3)

572 Introduction to Multimedia in Instruction (3)

573 Introduction to Multimedia in Instruction (3)

574 Introduction to Multimedia in Instruction (3)

575 The Internet: Implications for Teaching and Learning (3) Project and survey theories for using Internet as information, research, and instructional tool. Variety of browsers, search engines, and web page construction software.

576 Advanced Interactive Multimedia for Instruction (3) Design and production of educational and interactive Web sites using advanced software.

577 Introduction to Data Processing in Curriculum and Instruction (3) Analysis of current activities in educational computing and data processing. Curriculum, instructional, research, and classroom management applications from micro-computers to super computers.

580 Techniques for Research in Curriculum and Instruction (3)

585 Instructional Theory and Design (3) Relationship of curriculum to instruction; examination of
Interdisciplinary Programs

The College of Arts and Sciences offers a series of interdisciplinary undergraduate majors and minors through its Interdisciplinary Programs. These programs include specific areas of study such as African and African-American Studies, American Studies, 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

421 Comparative Studies in African and African-American Societies (3) Education, religion, and social stratification. Views African-Americans and Africans have of each other and of Pan-Africanism. Prereq: Consent of instructor. E

443 Topics in Black Literature (3) (Same as English 443.)


452 Black African Politics (3) (Same as Political Science 452.)


483 African-American Women in American Society (3) Historical and contemporary socio-eco-political factors in American society as related to African Americans. (Same as Women's Studies 483.)

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.

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.

Legal Studies

GRADUATE COURSES

400 Mass Communications Law and Ethics (3) (Same as Communications 400.)

424 Psychology and Law (3) (Same as Psychology 424.)

Comparative Literature

GRADUATE COURSES

401-02 Special Topics in Comparative Literature (3,3) Content varies. May be repeated. Maximum 9 hrs.

452 Modern Drama, 1880-1945 (3) (Same as English 452.)

465 Latin American Film and Culture (3) (Same as Spanish 465 and Latin American Studies 465.)

469 Sexuality and Cinema (4) (Same as Women's Studies 469.)

510 Special Topics (3) May be repeated. Maximum 6 hrs.

Judaic Studies

GRADUATE COURSES

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, 600-1400 (3) (Same as Art History 431.)

Latin American Studies

GRADUATE COURSES

456 Latin American Government and Politics (3) (Same as Political Science 456.)

465 Latin American Film and Culture (3) (Same as Spanish 465 and Cinema Studies 465.)

479 Disenchanted Texts in Hispanic Literature (3) (Same as Spanish 479.)

510 Special Topics (3) May be repeated. Maximum 6 hrs.
Urban Studies

GRADUATE COURSES

401 The City in the U.S. (3) (Same as Planning 401.)
441 Urban Geography of the United States (3) (Same as Geography 441.)
464 Urban Ecology (3) (Same as Sociology 464.)

Women's Studies

GRADUATE COURSES

400 Topics in Women's Studies (3) Content varies. May be repeated.
410 Gender Role Development: Implications for Education and Counseling (3) (Same as Counselor Education and Counseling Psychology 410.)
422 Women Writers in Britain (3) (Same as English 422.)
425 Women's Health (3) (Same as Health 425.)
426 Methods of Historical Linguistics (3) (Same as German 426, French 426, and Spanish 426.)

Journalism and Public Relations

MAJOR
Communications ..................................... M.S., Ph.D.
James A. Crook, Director

Professors:
Adamson, June N. (Emeritus), M.S. .............. Tennessee
Ashdown, Paul G., Ph.D. ......................... Bowling Green
Bolles, Dorothy, Ph.D. ......................... Wisconsin
Cadoz, D. 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
Lettier, B. Kelly (Emeritus), Ph.D. .............. Southern Illinois
Littmann, Mark (Chair of Excellence), Ph.D. ........ Northwestern
Miller, M. Mark, Ph.D. ......................... Michigan State
Siegfried, Michael W., Ph.D. ................. Southern Illinois
Teeter, Dwight L., Jr., Ph.D. .................. Wisconsin
Tucker, Willis C. (Emeritus), M.S. ............... Kentucky

Associate Professors:
Foley, Daniel, M.S.J .............................. Northwestern
Heller, Robert B., M.A. ................. Syracuse
Morrow, Jerry L., Ph.D. ...................... Toledo

Assistant Professors:
Fall, Lisa T., Ph.D. ......................... Michigan State
Riechter, Bonnie P., Ph.D. .............. Tennessee
White, Candace L., Ph.D. .................. Georgia

The School of Journalism and Public Relations 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.

Journalism

GRADUATE COURSES

403 International Communications (3) Development and operations of world mass communications channels and agencies. Comparative analysis of media, media practices, and flow of news throughout the world. Print and broadcast systems in terms of relevant social, political, economic, and cultural factors. Relation of communication practices to international affairs and understandings.
412 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.)
414 Magazine Article Writing (3) Techniques of writing in-depth articles of mass circulation and specialized magazines. Organizing and presenting material, problems in specialized areas, business, science, agriculture, humanities. Prereq: Writing for Mass Communication or consent of instructor.
416 Issues in Journalism (3) Topics vary. Prereq: of instructor. May be repeated. Maximum 6 hrs.
420 Print Media Management (3) Current business practice among print news media, especially newspapers. Problems in management and production and outlook for new technologies. Prereq: 6 hrs mathematics and/or accounting and senior standing. S
423 Water, Power, and Public Policy (3) Environmental science and reporting. Exemplary popular literature in environmental reporting. Prereq: Editing for majors; consent of instructor for non-majors.}

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 the Three Basic Parts of 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, and Spanish 425.)
426 Methods of Historical Linguistics (3) (Same as German 426, French 426, and Spanish 426.)
429 Romance Linguistics (3) (Same as French 429 and Spanish 429.)
430 Topics in Hispanic Linguistics (3) (Same as Spanish 430.)
431 Structure of the German Language (3) (Same as German 431.)
432 History of the German Language (3) (Same as German 432.)
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 (3) (Same as English 474.)
475 Teaching English as a Second or Foreign Language (3) (Same as English 475.)
476 Second Language Acquisition (3) (Same as English 476.)
477 Pedagogical Grammar for ESL Teachers (3) (Same as English 477.)
485 Special Topics in Language (3) (Same as English 485.)
490 Language and Law (3) (Same as English 490 and Legal Studies 490.)
510 Special Topics (3) May be repeated. Maximum 6 hrs.

Medieval Studies

GRADUATE COURSES

510 Special Topics (3) May be repeated. Maximum 6 hrs.

Women and Mass Media (3) Media effects on women. Historical and current status of women in mass communication industries.


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: 350 Public Relations Communications and 376 Public Relations Cases or consent of instructor. F,Sp

Seminar in Public Relations Issues (3) Topics vary. May be repeated. Maximum of 6 hrs.


Independent Study (3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

Internship (3) Professional work in public relations supervised by communications manager with faculty approval. No retroactive credit for previous work experience. Prereq: Completion of core curriculum.

Public Relations

GRADUATE COURSES

412 Opinion Writing (3) (Same as Journalism 412.)

416 Issues in Public Relations (3) Topics vary. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

470 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: 350 Public Relations Communications and 376 Public Relations Cases or consent of instructor. F,Sp

516 Seminar in Public Relations Issues (3) Topics vary. May be repeated. Maximum of 6 hrs.

520 Press-Government Relations (3) (Same as Journalism 520.)

525 Public Opinion (3) (Same as Journalism 525.)

Large Animal Clinical Sciences

See College of Veterinary Medicine and Comparative and Experimental Medicine

Law

(Major of Law)

MAJOR

DEGREES

Law J.D., J.D.-MBA, J.D.-M.P.A.

Thomas C. Galligan, Jr., Dean

Professors:

Ansley, Frances Lee, LL.M. ............. Harvard
Best, Reba, M.L.S. ....................... Florida
Blaza, Douglas A., J.D. ............... Georgetown
Cohen, Neil P., LL.M. .................. Harvard
Cook, Joseph G., LL.M. ............... Yale
Galligan, Jr., Thomas C., LL.M. .... Columbia
Hardin, Patrick, J.D. .................... Chicago
Hess, Amy M., J.D. .................... Virginia
Jones, Dunward S. (Emeritus), J.D. .... North Carolina
King, Joseph H., J.D. ................... Pennsylvania
Lacey, Forrest W. (Emeritus), S.J.D. .... Michigan
Le Clercq, Frederic S. (Emeritus), LL.B. Duke
Lloyd, Robert M., J.D. ............... Michigan
Phillips, Jerry J., J.D. ................. Yale
Piquet, Cheryn, M.S.L.S. .......... Tennessee
Reynolds, Glenn H., J.D. .......... Yale
Rivkin, Dean H., J.D. ................. Vanderbilt
Sewell, Toxey H. (Emeritus), L.L.M. .. George Washington
Sobieski, John L., Jr., J.D. .......... Michigan
Stark, Barbara, J.D. ............... New York
Wirtz, Richard S., J.D. .......... Stanford
Zwier, Paul J., II, LL.M. .......... Temple

Associate Professors:

Aarons, Dwight, J.D. ................. UCLA
Anderson, Gary L., LL.M. ............ Harvard
Barton, Benjamin H., J.D. .......... Michigan
Beinert, William J., J.D. ............ Miami
Black, Jery P., Jr., J.D. ............. Vanderbilt
Carnett, Judy M., J.D. ............. Tennessee
Davies, Thomas Y., J.D. .......... Northwestern
Gray, Grayford B., J.D. .............. Vanderbilt

Hemmway, Joan M., J.D. .......... New York
Kennedy, Deseree A., LL.M. .... Temple
Leatherman, Don A., LL.M. ......... New York
Medill, Colleen E., J.D. ........... Kansas
Parker, Carol M., J.D. ............ Illinois
Pierce, Carl A., J.D. .............. Yale
Plank, Thomas E., J.D. ............ Maryland
Pulchini, Gary A., Ph.D. ......... Wisconsin
Stein, Gregory M., J.D. ............. Columbia
White, Penny J., LL.M. .......... Georgetown
Williams, Paulette J., J.D. ......... New York

Assistant Professors:

Cochran, Cathleen R., M.S. ........ Tennessee
Davis, Melissa A., M.S.L.S. ....... North Carolina
Marshall, Sibyl D., J.D. .......... Loyola
Price, Loretta, M.S.L.S. .......... Tennessee

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.

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 69 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 given 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 (a grade of B or higher) 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
842 Contract Drafting Seminar
853 Representing Enterprises

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
922 Advanced Trial Advocacy
928 Case Development and Resolution

Students electing a concentration in advocacy and dispute resolution may not take any of the above courses on an S/NC basis.

DUAL J.D.-MBA DEGREE PROGRAM

The College of Business Administration and the College of Law offer a coordinated dual program leading to the conferral of both the Doctor of Jurisprudence and Master of Business Administration degrees. The dual program is designed to accommodate the intellectual benefits inherent in the concurrent study of both business and business-related law. This program is designed to accommodate the interests of students who (a) contemplate a career in public service and want to acquire the skills and perspective of the lawyer and the business-oriented manager, (b) contemplate a career in business management and want to acquire the skills and perspective of a lawyer, or (c) contemplate a career as a lawyer specializing in business-related law and want to acquire the skills and perspective of the business-oriented manager.

Admission Requirements
Applicants for the J.D.-MBA program must meet separate application to, and be competitively and independently accepted by, the College of Law for the J.D., 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 are started prior to entry into the last 28 semester hours of J.D. coursework and prior to the second semester 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 the 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 6 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 the MBA program, but may 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. During the first year in the MBA program, students register as graduate students. After the first two years, any term in which students take law courses or a mixture of law and graduate courses, they are classified and registered as law students. If taking only graduate courses, they are classified and registered as graduate students.

Approved Dual Credit
MBA courses in which the student has earned a B grade or higher and are to be counted toward the J.D. program must include 9 semester hours approved by the College of Law. The 6 hours of law courses in which the student has earned a 2.3 or C+ grade or higher and are to be counted toward the MBA must be selected from those approved by the Asst. Dean of the MBA Program.

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 would otherwise 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 meet separate application to, and be competitively and 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 graduation 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 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 classes 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 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 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 C+ or higher and a grade of No Credit for any lower grade. 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.

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 8 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/NC 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.-M.B.A 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 meeting degree requirements. Cumulative GPA for law courses only will be carried until graduation, at which time both the graduate and the law cumulative will be shown on the permanent transcript.

PROFESSIONAL COURSES

801 Civil Procedure I (3) Binding effect of judgments, selecting proper court (jurisdiction and venue), ascertaining applicable law, and federal and state practice.

802 Civil Procedure II (3) Pleading, joinder of claims and parties, discovery, trials, verdicts, judgments and appeals. Emphasis on federal Civil Procedure.

803 Contracts I (3) Basic agreement process and legal protections afforded contracts: offer and acceptance, consideration and other bases for enforcing promises; the Statute of Frauds, unconscionability and other controls of promissory liability. Introduction to relevant portions of Article 2 of the Uniform Commercial Code.

804 Contracts II (3) Continuation of Contracts I. Issues arising after formation: interpretation, duty of good faith; conditions, impracticability and frustration of purpose; 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 occupiers of land; defenses based on plaintiff's conduct; contributory and comparative negligence, assumption of risk, failure to take precautions, and avoidable consequences; causation, proximate cause; duty rules; and questions of joint and several or 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; immunities; 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 title in the area of landlord-tenant relations; estates in land and future interests; co-ownership and marital property; real estate conveyances and transfers; tenancy in common; servitudes; and sales.

811 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.

812 Evidence (3) Rules regulating introduction and exclusion of oral, written and demonstrative evidence at trials and other proceedings; weighing relevant evidence; hearsay; statutes; and judicial notice. Coreq: 920 for students electing concentration in advocacy.

813 Federal Procedure (3) Analysis of statutes, regulations, and judicial decisions in determining a student's GPA or 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 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 C+ or higher and a grade of No Credit for any lower grade. 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.

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 8 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/NC 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.-M.B.A 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 meeting degree requirements. Cumulative GPA for law courses only will be carried until graduation, at which time both the graduate and the law cumulative will be shown on the permanent transcript.

PROFESSIONAL COURSES

801 Civil Procedure I (3) Binding effect of judgments, selecting proper court (jurisdiction and venue), ascertaining applicable law, and federal and state practice.

802 Civil Procedure II (3) Pleading, joinder of claims and parties, discovery, trials, verdicts, judgments and appeals. Emphasis on federal Civil Procedure.

803 Contracts I (3) Basic agreement process and legal protections afforded contracts: offer and acceptance, consideration and other bases for enforcing promises; the Statute of Frauds, unconscionability and other controls of promissory liability. Introduction to relevant portions of Article 2 of the Uniform Commercial Code.

804 Contracts II (3) Continuation of Contracts I. Issues arising after formation: interpretation, duty of good faith; conditions, impracticability and frustration of purpose; 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 occupiers of land; defenses based on plaintiff's conduct; contributory and comparative negligence, assumption of risk, failure to take precautions, and avoidable consequences; causation, proximate cause; duty rules; and questions of joint and several or 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; immunities; 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 title in the area of landlord-tenant relations; estates in land and future interests; co-ownership and marital property; real estate conveyances and transfers; tenancy in common; servitudes; and sales.

811 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.

812 Evidence (3) Rules regulating introduction and exclusion of oral, written and demonstrative evidence at trials and other proceedings; weighing relevant evidence; hearsay; statutes; and judicial notice. Coreq: 920 for students electing concentration in advocacy.

813 Federal Procedure (3) Analysis of statutes, regulations, and judicial decisions in determining a student's GPA or 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 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 C+ or higher and a grade of No Credit for any lower grade. 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.

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 8 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/NC 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.-M.B.A 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 meeting degree requirements. Cumulative GPA for law courses only will be carried until graduation, at which time both the graduate and the law cumulative will be shown on the permanent transcript.

PROFESSIONAL COURSES

801 Civil Procedure I (3) Binding effect of judgments, selecting proper court (jurisdiction and venue), ascertaining applicable law, and federal and state practice.

802 Civil Procedure II (3) Pleading, joinder of claims and parties, discovery, trials, verdicts, judgments and appeals. Emphasis on federal Civil Procedure.

803 Contracts I (3) Basic agreement process and legal protections afforded contracts: offer and acceptance, consideration and other bases for enforcing promises; the Statute of Frauds, unconscionability and other controls of promissory liability. Introduction to relevant portions of Article 2 of the Uniform Commercial Code.
856 Discrimination and the Law (3) Comparison of race, sex, and other forms of discrimination with respect to education, employment, housing, political participation, and economic activity; historical landmarks and current issues in discrimination law.

850 Supreme Court (3) History of Supreme Court and of procedures by which Court arrives at decisions. Involves the role of the Court in political system.

854 Criminal Procedure I (3) Police practices and constitutional rights of persons charged with crimes: arrest; search and seizure; identification; interrogation and confessions; electronic eavesdropping; and rights to counsel.

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

859 Criminal Law Seminar (2) Advanced problems in criminal law and administration of justice. Prereq: 809.

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

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

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

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

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

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

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

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

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

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

889 Advanced International Law (2-3) Current international law problems. Prereq: 866 or 887.

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

896 Employment Law (3) Legal regulation of employer-employee relationship; legal, social and economic influences in employment; discrimination; employment discrimination; legally prescribed minimum standards of compensation and safety; restrictions on termination of employment; regulation of retirement systems.

898 Arbitration Seminar (2) Arbitration of labor agreements; judicial and legislative developments; nature of process; relationship to collective bargaining; selected arbitration problems on various topics under collective agreements; and role of lawyers and arbitrators. Prereq: 895.

899 Labor Relations Seminar (2) Selected labor relations law problems. Prereq: 895.

905 Advocacy Clinic (6) Supervised fieldwork requiring students to assume substantial responsibility for representing clients within the framework of the federal and state legal problems. Exploration and development of fundamental professional skills involved in practicing law: interviewing and counseling clients; working with other attorneys, planning for transactions and disputes resolution, initiating and defending claims, conducting factual investigations, and presenting evidence. Prereq: 920 and third-year standing.

908 Mediation Clinic (3) Mediation process, theory, strategy, tactics and skills through readings, simulations, and service as mediators in general sessions court and other settings: mediation ethics, relationship of mediation to other dispute resolution methods; roles of attorneys in mediation, and writing of mediation agreements.

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

920 Trial Practice (3) Litigation through simulation, trial preparation and practice, trial strategy, professional responsibility; fact investigation and witness preparation; discovery and presentation of evidence; selection and examination of witnesses; opening and closing arguments. Written work: pleadings, motions, interrogatories or memoranda. Coreq: 813 for students electing concentration in advocacy. Prereq: 813 for all others.

921 Pre-Trial Litigation (3) Civil pre-trial process. Drafting of actual pre-trial documents in civil cases: complaint, motions for preliminary injunction, class certification papers, motions to dismiss and 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, local rules of federal circuit; review of complete records of several United States Supreme Court cases and preparation of an appellate brief based on actual case.

927 Interviewing, Counseling and Negotiation (3) Development of conceptual and practical frameworks for understanding interviewing, counseling and negotiation, and lawyer's role in tasks. Readings of different methods, strategies and perspectives from recent literature involving lawyering skills. Simulations and videotape critiques, drafting of documents. Relevant ethical issues and principles discussed. Not open to students who have taken 904 or 906.

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 by team-teaching 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 Gratutious Transfers (4) Nature, creation, termination and execution of gifts; fiduciary administration; intestate succession; execution, revocation, probate and contest of wills; creation and construction of various types of future interests; construction of limitations; application of the rule against perpetuities.


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


943 Land Use Law (3) Private use controls: nuisance, easements, real covenants, equitable servitudes, and home owner association, 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 office uses of computers; and computerized research. Preparation of lawyers to think effectively concerning use of computers. Prior computer experience not necessary.

955 Entertainment Law (3) Role of law and lawyer in entertainment industry. Course content varies. Music industry: music copyright laws; artist/manager relations, contracts with record companies, 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 forms of knowledge and new ways of doing things. Biotechnology, regulation of scientific research, space law, legal issues relating to new information technologies, nanotechnologies, and other designed by instructor.

959 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, 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, practice of medicine; medical education; licensing and specialization; hospital staff privileges; medical malpractice liability: standard of care, proof, causation,
975 Tax Theory (3) Method and purposes of government revenue collection through examination of economic and political theory; comparative analysis of various actual and proposed patterns of taxation: income tax, consumption tax, sales tax, and value-added tax. Required preparation of expository essay on aspect of tax theory chosen by student. Limited enrollment.


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

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

985 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 the course of employment; causation; nature of medical, disability, and death benefits; exclusiveness of compensation remedy against employer and co-employee for same injury; and benefits of non-employees; administration and procedural aspects of Workers' Compensation process; and various new law reform measures. Examination of some exemplary cases involving Social Security disability claims.

990 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 or the Dean's designee. Maximum of one semester per year. May be repeated. 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. Minimum of 1 semester per year. May be repeated. Second-year standing.

996 Law Review (1) Performance of duties as staff member of the Tennessee Law Review. Responsibilities vary each semester as specified in Tennessee Law Review Policy Manual: writing of casenote, comment or article, and/or preparation of oral arguments as assigned by the Editor-in-Chief. Completion of potentially publishable comment or article for Tennessee Law Review satisfies requirement. May be repeated S/N only. (Does not count toward total number of elective upper division courses taken S/N.)

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.)

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

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Life Sciences

(College of Arts and Sciences)

MAJOR

Life Sciences.......................... M.S., Ph.D.

Jeffrey Becker, Chair

The program leading to the M.S. and Ph.D. degrees in Life Sciences are interdepartmental and intercollaborative and are designed to augment offerings of individual departments in two concentrations: genome science and technology, 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 concentration is administered separately and has unique admission requirements.

CONCENTRATIONS

Genome Science and Technology

The University of Tennessee-Oak Ridge National Laboratory Graduate Program in Genome Science and Technology (GST) is a unique and multidisciplinary program for full-time graduate study leading to the M.S. or Ph.D. degree. The program focuses on developments in the biological and computational sciences relating to genome sciences, and its program is designed to take advantage of collaboration of The University of Tennessee and the Oak Ridge National Laboratory. Students will be trained in emerging areas of genome science, with emphasis on mammalian genomics, structural biology, bioinformatics, and bioanalytical technologies. Scientists from both campuses participate in teaching. Research projects pursued for either the M.S. or Ph.D. degrees are mentored jointly by a faculty member from each campus. A year-long introductory course in Genome Science and Technology focuses on inquiry conducted on a genomewide scale. Laboratory rotations during the first year offer students hands-on experience in a variety of focus areas.

Applicants are expected to have a background in the biological, physical, or computational sciences. Requirements for admission are one year of general biology or the equivalent; two years of chemistry, including one year of general chemistry and one year of introductory organic chemistry with laboratory; one year of calculus; one year of physics; at least eight semester hours in cognate sciences related to the program; a combined GRE score of 1800 for the verbal, quantitative, and analytical sections is highly desirable; three letters of recommendation; and a minimum grade point average of 3.0 out of 4.0. Coursework in genetics, cell biology and computer sciences is advantageous. Superior students, deficient in one or more of the above requirements, may be admitted at the discretion of the program admissions committee. Deficiencies will be made up as a part of the courses taken by the individual student.

Requirements for the Ph.D. degree are satisfactory completion of the genome science and technology core courses, (Life Sciences 505, 515-16, 520-21, 540-41; Biochemistry and Cellular Molecular Biology 511 and 512); three semester hours of GST laboratory, satisfactory completion of second year advanced courses in the areas of the student's interest, passing written and oral comprehensive examinations, a dissertation reporting the results of original and significant scientific research (a minimum of 24 semester hours of course 600 is required), a final oral/written examination on the dissertation, and a formal seminar presentation of the dissertation research.

Participation in at least one seminar each year, each semester during last three semesters of study approved by the student's committee, a thesis, and an oral examination.

Plant Physiology and Genetics

This program provides the opportunity for intensive training and research experience in areas transcending the usual boundaries of botany, biochemistry, and agricultural plant sciences. Solutions of problems concerning the interactions of physiology and genetics in applied and fundamental aspects of plant sciences are the focus. Admission requirements are a Bachelor's degree with a major in a biological, behavioral, or physical science; GRE (general) score; three letters of recommendation; and 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.

Required courses are Life Sciences 510; Botany 521, 522; Biochemistry and Cellular Molecular Biology 511, 512; Plant and Soil Science 471 or Ecology and Evolutionary Biology 560; Plant and Soil Science 552; Microbiology 410. 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. The minimum requirements for the doctoral degree include at least 6 hours above the 600 level, 24 semester hours of course 600, courses approved by the student's committee, a comprehensive examination, a doctoral dissertation, and a defense of dissertation.

GRADUATE COURSES

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

502 Registration for Use of Facilities (3) Re-Registered for the student who needs registration 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/N only.

503 Graduate Research Participation (3-12) Special advanced research project not related to dissertation research. Topics chosen with consent of instructor. May be repeated. Maximum 12 hrs.
500 Research Rotation (2) Laboratory rotations with faculty member on clearly defined projects. Written proposal and oral report. May be repeated. Maximum 6 hrs.

506 Computational Biology and Genome Informatics (3) Computational basis of nucleic acid and protein sequence analysis; pairwise sequence comparison, multiple sequence alignments: gene and species trees. Genome annotation and feature finding. Computational protein structure analysis; threading homology modeling, ab initio methods. Prereq: Computer Science 140 Data Structures or consent of instructor.

509 Biotechnology Seminar (1-2) Topics of importance to biotechnology. May be repeated. Maximum 6 hrs.

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

515-16 Introduction to Genome Science and Technology I, II (1, 1) Introduction to research in genome science & technology concentration. Science and ethics of practice of science. S/N only.

520-21 Genome Science and Technology I, II (4, 4) Overview of genomics, advanced genetics principles, computational biology and bioinformatics. Computation, bioinformatics, analytical techniques and special technologies.

540-41 Colloquium (1, 1) Invited speakers. Topics announced in advance. Required every semester in residence after first year. May be repeated. Maximum 6 hrs.

550 Mammalian Genetics and Genomics (3) Genetic variation, inheritance, phenotypic traits, molecular genetics and genomics, mutagenesis in laboratory rodents and other mammals. Prereq: 520-21.

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.

595-98 Special Topics in Genome Science and Technology (1-3) Tutorials or lectures in variety of special topics to be chosen by instructor. May be repeated. Maximum 4 hrs.

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

610 Advanced Topics in Life Sciences (1-3) Topics vary. May be repeated. Maximum 6 hrs.

685-96 Advanced Topics in Genome Science and Technology (1-3) Tutorials or lectures on variety of advanced topics to be chosen by instructor. May be repeated. Maximum 4 hrs.

James, Lawrence R. (Pilot Chair of Excellence), Ph.D. ... Utah Kealy, A. H. (Emeritus), MBA ... Pennsylvania Ladd, Robert T., Ph.D. ... Georgia Larsen, John M. Jr. (Emeritus), Ph.D. ... Purdue Miller, Alex (W. B. Stokely Prof.), Ph.D. ... Washington Neel, C. Warren, Ph.D. ... Alabama Noon, Charles E., Ph.D. ... Iowa Rush, Michael C., Ph.D. ... Akron Srivivasan, M. M., Ph.D. ... Northwestern Stack, Michael J., Ph.D. ... Rensselaer Vance, S. C. (Emeritus) (W.B. Stokely Prof.), Ph.D. ... Pennsylvania Whillock, G. H. (Emeritus) (Distinguished Prof.), Ph.D. ... Tennessee Associate Professors:

Bowers, Melissa R., Ph.D. ... British Columbia Edriis, Chana, Ph.D. ... Israel Elenkov, Detelin S., Ph.D. ... MT Fowler, Oscar S., Ph.D. ... Georgia Haley, Usha C., Ph.D. ... New York Judge, William Q., Ph.D. ... North Carolina Maddox, Robert C., Ph.D. ... Texas Rentsch, J. R., Ph.D. ... Maryland Woehr, D., Ph.D. ... Georgia Tech Assistant Professor:

Smith, Anne D., Ph.D. ... North Carolina

BUSINESS ADMINISTRATION CONCENTRATIONS

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

MBA Concentration: Operations Management.

Minimum course requirements: 540, 541, and one course from the following: Management Science 526, 551, Statistics 566, Industrial Engineering 522, 526, or an applicable course approved by designated faculty.

Ph.D. Concentration: Management.

Minimum course requirements are: For operations management - 541 and 542; two semesters of 640 (may be repeated for credit); one additional semester of approved doctoral seminar work. For strategic management - 610, 611, 612, 613.

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

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

511 Organizational Theory: Integrated Structure and Behavior (3) Cases, group projects, discussion; organizational theory, organizational effectiveness; contextual factors of organizational environment, size, technology; organizational structure, design, social influence, organizational effectiveness; motivation, leadership, group behavior, intergroup relations, organizational change and development.

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

531 Management of Technology-Based Organizations (3) Role of technology and innovation in formulation and implementation of strategy. Management of research and development function and coordination with other functions. Management of scientists and engineers.

540 Logistics and Operations Management (3) Analysis of methods and models for understanding supply chain flows and processes. Introduction to management strategies and techniques applicable to design of systems in logistics and operations processes. Prereq: Business Administration 501, 511, 612, and 513 or consent of instructor. (Same as Logistics and Transportation 510)

541 Operations Management (3) Techniques applicable to design of systems in operations function.

542 Operations Management II (3) Operations planning and control function. Application of models to real-world systems.

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

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

581 Environmental Management (3) Managerial frameworks for addressing environmental issues. Most pressing environmental challenges; options compatible with sustained business performances. Cases, field projects, research papers.

593 Directed Independent Study (1-3) Topics of mutual interest. Available only by prearrangement with supervising faculty member. May be repeated. Maximum 6 hrs. S/N only.

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

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

601 Research Methods (3) Seminar covering broad range of issues in research process as applied to study of strategic management. Literature and examples of research. Research proposal.

610 Seminar in Advanced Organization Theory (3) Analysis of functioning of complex organizations. Classical and open systems models, organization growth and change, organizational effectiveness and design of complex organizations.

611 Seminar in Strategic Management I (3) Analysis of concepts and research in strategic management.

612 Seminar in Strategic Management II (3) Analysis of concepts and research in strategic management.

613 Seminar in Strategic Management III (3) Review and analysis of important books and monographs in strategic management. Understanding evolution of thought and emergence of distinct paradigms.

Management Science

(College of Business Administration)

MAJORS

DEGREES

Management Science ............... M.S., Ph.D.

Logistics

See Marketing, Logistics and Transportation

Management

(College of Business Administration)

MAJOR

DEGREES

Business Administration ............. MBA, Ph.D.

Oscar Fowler, Head

Professors:

Boling, Ronald W. (Emeritus), Ph.D. ... Stanford Dewhirst, H. Dudley (Emeritus), Ph.D. ... Texas Gilbert, Kenneth C., Ph.D. ... Tennessee
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, qualify the graduate 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. 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.

Admission Requirements
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.

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. E
502 Registration for Use of Facilities (3-15) Re- quired 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
526 Advanced Applications of Systems Modeling and Simulation (3) (Same as Industrial Engineering 526)
531 Mathematical Programming (3) Linear programming solution procedures, duality, sensitivity, and
parametric analysis, linear-fractional, piecewise-linear, separable and integer programming, transportation linear programs. 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 563 and Mathematical Analysis or consent of instructor. E

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 from 531, 532, and 533 to real world problems in business/industry.

551 Leveraging Information Through Descriptive and Prescriptive Modeling (3) Concepts and tools for formulating business operations (descriptive modeling) and for determining optimal operational or tactical strategies (prescriptive modeling). Visualization, optimization, and simulation concepts reinforced through hands-on experience with technologies: geographic information systems (GIS); spreadsheet-based models, simulation packages, and supply chain optimization software. (Same as Information Management 522.)

593 Management Science Problems (1-6) Directed study on subject of mutual interest. E

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

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 with integer variables, 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 programs, search techniques, quadratic programming, duality and sensitivity analysis. Prereq: 531 or equivalent, proficiency in computer language. (Same as Industrial Engineering 602.)

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.

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**Marketing, Logistics and Transportation**

*(College of Business Administration)*

**MAJOR**

**DEGREES**

Business Administration MBA, Ph.D.

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Associate Professors:

- Dabholkar, P. A., Ph.D. Georgia State
- Foggia, J. H. (Liaison), DBA Indiana
- Gardial, S. F., Ph.D. Houston
- Holcomb, M. C., Ph.D. Tennessee

Assistant Professors:

- Kuhn, K. B., Ph.D. Virginia Tech
- Moen, M. A., Ph.D. North Carolina
- Ruzicka, M. E., Ph.D. Arizona State

**BUSINESS ADMINISTRATION CONCENTRATIONS**

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

**MBA Concentration: Logistics and Transportation**

Minimum course requirements for logistics and transportation—510 and two courses approved by the logistics faculty. For marketing—520 and two courses approved by the marketing faculty.

**Ph.D. Concentration: Logistics and Transportation**

Minimum course requirements for logistics and transportation—611, 612, 614, 615. For marketing—611, 612, 613, 614, 615, and 616.

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**Logistics and Transportation**

**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/N only. E

504 Logistics and Supply Chain Operations (3) Organizations' internal functional areas and external interactions with suppliers and customers. Operations, interactions, and issues within context of supply chain. Prereq: Business Administration 501.

507 Global Logistics and Supply Chain Management (3) Logistics strategy in global firm: materials management, international sourcing and procurement, global production and distribution, import/export activity, design and operation of supply chains in global environment. Prereq: Business Administration 501.

508 Executive-In-Residence Seminar in Logistics and Transportation Strategy (3) Case study of logistics and transportation strategy participation in Executive-In-Residence program that provides student interaction with top-level logistics and transportation executives.

509 Logistics and Supply Chain Analysis Techniques (3) Application of various methods and models for analyzing supply chain processes. Understanding, definition, and application of problem-solving process, potential solutions to enterprise issues commonly faced by managers, consultants, and project analyst. Prereq: Business Administration 501. (Same as Information Management 521.)

540 Logistics and Operations Management (3) (Same as Management 540.)

593 Independent Study (3-6) Directed research and study. Prereq: Consent of instructor. May be repeated.

599 Special Topics in Logistics and Transportation (3-6) Seminar designed to study specific current problem areas in logistics and transportation. Topic announced prior to offering. Prereq: Consent of instructor. May be repeated.

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

611 Seminar in Theoretical Foundations (3) (Same as Marketing 611.)

612 Research Methods (1-3) (Same as Marketing 612.)

614 Seminar in Evolution of Logistics Thought (3) Survey of concepts, frameworks, theory, research issues, and conceptual development of the logistics and transportation field.

615 Seminar in Logistics and Transportation Models (3) Analysis of contemporary models and methodologies used in logistics and transportation research.

593 Independent Study (1-6) Directed research on subject of mutual interest to student and faculty. May be repeated. Prereq: Consent of instructor.

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**Marketing**

**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/N only. E

507 Global Marketing (3) Strategic issues related to international and multi-national marketing operations; identification and evaluation of opportunities in overseas markets; coordination of strategies in world markets.

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

511 MBA Marketing Concentration I (6) Determination of customer value. Principles of consumer behavior, marketing research, and building customer value. Prereq: Business Administration 504 and 505 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. Prereq: Business Administration 504 and 505 or consent of instructor.

513 Marketing Forecasting (3) Techniques, systems, and management approaches used to develop sales forecasts of markets. Performance measurement of sales forecasting and use of forecasts in business planning. Prereq: Business Administration 504 and 505 or consent of instructor.

520 Marketing and Customer Value (3) Frameworks, techniques, and processes required for customer relationship management and demand planning in organizations. Taps problems of analyzing markets and customers and translating these analyses into actionable marketing strategies. Prereq: Business Administration 501, 511, 512, and 513 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
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. Experience with sophisticated statistical techniques, using real marketing databases.

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

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.

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

617 Special Topics (3) Topics vary: marketing strategy, advertising, consumer behavior, influence and persuasion theory and strategy, pricing issues, international marketing issues, and nonprofit organization marketing issues.

693 Independent Study (1-6) Directed research on subject of mutual interest to student and staff member. May be repeated.

Materials Science and Engineering (College of Engineering)

MAJORS DEGREES
Materials Science and Engineering M.S., Ph.D. Polymer Engineering M.S., Ph.D.

Patrick R. Taylor, Head

Professors:
Benson, R. S., Ph.D. .......... Florida State University, C. R. Emeritus, Ph.D. .......... Tennessee Technological University, Raymond A., Ph.D. .... Vanderbilt University
Clark, Edward S., Emeritus, Ph.D. .... California Institute of Technology
Dahotre, N. B., Ph.D. .......... Michigan State University
Fellers, J. F., Ph.D. .......... Akron University
Hansen, Marion G., Ph.D. .......... Wisconsin University, P. K., Racheff Chair of Excellence
Lundin, Carl D., Ph.D. .......... Rensselaer Polytechnic Institute
Lowndes, Douglas H., Ph.D. ......... Colorado State University
Mehrander, J. F., Ph.D. .......... Louisiana State University
Oliver, Ben F., Emeritus, Ph.D. .... Penn State University
Pedraza, A. E., Ph.D. .......... La Plata (Argentina)
Pharr, George M., Ph.D. .......... Stanford University
Phillips, Paul J., Ph.D. .......... Liverpool (UK)
Prud'homme, Joseph E., Ph.D. ....... University of Pennsylvania
Stansbury, E. E., Emeritus, Ph.D. .... Cincinnati University
Taylor, Patrick R., (Liaison), Ph.D. .......... Colorado School of Mines

Associate Professors:
Becker, William T., Ph.D. .......... Illinois State University
Meek, Thomas T., Ph.D. .......... Ohio State University
Assistant Professor:
Kit, Kevin, Ph.D. .......... Delaware University

Graduate programs are offered leading to the degrees of Master of Science and Doctor of Philosophy in Materials Science and Engineering or Polymer Engineering. Both the Materials Science and Engineering and Polymer Engineering 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.

Areas of concentration within the Materials Science and Engineering degree program include metallurgy, polymers, and materials. Specializations include, but are not limited to: ceramics; composites; electronic materials; physical metallurgy; materials processing; welding metallurgy and materials joining; corrosion science and engineering; biomedic materials, and mechanical and physical behaviors of materials.

Areas of concentration within the Polymer Engineering degree 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 Materials Science and Engineering or Polymer Engineering. Additional requirements include:

1. A major consisting of 12 semester hours of graduate courses in materials science and engineering or polymer engineering. The materials science and engineering major must include 511, 512, 515, and 516 for the metallurgy concentration; 511, 512, 514, and 541 for the polymers concentration; and 511, 512, and two graduate specialization courses approved by the student's faculty committee for the materials concentration. The polymer engineering major must include 540, 541, 543, 546, 549, and 550 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.

All resident students are required to register for and participate in the graduate seminar in materials science and engineering or polymer engineering, as appropriate, during each semester in which it is offered. Three hours of MSE 502 or 504, Seminar, graded Satisfactory/No Credit, may be counted toward degree requirements.

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 faculty in the major area, either materials science and 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 materials science and engineering major and the polymer engineering major must include the same courses 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 590 (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 faculty, 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 502 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 materials science and engineering major and 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 Materials Science and Engineering, Polymer Engineering, or Metallurgical 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 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.

GRADUATE COURSES

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

421 Mechanical Behavior of Materials II (3) Description of stress and strain; linear elastic constitutive equations; isotropic and anisotropic moduli in various materials; yield criteria; brittle fracture; crazing; plastic strain constitutive equations, forming operations and

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 properties 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; injection molding; molding processes; 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: 302 or equivalent. (Same as Engineering Science 426.)

474 Biomaterials (3) Metals, polymers and ceramics used in orthopaedic, cardiovascular, and dental surgical implant design and development; fatigue analysis of materials; mechanical properties of biological importance; tissue response to synthetic materials. Prereq: 201. Recommended for engineering science and mechanics majors.

475 Fracture-Safe Design (3) (Same as Engineering Science and Mechanics 423.)

484 Introduction to Maintenance Engineering (3) (Same as Nuclear Engineering 484, 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. Prereq: 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 Graduate Seminar in Materials Science and Engineering (1) Prereq: Admission to graduate program. May be repeated. S/NC only. E

504 Graduate Seminar in Polymer Engineering (1) Prereq: Admission to graduate program. May be repeated. S/NC only. E

505 Engineering Analysis (3) (Same as Chemical Engineering 505.)

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

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


522 Defects in Crystals (3) Analytical and experimental analysis of defect intersections 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, closed work hardening, effect of temperature, 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 treatments, 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.

526 Ceramic Matrix Composites: Material and Mechanics (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 transformation.

531 Advanced Corrosion (3) Analyses of corrosion processes in terms of polarization measurements and Pourbaix diagram. Influence of environmental and mechanical factors contributing to pitting, crevice, fretting, wear, fatigue and stress corrosion. Prereq: 470 or consent of instructor.


540 Basic Polymer Chemistry (3) Synthesis, reactions and degradation of polymers. Molecular characteristic solution method 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 rheology; applications in polymer processing; extrusion, fiber spinning, injection molding. (Same as Chemical Engineering 541.)

542 Further Topics in Polymer Processing (3) Design 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; Hookean and rubber elasticity; plastic deformation; fracture, linear viscoelasticity; dynamic mechanical behavior and testing; loss tangent; experimental methods. Introduction to mechanical properties of polymeric composites.

450-50 Laboratory Methods in Polymer Engineering (1,2) 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. 540-S/NC only.

560 Principles of Ceramics Processing (3) Treatment of ceramic processing; raw materials preparation and characterization; powder consolidation; drying, firing, sintering techniques and mechanisms. Prereq: 360 or equivalent.

561 Inorganic Glass Forming Systems (3) Physical and chemical nature of inorganic glasses; structural theories of glass formation; major glass forming systems; silica, other oxides glasses, glasses, water glasses, and chalchogenide glasses. Prereq: 360, Chemistry 371.

571 Electron Microscopy (3) Operation of electron microscope; kinematical and dynamical diffraction theories; structure determination, analysis of lattice defects. Prereq: 405 or equivalent.

572 X-Ray Diffraction (3) Symmetry of crystals, space group theory, reciprocal lattice and application to definition of atomic structures; powder and single crystal x-ray techniques; introduction to crystal structure determination; characterization of orientation; application to inorganic, metallic and polymer systems.

576 Special Topics in Materials Science and Engineering (1) Prereq: current and temperature. Prereq: Consent of instructor. May be repeated.

580 Technical Review and Assessment (3) Preparation of critical review of literature in area related to materials science and engineering. Must be taken only in research options. Prereq: Consent of faculty committee.

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

621-22 Theoretical Metallurgy (3,3) Topics in solid state physics as applied to metallurgy; introduction to quantum theory, specific heat, electron theory of solids, electrical and thermal conductivity, magnetic properties, theories of alloy formation. Prereq: Consent of instructor.

623 Solidification and Crystal Growth (3) Theories of solidification, flow; flow effects, magnetohydrodynamics of incompressible fluids; thermodynamic stability theory, thermodynamic applications, rapid solidification theory, metastability. Prereq: Consent of instructor.

625 Materials Lifetime Science and Engineering I (3) Fundamentals of aqueous and high-temperature corrosion and fatigue; methods of materials lifetime modeling. Prereq: 531 and 532, or consent of instructor.

626 Materials Lifetime Science and Engineering II (3) Interactions between corrosion and fatigue at ambient and high temperatures; lifetime modeling of materials simultaneously subjected to corrosion and fatigue. Prereq: 625.

627 Case Studies in Materials Lifetime Science and Engineering (3) Studies of, and participation in, industrial analyses of lifetimes of structural materials subjected to aqueous corrosion-fatigue and high-temperature oxidation-fatigue, performed as part of the student's industrial and national-laboratory internship programs. Prereq: 531 and 532, or consent of instructor.

628 Graduate Seminar in Materials Lifetime Science and Engineering (3) Interactions between corrosion and fatigue at ambient and high temperatures; lifetime modeling of materials simultaneously subjected to corrosion and fatigue. Prereq: 625.

641 Advanced Rheology and Viscoelasticity Theory (3) Continuum mechanics, formulation of viscoelastic theories for describing deformation and flow of polymeric materials; polymer processing problems. Recommended for MS candidates working in rheological areas. Prereq: 541.
Mathematics (College of Arts and Sciences)

MAJOR DEGREES

Mathematics ......................... M.M., M.S., Ph.D.

John B. Conway, Head

Professors:

Alexiades, V., Ph.D. .................... Delaware
Alikakos, N. (Emeritus), Ph.D. ........ Brown
Anderson, D. F., Ph.D. .................. Chicago
Bradley, John S. (Emeritus), Ph.D. .... Iowa
Caruth, J. H. (Emeritus), Ph.D. ...... Louisiana State
Clark, C. E. (Emeritus), Ph.D. ......... Louisiana State
Conway, J. B., Ph.D. .................... Louisiana State
Daverman, Robert J., Ph.D. ........... Wisconsin
Dobbs, D. E., Ph.D. .................... Cornell
Dydek, J., Ph.D. .......................... Warsaw
Frandsen, Henry (Emeritus), Ph.D. ... Illinois
Gross, L. J., Ph.D. ........................ Cornell
Hinton, D. B., Ph.D. ..................... Tennessee
Husch, L. S., Ph.D. ........................ Florida State
Johansson, K., Ph.D. ................... Bleiefeld
Jordan, G. Samuel, Ph.D. ............. Wisconsin
Karakashian, O., Ph.D. ................. Harvard
Kupershmidt, B. A. (UTSI), Ph.D. .... MT
Lenhart, S., Ph.D. ........................ Kentucky
McConnel, R. M. (Emeritus), Ph.D. ... Duke
Mathews, H. T. (Emeritus), Ph.D. ..... Tulane
Miller, D. D. (Emeritus), Ph.D. ....... Michigan
Mulay, S., Ph.D. .......................... Purdue
Rajput, B. S., Ph.D. ........................ Illinois
Reddy, K. C. (UTSI), Ph.D. ............ Indian IT
Richler, Stefan, Ph.D. ................... Michigan
Rosinski, J., Ph.D. ........................ Wisconsin
Schaefer, P. W., Ph.D. ................... Maryland
Serbin, Steve, Ph.D. .................... Cornell
Simpson, H., Ph.D. ........................ Cal Tech
Son, K. (Emeritus), Ph.D. ............... Oregon State
Son, R. P., Ph.D. ........................... Oregon State
Stallman, F. W. (Emeritus), Ph.D. ..... Iowa
Stephenson, K. R., Ph.D. .............. Wisconsin
Sundberg, C., Ph.D. ........................ Wisconsin
Thistlethwaite, M. B., Ph.D. .......... Manchester
Wade, W. R., Ph.D. ...................... California (Riverside)
Wagner, C. G., Ph.D. ................... Duke

Associate Professors:

Collins, Charles R., Ph.D. ............. Minnesota
Feng, Xiaobing, Ph.D. ................. Purdue
Freire, A., Ph.D. ............................ Princeton
Gavriliadis, Sergey, Ph.D. ............ Moscow State
Guan, Bo, Ph.D. ............................. Massachusetts
Kimble, K. R. (UTSI), Ph.D. .......... Ohio State
Kuo, Y., Ph.D. ............................. Cincinnati
Leut, Conrad, Ph.D. ..................... Maryland
Smith, Jh., Ph.D. ............................ California
Xiong, X., Ph.D. ............................ North Carolina

Assistant Professors:

Chen, Xia, Ph.D. ............................ Case Western
Davis, Reid, Ph.D. ....................... Tennessee
Dwyer, Jerry, Ph.D. ...................... Ireland
Kachl, Yasuyuki, Ph.D. ................. Tokyo
Matthews, Gretchen, Ph.D. .......... Louisiana State
Schulze, Timothy, Ph.D. ............ Northwestern
Tzermias, Pavlos, Ph.D. ............... California

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 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.utk.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 outsidethe 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 also required that a written final examination be passed and that credit be received for a reading course (596) 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:

1. Prerequisite courses:
   d. Matrix Algebra II 453.

2. One hour of Seminar in Applied Mathematics 519 or Seminar in Mathematical Ecology 589.

3. One course from each of the following five areas:
   e. Statistics - Statistics 525, Stochastic Modeling 527, Statistical Methods 571 (Statistics), Biometry 560 (Ecology and Evolutionary Biology).

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 choose either but is 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 a one-year, 600-level sequence in mathematics outside the student's area of specialization. The sequence of courses 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.) Requirement or the written examination associated with two additional subjects from the groups listed in the standard program. This requirement may not be satisfied with courses from outside the department. At least one of the subjects must be a 500-level sequence from outside the Department of Mathematics. The sequence must be approved in advance by the department head and the student's doctoral committee. (Such approval may occur after completion of the sequence.)

4. Pass a one-year, 600-level sequence in mathematics outside the student's area of specialization from the standard program and the interdisciplinary mathematical ecology concentration. Descriptions of both programs are given below.

Standard Program

Demonstrate knowledge in five subjects selected from the groups listed below by passing written examinations in three subjects and by earning grades of B+ or better in each semester in the courses associated with two additional subjects. The three subjects selected for written examinations must be from Groups I, II, and III. At least two groups must be represented in the three written examinations. At least three groups must be represented in the five subjects.


A student's five subjects may not include both Real Analysis and Applied Linear Analysis or both Mathematical Principles of Fluid Mechanics and Mathematical Principles of Continuum Mechanics. A student may not count examinations in both Ordinary Differential Equations and Partial Differential Equations, but both may be included in a student's five subjects. With prior approval of the graduate committee, a student may utilize as a Group IV course a year-long graduate-level sequence from outside the Department of Mathematics. At most one such utilization may be made.

A student may take as many written examinations as desired at any time the examinations are given, subject to the following conditions:

a. The examinations to be taken must be approved in advance by the student's advisory committee.

b. At any one time a student may take at most only the number of examinations necessary to complete the requirements. Does a student may take a collection of written examinations a maximum of 3 times, but no one failing 4 examinations, counting possible repetitions, will be permitted to take another examination. An exception is that a student who does not have a master's degree in mathematics and who has been enrolled in a UT graduate program in mathematics no longer than one year may take written examinations at one time during that year without having that sitting for the examinations or any failure counts toward the limits imposed above.

c. At least two examinations must be taken and at least one must be passed before the start of a student's fourth year. Three examinations must be passed before the start of a student's fifth year.

In lieu of earning a grade of B+ or better each semester in a sequence from Group I, II, or III, a student may demonstrate proficiency in the subject by passing the associated written examination. The purpose of only one examination is permitted for each of up to two subjects, and this use of a written examination must be declared before the examination is taken so that the sitting for the examination and any failure are not counted toward the limits in condition c.

Mathematical Ecology Concentration

The student must pass written examinations in three subjects:


2. A subject from Groups I, II, and III of the standard program.

3. A subject represented by a year-long graduate-level sequence from outside the Department of Mathematics. The sequence must be approved in advance by the mathematical ecology faculty and by the departmental Graduate Committee. At least one member of the mathematical ecology faculty must be involved in the grading of the examination. The examination in this subject may be taken only once.

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 from 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. Except 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 modern times and influence of ideas in science, technology, philosophy, art, and other areas. Writing emphasis course: at least one in-class essay examination and 3000 words of writing outside classroom. Prereq: Matrix Algebra I and Introduction to Abstract Mathematics.

401 Mathematics and Microcomputers (3) Primarily for students seeking certification as mathematics teachers at secondary level. Use of microcomputers to study concepts and problems. Does not satisfy the major requirements for a B.S. or M.S. in mathematics. Prereq: Calculus I.

404 Applied Vector Calculus (3) Topics from multivariate 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. Not may be counted toward graduate degree. Prereq: Calculus II or Biocalculus.


421 Combinatorics (3) Introduction to problems of construction and enumeration for discrete structures: sequences, partitions, graphs, finite fields and geometries, and experimental design. Prereq: Probability and Statistics or consent of instructor.

423 Probability I (3) Axiomatic probability, multivariate distributions, conditional probability and expectation, 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: F, t, and χ²; 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; sufficient statistics. Prereq: Probability I or consent of instructor.


443 Complex Variables I (3) Theory of functions of complex variable: residue theory and contour integrals. Prereq: Calculus III. Recommended prereq: 300- or 400-level mathematics course.

448-456 Advanced Calculus II, III (3, 3) Theory of sequences, series, differentiation, and Riemann integrals. Functions of one or more variables. Prereq: Calculus III and Introduction to Abstract Mathematics, or consent of instructor.

447-448 Honors: Advanced Calculus II, III (3, 3) Honors version of 445-46. Prereq: 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.

455-56 Abstract Algebra I, II (3, 3) Algebraic structures: groups, rings, fields, vector spaces and linear transformations. Prereq: Matrix Algebra I and Introduction to Abstract Mathematics, or consent of instructor.

457-58 Honors: Abstract Algebra I, II (3, 3) Honors version of 545-56. Prereq: Matrix Algebra I and Introduction to Abstract Mathematics, or consent of instructor.

460 Geometry (3) Axiomatic and historical development of neutral, Euclidean, and hyperbolic geometries. Geometric constructions and theorems of Gauss and Lobachevsky. Prereq: Introduction to Abstract Mathematics, or consent of instructor.

461 Topology (3) Topology of line and plane, separation properties, compactness, connectedness, continuity, homeomorphisms, and topological invariants. Prereq: Calculus III and Intro-
471 Numerical Analysis (3) Computation, instabilities, and rounding. Interpolation and approximation by polynomials and piecewise polynomials. Quadrature and numerical solution of initial and boundary value problems of ordinary differential equations, stiff systems. Prereq: Numerical Algorithms I or consent of instructor. (Same as Computer Science 471.)


475 Industrial Mathematics (3) Modeling, analysis, and computation applied to scientific/technical/industrial problems. May be taken in sequence. Either Computer Literacy for Mathematics or Numerical Algorithms, or consent of instructor.

490 Readings in Mathematics (1-3) Open to superior students with consent of department head. Independent study with faculty guidance. Prereq: Consent of faculty mentor to supervise independent work. May be repeated. Maximum 9 hrs.

499 Seminar in Mathematics (1-3) Topics vary. Requires out-of-class projects and in-class presentations by students. Credit hours announced for each seminar. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

505 Analysis for Teachers (3) Development of differential and integral calculus, proofs of basic theorems. Prereq: 1 year calculus or equivalent. May not be used toward degree requirements. May be taken in sequence. Prereq: 455, 456. Recommended prerequisite: 46. (Same as Computer Science 472.)

507 Probability and Statistics for Teachers (3) Basic theory, definition of abstract probability spaces; Kolmogorov's existence theorem; series of independent random variables; laws of large numbers; general theory of distributions of random vectors and their characteristic functions; weak convergence concepts; convergence of probability measures; continuity theorem in Euclidean spaces; infinite divisibility distributions and central limit problem; general concept and properties of conditional expectation, martingales, Doob's martingale convergence theorem. Prereq: 445-46. Recommended prerequisite: 423.

526 Statistics (3) Pertinent facts from probability theory; formulation of classical models; sufficiency; Fisher-Neyman factorization theorem, exponential families. Bayesian models; effects of estimation and optimality; uniform minimum variance unbiased estimates, asymptotic efficiency and optimality; the confidence procedure and hypothesis testing; optimal tests and confidence intervals, the Neyman-Pearson lemma, uniformly most powerful tests; general linear models, estimation and tests in linear models; non-parametric methods, rank methods for comparison, linear regression and independence, robust tests; topics from decision theory. Prereq: 445-46. Recommended prerequisite: 423.

527 Stochastic Modeling (3) Models in probability applied to real world situations; queueing theory; branching processes; Monte Carlo simulation. Prereq: 445-46 or consent of instructor.


534 Calculus of Variations (3) Necessary conditions for extremal, Euler's equation, broken extremals. Weierstrass-Erdmann conditions. Sufficient conditions for extrema-Lagrange's and Jacobi's conditions, conjugate points, Multiple integrals. Prereq: 431.

535-36 Partial Differential Equations (3,3) First order equations, classification of equations and properties of elliptic, hyperbolic, and parabolic equations in several variables. Prereq: 445-46 and 231 or consent of instructor.

537-38 Mathematical Principles of Continuum Mechanics (3,3) Conservation principles, equations of equilibrium and motion for fluids and elastic solids, conservation laws, one dimensional unsteady, convexity properties, bifurcation phenomena, existence theory. Prereq: 431, 435, 446, or 448, or consent of instructor.

539 Seminar in Differential Equations (1-3) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.


547-48 Applied Linear Algebra (3,3) Banach and Hilbert spaces, linear operators and spectral theory with applications to integral and differential equations, optimization, numerical analysis, and quantum mechanics. Prereq: 445-46. (Same as Computer Science 472.)

549 Seminar In Analysis (1-3) May be repeated. Maximum 12 hrs.

551-52 Modern Algebra (3,3) Groups, rings, modules and linear algebra, fields and Galois theory. Must be taken in sequence. Prereq: 455-46 or consent of instructor.

553 Linear Programming (3) Theory and applications. Prereq: Consent of instructor or 453 and programming ability.


555-56 Number Theory (3,3) Introduction to algebraic number theory. Prereq: 455-46 or consent of instructor.

559 Seminar in Algebra (1-3) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.


567-68 Differential Geometry (3,3) Classical differential geometry in two and higher dimensions: curves and surfaces in Euclidean space, Gauss map, curvature, Gaussian-Bonnet theorem, hyperbolic geometry, Manifolds and Riemannian manifolds, connections, geodesics, Jacobi fields, sectional curvature. Differential forms and moving frames. Prereq: 445-46 or consent of instructor.

569 Seminar in Topology (1-3) May be repeated. Maximum 12 hrs.


575 Matrix Theory and Techniques in Numerical Analysis (3) Advanced topics in study of iterative and direct methods for large systems of linear equations; matrix eigenvalues, analysis and design of algorithms for modern computer architectures. Prereq: 453, 471-72, or consent of instructor. May be repeated. Maximum 9 hrs. (Same as Computer Science 575.)


659 Seminar in Algebra (1-3) Prereq. Consent of instructor. May be repeated with consent of department. Maximum 12 hrs.


663-64 Algebraic Topology (3,3) Homology, cohomology and homotopy theories: duality theorems and Hurewicz isomorphism theorem. Prereq.: 561-62 and 1 yr. of abstract algebra. 455-56 or 551-52. 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 Seminar in Applied Mathematics (1-3) May be repeated. Maximum 12 hrs.

681-62 Advanced Mathematics (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 algebraic structures, limit theorems, geometry and probability in Banach spaces, probability methods in analysis. Prereq.: 523-24 or consent of instructor. May be repeated with consent of department. Maximum 12 hrs.

682 Seminar in Combinatorics (1-3) May be repeated with consent of department. Maximum 12 hrs.

683-38 Advanced Topological Algebra (3,3) Selected topics in modern topological algebra, and applications to analysis and equations between spaces. Prereq.: 541-42 or 547-48 or consent of instructor. May be repeated with consent of department. Maximum 12 hrs.


685-44 Harmonic Analysis (3,3) Fourier series and transforms in Euclidean spaces or topological groups: convergence, summability, uniqueness, inversion, duality, Plancherel transform, Hilbert transform, Hardy-Littlewood maximal function, interpolation of operators, or Fourier-Stieltjes duality. Prereq.: 541-42 and 543. May be repeated with consent of department. Maximum 12 hrs.

689 Seminar in Analysis (1-3) May be repeated with consent of department. Maximum 12 hrs.

561-52 Advanced Modern Algebra (3,3) Selected topics in modern algebra or number theory. Prereq. 551-52 or consent of instructor. May be repeated with consent of department. Maximum 12 hrs.

Hodgson, J. W. (Emeritus), PE, Ph.D. .......... Georgia Tech
Jendrucko, R. J., PE, Ph.D. ................. Virginia
Johnson, W. S., Ph.D. ...................... Clemson
Keeler, D. R. (UTSI), Ph.D. .......... Florida
Keyhani, M., Ph.D. ...................... Ohio State
Kim, K. H. (Emeritus), Ph.D. ............ NC State
Krannich, R. J., Ph.D. ..................... Oklahoma
Landes, J. D., Ph.D. ...................... Lehigh
Lee, C. W. (Emeritus), Ph.D. .............. Illinois IT
Liston, H., Jr., M.E.A., George Washington
Lo, C. F. (UTSI), Ph.D. ................. Cornnell
McCay, M. H. (UTSI), PE, Ph.D. .... Florida
McCay, T. D. (UTSI), PE, Ph.D. .... Aubern
Maxwell, R. L. (Emeritus), PE, M.S. ...... Case Western
Merkle, C. L., Ph.D. .................... Princeton
Milligan, M. W., PE, Ph.D. .......... Tennessee
Parang, M., PE, Ph.D. ................... Oklahoma
Peters, C. E. (Emeritus), Ph.D. ......... Brussels
Ph. H. (Emeritus), PE, Ph.D. .......... Illinois IT
Pitts, D. R. (Emeritus), Ph.D. ......... Georgia Tech
Remenyik, C. J. (Emeritus), Ph.D. ...... Johns Hopkins
Schulz, R. J. (UTSI), Ph.D. ............ Tennessee
Scott, W. E. (Emeritus), Ph.D. ....... Johns Hopkins
Shahroki, F. (UTSI), Ph.D. .......... Oklahoma
Shannon, T. E., PE, Ph.D. ............. Tennessee
Shobe, L. R. (Emeritus), PE, M.S. ...... Kansas State
Smith, G. V., Ph.D. .................... Penn State
Snyder, W. T., Ph. D. ................... Northwestern
Soliman, O., PE, Ph.D. ............... Tennessee
Speckhart, F. H. (IBM Prof.), PE, Ph.D. .... Georgia Tech
Stair, W. K. (Emeritus), M.S. .......... Tennessee
Steinhoff, J. S. (UTSI), Ph.D. ....... Chicago
Stoneking, J. E., PE, Ph.D. .......... Illinois
Vakili, A. D. (UTSI), Ph.D. ........ Tennessee
Venkataprasan, S. (UTSI), Ph.D. ...... Penn State
Wasserman, J., PE, Ph.D. .............. Cincinnati
Weitsman, Y. J. (Distinguished Prof.), Ph.D. ... Rensselaer
Wilkinson, H. J. (Emeritus), PE, Ph.D. ....... Tennessee
Wilson, C. C. (Emeritus), Ph.D. .... Purdue
Wu, J. Z. (UTSI), Ph.D. .............. Beijing Institute
Wu, Y. C. (Emeritus) (UTSI), Ph.D. .... Cal Tech
Young, R. L. (Emeritus) (UTSI), PE, Ph.D. ... Northwestern

Associate Professors:

Boulet, J. A. M., Ph.D. .......... Stanford
Freeman, J. S., Ph.D. ............... Wisconsin
Hamal, W. R., Ph.D. ................. Tennessee
Hopkins, C. A. (UTSI), Ph.D. .... Tennessee
Iannelli, G. S., Ph.D. .......... Tennessee
Kasra, M., Ph.D. ................. Ecole Polytechnique (Canada)
Kawiecki, G., Ph.D. ............... West Virginia
Lynne, J. E., M.D., Ph.D. ........ NC State
Madhukar, M.S., Ph.D. ....... Drexel
Moulton, T. H. (UTSI), Ph.D. .... Tennessee
Nguyen, K., Ph.D. ................... Colorado
Pionke, C., PE, Ph.D. .............. GA Tech
Yu, N., Ph.D. ...................... California (San Diego)

Assistant Professors:

Kess, R. L., PE, Ph.D. ......... Arizona
Zheng, M., Ph.D. ................. Calgary (Canada)
Graduate programs leading to the degrees of Master of Science and Doctor of Philosophy are available in Mechanical Engineering, Aerospace Engineering, and Engineering Science. Changing from one of these programs to another requires departmental approval. Each applicant is advised as to any prerequisite courses before entering a program. A dual M.S.-MBA degree program with a concentration in product development and manufacturing is also available with a major in Mechanical Engineering or in Engineering Science.

In Mechanical Engineering, program concentrations include dynamics, control, and robotics; energy conversion and utilization; gas dynamics; heat transfer and fluid mechanics; machine design; power generation; product development and manufacturing (MS only); propulsion; space engineering; stress analysis; and thermodynamics.

In Aerospace Engineering, program concentrations include aeroacoustics; aerodynamics and performance; energy conversion and utilization; flight and aerospace mechanics; gas dynamics; heat transfer and fluid mechanics; propulsion; space engineering; structures and stress analysis; and thermodynamics.

In Engineering Science, program concentrations include applied artificial intelligence, biomedical engineering, computational mechanics, fluid mechanics, mechanics of composite materials, solid mechanics, industrial engineering (Ph.D. only), product development and manufacturing (MS only), 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 is available 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 applicant 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 Mechanical Engineering, Aerospace Engineering, and Engineering Science, two M.S. options are offered. Option I requires a thesis and is the normal program for graduate students. Option II does not require a thesis and provides graduate students, including co-op and other off-campus students, the opportunity to focus their programs in special areas through extended coursework.

Credit requirements for these two options in Mechanical Engineering and Aerospace Engineering are:

<table>
<thead>
<tr>
<th>Course Areas</th>
<th>Hours Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thesis credit</td>
<td>6</td>
</tr>
<tr>
<td>Coursework</td>
<td>24</td>
</tr>
<tr>
<td>Courses in program (500-level or above) (min.)</td>
<td>12</td>
</tr>
<tr>
<td>Mathematics (400-level or above)</td>
<td>6</td>
</tr>
<tr>
<td>590 Selected Engineering Problems (max.)</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
</tr>
</tbody>
</table>

Credit requirements for these two options in Engineering Science are:

<table>
<thead>
<tr>
<th>Course Areas</th>
<th>Hours Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thesis credit</td>
<td>6</td>
</tr>
<tr>
<td>Coursework</td>
<td>24</td>
</tr>
<tr>
<td>Engineering courses (Major concentration may include but is not restricted to course offered by the Department.) (min.)</td>
<td>12</td>
</tr>
<tr>
<td>Mathematics (400 level or above)</td>
<td>6</td>
</tr>
<tr>
<td>Related courses (May include additional courses in mathematics, computer science, or the physical and life sciences as well as engineering courses.) (max.)</td>
<td>6</td>
</tr>
<tr>
<td>590 Selected Engineering Problems (max.)</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
</tr>
</tbody>
</table>

For all program options, other 500 level engineering courses that are approved by the student's master's committee and the graduate programs committee may be substituted for the mathematics courses. All program options require participation in the departmental graduate seminars program, and passing a final examination on all work submitted for the degree. The final examinations in Option II will cover all coursework. The thesis option, Option I, requires submission and defense of a written thesis that demonstrates the abilities to conduct and report an independent investigation.

**DUAL M.S.-MBA PROGRAM**

The College of Business Administration and the College of Engineering offer an integrated program leading to the conferral of the Master of Business Administration degree with a major in Business Administration (concentration in operations management) and the Master of Science degree with a major in Engineering Science or Mechanical Engineering (concentration in product development and manufacturing).

The Engineering Science program is intended to provide other engineering majors an opportunity to participate in this program with a flexible coursework plan based on their undergraduate degree.

The establishment of the dual program addresses the critical need for personnel trained in both engineering and management who can integrate an increasingly complex body of knowledge for rapid introduction of new products to the marketplace. The objective of the dual degree program is to prepare graduates to take a leading management role in companies that must react quickly to a dynamic market where forces of competition require rapid changes in design and manufacturing and a short product development cycle.

**Admission Requirements**

Applications are accepted for fall semester only. Applicants for the M.S.-MBA program must make separate applications to the Graduate School, the MBA program, and the Master of Science degree program 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 Engineering Science or Mechanical Engineering, and by the Dual Program Committee.

Students will initially apply for the MBA program, indicating on their application the intent to pursue the dual M.S.-MBA program and the appropriate engineering major (refer to the MBA program for separate instructions). Students accepted for both the MBA and the M.S. with a major in Engineering Science or Mechanical Engineering programs will be assigned to Dual Program Committee advisors, who will be responsible for course approval and supervision of the students' progress through the dual program.

Applications by U.S. citizens and permanent residents received after the MBA application deadline (March 1) will be considered as space allows. Additional information is required and different application dates are established by The Graduate School for international students.

**Curriculum**

All engineering students enrolled in the program must complete common coursework designed to provide them with an integrated, multidisciplinary teamwork experience. The MBA curriculum in product development and manufacturing consists of 33 hours of common coursework in the College of Business Administration and 15 hours of common coursework in the College of Engineering. Engineering common coursework includes a culminating 3-hour integrated...
project course requiring a comprehensive report, and a final examination as required by the Dual Program Committee, to be taken during the first session of summer following the second year.

During the second year dual degree candidates will take courses in their engineering major. The coursework for each option is designed to provide students with a concentration in their major and advanced skills to accomplish their teamwork assignments.

Curriculum for Dual M.S.-MBA Degree - Major in Mechanical Engineering

### August - First Year
- **BA 511** MBA Core I 3
- **ME 504** Product Development Process 1

### Fall - First Year
- **BA 512** MBA Core II 15 3
- **ME 509** Project Management 1
- **BA 513** MBA Core III 9
- **ME 506** Product Selection and Evaluation 2
- **ME 508** Integrated Product, Process, and Manufacturing System Design 3

### Summer
- **Intelship**
- **BA 514** Integrated Business Simulation 3
- **ME 509** Project Management 1
- **ME 509** Engineering courses 9

### Fall - Second Year
- **IE 511** Business Planning and Commercialization 3
- **ME 509** Project Management 1
- **ME 509** Engineering courses 9

### Summer (first session)
- **ME 594** Culminating Integrated Project Report 3

### TOTAL 66

The dual degree candidate must satisfy the curriculum and graduation requirements of the engineering major being pursued and the College of Business Administration. Students withdrawing from the dual degree program before completing both degrees will not receive credit toward graduation in either degree program for courses taken in the other degree program, except as such courses qualify for credit without regard to the dual degree program. The M.S. and the MBA degrees will be awarded upon successful completion of the requirements of the dual program.

### Approval Dual Credit
A maximum of 15 semester hours of the common program courses completed in the College of Engineering may be counted toward the MBA degree program.

### 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 9 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(s) that are more appropriate.

### Additional Requirements
- **ME 561** Mechanical and Aerospace Engineering: Foundation courses
- **ME 562** Mechanical and Aerospace Engineering: Advanced courses
- **ME 563** Mechanical and Aerospace Engineering: Specialized courses

### 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 on an in-state tuition basis. The M.S. program in Aerospace Engineering is available to residents of the states of Kentucky or South Carolina. The Ph.D. program in Aerospace Engineering 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 Student Services.

### GRADUATE CREDIT FOR UNDERGRADUATE COURSES
Students majoring in Mechanical Engineering or Aerospace Engineering may not normally use more than one 400-level engineering course to meet their advanced degree requirements. For students majoring in Engineering Science, four hundred-level courses in engineering may be used for graduate credit at the discretion of the advising committee. However, at least two-thirds of minimum required credit hours in a master's degree program must be at or above the 500 level. With the approval of the student's major department, a student whose major is outside the Department of Mechanical and Aerospace Engineering and Engineering Science may take senior (400-level) courses in the Department for graduate credit. Such students should consult with instructors regarding prerequisites for undergraduate courses.

### Aerospace Engineering

**NOTE:** Not all the courses listed below are available at both the UT and the UTSI campuses.

### GRADUATE COURSES


#### 424 Astronautics (3) Orbital mechanics, propulsion, atmospheric reentry of space vehicles; reentry thermal protection materials. Human factors in space flight, space environment and current topics. Prereq: 351 Compressible Flow, Coreq: Mechanical Engineering 344 Heat Transfer. F

#### 425 Propulsion (3) Principles of propulsion devices; turbo-jet, ram jet and rocket engines. Prereq: 351.
Aerospace Ground Test Facilities

Atmospheric boundary layer; free molecule and rarefied gas flow.

Hypersonic Flow

Slender body flow; similarity theory.

One-dimensional internal and external flow; shock waves;

characteristics, and trajectory optimization. Prereq: 422, 515, 516.

Aerodynamics principles to aircraft design.

Applicable to aerospace vehicles, equations of motion, and turbulence measurements. Prereq: 516.

Introduction to Turbulence

Macroscopic equations and applications. Prereq: 422 and Mathematics 471.

Magnetohydrodynamics


Rarefied Gas Dynamics

Binary elastic collisions.

Problems in aerospace engineering, application to air-ground interaction and jet propulsion. Discussion of special topics of interest to students. Prereq: 512, continuum mechanics.

Biomedical Engineering

GRADUATE COURSES

Civil and Tissue Engineering (3) Culture of cells and tissue in vitro or in vivo.


Environmental Engineering (15-18) P/ NP only. 


Advanced Aerodynamics (3) Performance, stability, control of rotary wing, tilt rotor, and vertical lift aircraft. Prereq: 554.

Aerospace Vehicle Stability and Control (3) Stability and control of rotary wing, tilt rotor, and vertical lift aircraft. Prereq: 554.

Aerospace Vehicle Stability and Control (3) Performance, stability, control of rotary wing, tilt rotor, and vertical lift aircraft. Prereq: 554.

Advanced Aerodynamics (3) Performance, stability, control of rotary wing, tilt rotor, and vertical lift aircraft. Prereq: 554.

Aerospace Vehicle Stability and Control (3) Performance, stability, control of rotary wing, tilt rotor, and vertical lift aircraft. Prereq: 554.

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Aerospace Vehicle Stability and Control (3) Performance, stability, control of rotary wing, tilt rotor, and vertical lift aircraft. Prereq: 554.
Engineering Science

GRADUATE COURSES

423 Fracture-Safe Design (3) Critical review of variables controlling fracture toughness: part and flaw geometry, temperature, loading rate, section size, material, environment. Residual stresses, fracture toughness by stress intensity factors, strain energy release rate. J integral, COD data, transition temperature tests; use of fracture mechanics to design. Prereq. 321 and Materials Science and Engineering 291. (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 472.)

442 Fluid Mechanics II (3) Integral forms of linear and angular momentum equations and applications to pumps and turbomachinery; performance/pairility; differential conservation equations; internal one-dimensional incompressible and compressible flows; potential flow; methods of flow measurement; laboratory. Prereq: Fluid Mechanics I, Differential Equations, Calculus III. Sp

465 Dynamic Data Acquisition (3) Use and calibration of instrumentation for measuring responses of mechanical systems to dynamic events; Fourier analysis, transfer function analysis, digital signal processing, transduction, experimental parameter estimation with applications to modal vibration analysis. Prereq: Circuits and Electro Mechanical Components, Mechanical Vibration. 2 hrs and 1 lab.

475 Design of Artificial Internal Organs (3) Design, development and evaluation of artificial internal organs; analysis of transport processes in therapeutic devices for design optimization; review of currently available devices; federal regulation and ethical considerations. Prereq.: 341, Mathematics 231.

494-95 Special Engineering Science Topics (1-3, 1-3) Problems related to recent developments and advancements in engineering science. May be repeated. Maximum 3 hrs. Prereq.: Consent of instructor.

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

502 Registration for Use of Facilities (3-15) Re-...

507 Optical Engineering II (4) Statistical optics; spontaneous and induced emission: black and gray body radiation; incandescence, partial and totally coherent radiation; modal coherence function; detectors; radiometry. Prereq.: 566.

517 Biomechanics of Hard and Soft Tissue (3) Introduction to terminology, physiology, and analytical methods for mechanics of living tissue. Continuum mechanics analysis of hard and soft tissue, biological fluid flows. Flow properties of blood, rheology of blood in micro vessels; biocosthelicity of fluids and solids; biomechanical properties of skin; skeletal, heart and smooth muscle; bone and cartilage. Research paper.


519 Expert Systems in Engineering (3) (Same as Nuclear Engineering 576 and Mechanical Engineering 576.)


528 Ceramic Matrix Composites: Material and Mechanics (3) Micromechanics and microstructural defi-
Mechanical Engineering

NOTE: Not all the courses listed below are available at both the UT and the UTSA campuses.

GRADUATE COURSES


455 Introduction to Design (2) Engineering economy, optimization, design for automation, reliability, patents and product liability; design of mechanical engineering processes; team design projects; participation in team design effort; design report. Prereq: Dynamics and Vibrations of Machines.

456 Introduction to Thermal Design (2) Engineering economy, optimization, design for automation, reliability, patents and product liability; design of mechanical engineering processes; team design projects; participation in team design effort; design report. Prereq: 332, 344. F.


471 Refrigeration and Air Conditioning (3) Vapor compression and absorption cycles; heat pump systems; psychrometric processes; air washers; cooling towers; solar radiation; building heat transmission. Prereq: 332, 344.

475 Thermal Engineering (3) Thermal systems, turbomachinery, heat exchangers, combustion and system analysis and design, second law and economic analysis. Prereq: 332, 344. F.


484 Introduction to Maintenance Engineering (2) (Same as Mechanical Engineering 483, Industrial Engineering 484, and Materials Science and Engineering 484.)

501-55 Selected Topics In Mechanical Engineering (1-4, 1-4) Problems and topics related to developments and practice in mechanical engineering. Prereq: Consent of instructor. E

500 Thesis (1-15) 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 satisfy degree requirements. May be repeated. S/NC only. E

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

505 Mechatronics (3) Application of microcomputers to control electromechanical systems, and/ or theory: dynamics of machine control, assembly language programming, microcontroller architecture, stepping and DC motors, A/D, D/A, integrated circuits. Prereq: Electronics and Computers Circuits and consent of instructor.

506 Product Selection and Evaluation (2) Development of operational requirements and features for new product having potential for business venture. Market potential, design feasibility and manufacturing requirements. Design alternatives created and evaluated against set of performance requirements determined from market analysis. Preferred product concept selected by end of semester. Prereq: 504. (Same as Industrial Engineering 506.)

507 Application of Linear Algebra in Engineering Systems (3) (Same as Aerospace Engineering 507 and Electrical Engineering 507) Prereq: 506.

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

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

510 Prototype Development and Evaluation (3) Prototype of selected product made and tested against required operating conditions. Design changes implemented to meet customer's needs. Fabrication drawings and manufacturing plans finalized for introduction of production process. Prototype development managed using project management plan. Prereq: 555.


514 Phase Change Heat Transfer (3) Mechanisms and modeling of nucleate, transition and film boiling processes; critical heat flux; forced convection boiling and post-dry out heat transfer; condensation processes; heterogeneous nucleation; dropwise and filmwise condensation; flow condensation; liquid-solid phase change; moving phase fronts; mathematical modeling. Prereq: 344, 511.


521-22 Thermodynamics I and II (3, 3) Macroscopic thermodynamics, including First and Second Law analyses, availability, phase and chemical equilibrium criteria, perfect gas, gas mixtures, and property relations, determination of thermodynamic properties from molecular structure, spectroscopic data, kinetic theory, statistical mechanics, quantum physics, Schrodinger equation. Prereq: 332.

523 Special Topics in Thermodynamics (3) Application of thermodynamics to topics of current interest in mechanical engineering. Prereq: Consent of instructor.

525 Combustion and Chemically Reacting Flows (3) Fundamentals: thermal, kinetic, gas dynamics and conservation equations; phenomenological approach to laminar flames; diffusion and premixed flame theory; single droplet combustion; deflagration and detonation theory; combustion waves in laminar streams; flammability limits of premixed laminar flames; introduction to turbulent flames. Prereq: 522, 541, or consent of instructor.

526 Combustion and Chemically Reacting Flows II (3) Advanced topics: phenomenological approaches to turbulent flames; fundamentals of turbulent flow, application of probability density functions to turbulent flame models, reaction transport equation models, non-reacting and/or non-premixed reactants; spray combustion models; fluidized bed combustion; chemically reacting boundary layers; detonation waves; droplet combustion, flames; introduction to supersonic combustion and hypersonic flows. Prereq: 525.

533 Dynamics (3) Kinetamatic and dynamics of particles in three dimensions. Rotating coordinate systems. Hamilton's principle. Lagrange's equations of motion. Kinematics and dynamics of rigid bodies. Prereq: Mathematics 431 or Engineering Analysis. Prereq: Undergraduate vibrations or (Same as Aerospace Engineering 533 and Engineering Science 533.)

534 Mechanical Vibrations (3) Vibrations of linear, discrete, undamped and damped systems. Lagrange's equations for holonomic systems. Modal analysis. Lagrange's equations for nonholonomic systems. Response to random and/or deterministic transients. Prereq: Undergraduate vibrations course. (Same as Aerospace Engineering 533 and Engineering Science 534.)


539 Continuum Mechanics (3) (Same as Engineering Science 539 and Aerospace Engineering 539.)

541 Fluid Mechanics I (3) Derivation of equations governing flow of inviscid and viscous fluids (conservation of mass, momentum, and energy). Equations of state and constitutive relations. Euler and Navier-Stokes forms and nondimensionalization. Exact solutions and introduction to potential and boundary layer flows. (Same as Aerospace Engineering 541 and Engineering Science 541.)

581 Selected Engineering Problems (2-4) Enrollment limited to students in problems program. Prereq: Consent of advisor. May be repeated. S/N only.

584 Culminating Integrated Project Report (3) Final phase of product development process. Multidisciplinary teams submit and defend comprehensive project report. Report includes all engineering and business considerations needed to convince potential investors to fund proposed business venture. Prereq: Consent of instructor. (Same as Industrial Engineering 584.)

589 Seminar (1) All phases of mechanical engineering, reports on current research at UTK and UTSI. May be repeated. S/N only.

590 Special Topics in Mechanical Engineering (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

600 Doctoral Research and Dissertation (3-15) Prereq: Consent of instructor. May be repeated. Maximum 6 yrs.

610 Advanced Topics in Fluid Mechanics and Heat Transfer (3) Advanced theory and application of fluid mechanics and heat transfer; natural convection, multi-phase flow, high speed reacting and nonreacting flows, advanced boundary layer techniques, combustion, perturbation and variational methods of analysis, heat exchanger theory and corrosion. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. Prereq: Consent of instructor.

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


642 Advanced Topics in Thermodynamics (3) Com-parison of macroscopic and microscopic approaches to equilibrium of pure substances, metastable states. Non-equilibrium thermodynamics. Prereq: Consent of instructor.

651-52 Advanced Topics in Computational Fluid Dynamics (3,3) (Same as Engineering Science 651-52 and Aerospace Engineering 661-62.)

653-54 Advanced Topics in Computational Solid Mechanics (3,3) (Same as Engineering Science 653-54 and Aerospace Engineering 653-64.)


671 Advanced Topics in Applied Artificial Intelligence (3) (Same as Nuclear Engineering 671 and Engineering Science 671.)

686 Telerobotic Systems (3) Analysis of modern telerobotic concepts; review of current research and literature in telerobotics. Detailed comparison of telerobotic systems, robotic systems, and telerobotic systems; human-machine interfaces, control system architectures, data communications and sensing. Virtual reality-based and Internet-based systems concepts. Prereq: 586 or consent of instructor.


Medical Biology

See College of Veterinary Medicine and Comparative and Experimental Medicine
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) a complete course sequence in biochemistry or molecular biology; (5) presentation of a research thesis and its oral defense.

THE DOCTORAL PROGRAM

The program leading to the Ph.D. is designed to develop the student's ability to pursue independent and original research in microbiology and allied fields, to teach both oral and written communication of the results of research to the scientific community, and to train effective teachers. Students may enter the program after receiving either a bachelor's or master's degree. Students who enter with a bachelor's degree usually receive the Ph.D. after four or five years; those with the master's degree usually take three or four years to complete the degree. Departmental requirements are: (1) 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 scale; (2) a 3.0 GPA in courses taken in the department; (3) satisfactory performance in at least one semester as a teaching assistant; (4) one semester of physical chemistry; (5) one course in statistics; (6) two semesters of biochemistry or molecular biology; (7) satisfactory performance in a comprehensive examination that must be attempted before the end of the fifth semester in the program and passed before admission to candidacy; and (8) 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. F

411 Bacterial Genetics (3) Transmission and expression of genetic information by bacteria. Prereq: Introduction to Microbiology. Sp

420 Medical Microbiology (3) Disease-producing microorganisms, including bacteria, ricketsiae, chlamydial and fungi. Prereq: Introduction to Microbiology. Sp

429 Medical Microbiology Laboratory (2) 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; complement, hypersensitivities, cell cooperation and recognitions in immune mechanisms; soluble factors. Prereq: General Genetics. F


470 Microbial Ecology (3) Physiological diversity and taxonomy of microorganisms from natural environments. Function of 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/NC only. E

575 Applied Microbiology and Bioengineering (3) Same as Chemical Engineering 575, Environmental Engineering 575, and Biosystems Engineering 575.

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/NC only. E

596 Laboratory Rotation (1) Familiarization with research areas in department through series of rotations in laboratories of individual faculty members. May be repeated. Maximum 3 hrs. S/NC 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/NC only. E

602 Journal Club in Microbial Pathogenesis (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/NC only. E

603 Journal Club in Immunology (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/NC only. E

604 Journal Club in Virology (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/NC only. E

605 Journal Club in Microbial Genetics (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/NC only. E

610 Topics in Microbial Physiology (1-3) Prereq: 410 or consent of instructor. May be repeated. Maximum 12 hrs.

620 Topics in Microbial Pathogenesis (1-3) Prereq: 420, 430 or consent of instructor. May be repeated. Maximum 12 hrs.

630 Topics in Immunology (1-3) Prereq: 430 or consent of instructor. May be repeated. Maximum 12 hrs.

640 Topics in Virology (1-3) Prereq: 440 or consent of instructor. May be repeated. Maximum 12 hrs.

650 Topics in Microbial and Molecular Genetics (1-3) Prereq: 411 or consent of instructor. May be repeated. Maximum 12 hrs.

670 Advanced Topics in Environmental Microbiology (1-3) Prereq: 570 or consent of instructor. May be repeated. Maximum 12 hrs.
The Department of Modern Foreign Languages and Literatures offers graduate programs leading to the Master of Arts degree with majors 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 600-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 at least 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 Theses 500. 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 or 485. 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 30 semester hours of coursework. A common written examination covering 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 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 (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 at least 30 semester hours, with a maximum of 6 at the 400 level, the rest at the 500 level, including Spanish 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.

**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 or in either the first or second concentration approved by the student's graduate committee.

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 or in either the first or second concentration as approved by the student's graduate committee. 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, 520, and 560. Thesis 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. 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, 519, 584 or Spanish 512 and 550. Thesis 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.

3. 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 hours must be at the 500 level or above. For Track II, 3 of these hours must be at the 500 level or above.

French students choosing applied linguistics must take French 421 or 429; 425, 435, 510, or 512; 3 hours of German linguistics, such as 426, 436, 631, or 632, and 6 hours of linguistics
electives in English or German. Spanish students choosing applied linguistics must take Spanish 421 or 429, 425, 512, and 9 (Track I) or 12 (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. With the consent of the student’s graduate committee, the 6 hours in the cognate field may be substituted by 6 hours in either the first or second concentration.

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 Examinations for Teachers and Advanced Students, or the proficiency standards of the United States Foreign Service Institute (FSI). 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 text 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 opportunity and will be strongly encouraged 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, Fulbright-Rotary, 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 on an in-state tuition basis. The Ph.D. program in Modern Foreign Languages is open to residents of the state of Alabama. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Student Services.

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**Asian Languages**

**GRADUATE COURSES**

431 Readings in Chinese Literature (3) Prereq: Mastery of intermediate-level Chinese 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. Excerpts from Rabelais and Montaigne; readings from writers from Lyons and members of Pléiade. 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 Waves directors. Prereq: 300-level literature course. May apply toward major.

421 Phonetics (3) Foundation in science of phonetics. Practical exercises and individual performance. Graduate credit not to students majoring in Romance language. 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. Stress 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 prerequisite: Language, Linguistics and Society. (Same as German 425, Linguistics 425, and Spanish 425.)

426 Methods of Historical Linguistics (3) (Same as German 426, Spanish 426 and Linguistics 426.)

429 Romance Linguistics (3) Development of Classical Latin through Vulgar Latin into major Romance languages. (Same as Spanish 429 and Linguistics 429.)


431 Highlights of French Civilization (3) Survey of French civilization from earliest times to World War II. Historical events, daily life, all forms of arts. Prereq: 300-level literature course.

432 Contemporary French Culture (3) Current French cultural issues placed in historical perspective with comparative emphasis. Taught in English; readings in French for majors.

434 Literature of Quebec (3) Survey of literature of Quebec as well as French literature connected with North America. Readings include explorer and missionary works, such as Voyages of Champlain and Journals of Jesuits, and literature of contemporary Quebec. Prereq: 300-level literature course.

445 Advanced French for Business (3) Advanced contemporary French language and culture as relates to business transactions. Comparative approach to explore differences and similarities between francophone business culture(s) and those of North America and Japan. Building knowledge of business terminology while being sensitized to cultural differences and dangers of simplistic stereotyping. Prereq: French for Business or consent of instructor.

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

501 Techniques in Literary Analysis (3) Required for M.A. program. Close stylistic analysis of texts representative of different eras and of different genres. Development and improvement of student’s written French.

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

510 The French Language (3) French as spoken and written from Medieval period to present.

512 Teaching a Foreign Language (3) Practical application of methods for teaching and evaluating basic language skills and foreign language skills, and cultural aspects through oral demonstrations, peer teaching, and observation of foreign language classes. Required of all M.A. and Ph.D. students holding Graduate Teaching Assistantships, except those whose previous training or experience warrants their being excused by department.

515 Technology Enhanced Language Learning (3) Introduction to TELL. Overview of existing software, programs, and professional literature on topic. Hands-on development of instructional Web site for teaching language, culture, or literature.

519 Bibliography and Methods of Research (3) Critical research tools and scholarly contributions in French literature and language. Practical exercises on compiling of scholarly data using computer-based and non-computer sources.

520 French and Francophone Film (3) French and Francophone culture through film.

530 French and Francophone Theater (3) Changing Francophone culture through film.

530 French and Francophone Theater (3) Changing approaches to French and Francophone Theater.

540 French Literature and Culture I (3) Literary and cultural heritage of Middle Ages.

550 French Literature and Culture II (3) Literary and cultural heritage of 16th- and 17th-century France.

560 French Literature and Culture III (3) Literary and cultural heritage of 18th- and 19th-century France.

570 French and Francophone Literature and Culture (3) Literary and cultural heritage of France and other Francophone countries in first part of 20th century.

573 French and Francophone Literature and Culture II (3) Literary and cultural heritage of France and other Francophone countries from late 20th century to present.

580 Critical Moments in French and Francophone Studies, or Linguistics (3) Contribution of France and Francophones around the world to evolution of literature, society, and ideas. May be repeated. Maximum 6 hrs with consent of department.
German

Graduate Courses

331-32 Elements of German for Upper-Division and Graduate Students (3,3) Elements of language, elementary and advanced readings; and a final 10,000 word translation project. Open to graduate students preparing for language examinations, and upper-division students desiring reading knowledge of the language. No credit for students having completed 101-02 or 107-32. May be repeated. Maximum 12 hrs with consent of department.

415 Special Topics (3) Topics vary. May be repeated. Maximum 6 hrs.

420 Selected Topics in German Literature from 1750 to the Present (2) Prereq: 6 hrs of 300-level courses (excluding 331-32 and courses in English translation) or equivalent.

421 German Lyric Poetry (3) Prereq: 6 hrs of 300-level courses (excluding 331-32 and courses in English translation) or equivalent.

422 German Drama (3) Prereq: 6 hrs of 300-level courses (excluding 331-32 and courses in English translation) or equivalent.

423 German Narrative Prose (3) Prereq: 6 hrs of 300-level courses (excluding 331-32 and courses in English translation) or equivalent.

424 German Literary Movements (3) Survey of major periods in development of German literature since 1750: problems and pitfalls of periodization.

425 Introduction to Descriptive Linguistics (3) (Same as French 425, Spanish 425, and Linguistics 425.)

426 Methods of Historical Linguistics (3) Phonetics, distinctive feature analysis, sound change types, nature of sound change, principles of reconstruction, and fundamental assumptions about language change through time. Survey of non-phonological linguistic systems, language families, Proto-Indo-European, and other proto languages. Prereq: 6 hrs of upper division foreign language courses (excluding courses in translation or graduate reading courses). (Same as French 426, Spanish 426, and Linguistics 426.)

435 Structure of the German Language (3) Contrastive English-German segmental and suprasegmental phonemes, contrastive English-German linguistic structures, selected topics in advanced German grammar and syntactic analysis. Prereq: 6 hrs of upper division German language courses (excluding courses in translation and graduate reading courses). (Same as Linguistics 435.)

436 History of the German Language (3) Development of German language from Indo-European through Proto-Germanic, Old High German, Middle High German, Internal and external linguistic history of German speech. Prereq: 6 hrs of upper division German language courses (excluding courses in translation or graduate reading courses). (Same as Linguistics 436.)

485 Business German (3) Survey of German used in fields of business, government, administration, and economics. Prereq: 6 hrs of upper-division German excluding courses in translation and graduate reading 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

510 German Phonetics and Advanced Grammar (3) Advanced work in phonetics, pronunciation, and selected topics in German grammar. For teachers and prospective teachers. Prereq: Consent of Instructor.

512 Teaching a Foreign Language (3) Practical application of methods for teaching and evaluating basic language skills and foreign language skills, and cultural knowledge through seminars, demonstrations, peer teaching, and observation of foreign language classes. Required of all M.A. and Ph.D. students holding GTA's, except those whose previous training or experience warrants excuse by department.

519 Bibliographical Methods (1) Bibliographical methods; major reference works and bibliographical problems in language and literature.

520 Proseminar (2) Advanced training in use of bibliographical and reference tools; illustrative problems, paper preparation.

541 Medieval German Language and Literature (3) Introduction to Middle High German.

550 Studies in German Literature (3) Content varies. May be repeated. Maximum 8 hrs.

552 German Enlightenment, Rococo, and Sturm und Drang (3) Content varies. May be repeated. Maximum 6 hrs.

556 Modern German Literature 1890-1945 (3) Content varies. May be repeated. Maximum 6 hrs.

555 Modern German Literature 1945-Present (3) Content varies. May be repeated. Maximum 6 hrs.

560 German Literary Theory and Criticism (3)

561-62 Directed Readings in German Language and Literature (3,3)

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 culture of Portugal and Brazil. 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 countries. Topics may vary. Prereq: At least one course at the 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.

Russian

Graduate Courses

401-02 Advanced Russian Language (3,3) Prereq: Russian Composition and Conversation or equivalent. (Same as Russian and East European Studies 401-02.)

430 Selected Topics in Russian Literature (3) Content varies. May be repeated. Maximum 9 hrs.

451-52 Senior Seminar (3,3) For majors in Russian; minors admitted at discretion of instructor. Intensive study of language, literary style, and literary criticism based on selected major novels. (Same as Russian and East European Studies 451.)

510 Russian Phonetics and Advanced Grammar (3) Phonetics, pronunciation, stylistics, and selected topics in Russian grammar. For teachers and prospective teachers. Prereq: Consent of Instructor.

550 Studies in Russian Literature (3) Content varies. May be repeated. Maximum 9 hrs.

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

Italian

Graduate Courses

401 Dante and Medieval Culture (3) Introduction to significance of this great Italian writer. Prereq: 212 or consent of instructor.

402 Petrarch and Boccaccio (3) Prereq: 212 or consent of instructor.

403 Literature of the Rinascimento (3) From Pulp 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 Calvino. 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 literary 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.


423 Advanced Composition and Conversation (3) Development of speaking skill at advanced level, wide range of topics and situations. Variety of in-class and extra-class activities. Not available for credit for students whose level of proficiency in Spanish is superior defined by the ACTFL Proficiency Guidelines or for graduate students in the Spanish M.A. or Ph.D. programs. Prereq: 323 Intermediate Composition and Grammar.

425 Introduction to Descriptive Linguistics (3) (Same as French 425, German 425, and Linguistics 425.)

426 Methods of Historical Linguistics (3) (Same as German 426, French 426, and Linguistics 426.)

429 Romance Linguistics (3) (Same as French 429 and Linguistics 426.)

430 Topics in Hispanic Linguistics (3) Spanish language through different areas of Linguistics: phonology, morphology, syntax, semantics, sociolinguistics, dialectology and second language acquisition. Prereq: 323 Intermediate Composition and Grammar, 332 Survey of Spanish Literature: 1700-1700, 332 Survey of Spanish American Literature: 1700-1900, and completion of an additional 9 hours of upper division Spanish. May be repeated. Maximum 6 hrs with consent of department. (Same as Linguistics 430.)

433 Images of Woman in Hispanic Literature (3) Major Hispanic texts (and/or women authors) in light of relation of female individuality to particular social context, role of women in society, patriarchal tradition, woman as cultural and aesthetic value ("the feminine symbolic"), and feminist theoretical issues. Prereq: 323 Intermediate Composition and Grammar, 330 Textual Analysis and completion of 9 additional hours of upper division Spanish.

434 Hispanic Culture through Film (3) Analysis of selected films on subjects concerning life, culture, and artistic traditions in the Hispanic world; exploration of ideological, philosophica, social, and political implications of films and comparison of them with treatments of related subjects in literature and film. Prereq: 323 Intermediate Composition and Grammar, 332 Survey of Spanish Literature: 1700-1700, and completion of an additional 9 hours of upper division Spanish. Taught in Spanish. May be repeated. Maximum 6 hrs with consent of department. (Same as Cinema Studies 434.)

481 Special Topics (3) Topics of Hispanic literature, culture, linguistics, or foreign language pedagogy. Topics vary. May be repeated with consent of department. Maximum 6 hrs.

485 Latin American Film and Culture (3) Latin American and Latin/o/a films and videos from 1900s to present as works of art in light of political, cultural, and social contexts. Taught in English. Graduate credit available only for Latin American Studies and Cinema Studies majors. 1 hr lecture, 2 hrs screening, and 1 hr discussion. (Same as Latin American Studies 485 and Cinema Studies 485.)


480 Social Forces in Hispanic Literary Expression (3) Analysis of major Hispanic texts that address factors and events that influenced and/or continue to influence social and cultural evolution of Hispanic world, including literature itself. Prereq: 323 Intermediate Composition and Grammar, 332 Survey of Spanish Literature: 1700-1700, and completion of 9 additional hours of upper division Spanish. May be repeated. Maximum 6 hrs with consent of department.

482 Trends in Hispanic Thought (3) Intellectual/philosophical currents represented in literary works, life and thought of painters, or movements from historical periods of Spain and Latin American countries. Prereq: 323 Intermediate Composition and Grammar, 332 Survey of Spanish Literature: 1700-1700, and completion of 9 additional hours of upper division Spanish. May be repeated. Maximum 6 hrs with consent of department.

484 Race, Ethnicity, and Nation in Hispanic Literature (3) Close reading and analysis of literary texts that deal with theme of race and ethnicity in Latin America. Content varies. Prereq: 323 Intermediate Composition and Grammar. 332 Survey of Spanish Literature: 1700-1700, and completion of 9 additional hours of upper division Spanish. May be repeated. Maximum 6 hrs with consent of department.

486 Literature and Artistic Movements in the Hispanic World (3) Relationships (thematic, cultural, social, political, aesthetic, philosophical etc.) between specific trends in literature and other artistic media, in light of historical context in which those relationships emerged. Prereq: 323 Intermediate Composition and Grammar. 332 Survey of Spanish Literature: 1700-1700, and completion of 9 additional hours of upper division Spanish. May be repeated. Maximum 6 hrs with consent of department.

490 Topics in Hispanic Civilization (3) Analysis of trends, issues and/or movements in the civilizations of Spain and Spanish America. Historical and cultural perspectives dealing with topics from Middle Ages to present day. Prereq: 323 Intermediate Composition and Grammar. 332 Survey of Spanish Literature: 1700-1700, and completion of 9 additional hours of upper division Spanish. May be repeated. Maximum 6 hrs with consent of department.

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 or quarter. May be repeated. Maximum 6 hrs with consent of department.

540 Golden Age Poetry (3) Carlos Fuentes, Fray Luis de Leon, San Juan de la Cruz, Lope de Vega, Quevedo, and Gongora.

543 Don Quijote (3) Cervantes' masterpiece in socio-cultural and literary context of its times: study of thematic, structural, and stylistic issues: crisis of aristocratic "Quixotic" madness, courtly love, consciousness and nihilism, ethnomorphic, satiric irony, culture of sentiment, and Cervantes' legacy to subsequent literature. Content varies. May be repeated. Maximum 6 hrs with consent of department.

546 Golden Age Drama (3) Major dramatists of period: Lope de Vega, Tirso de Molina, Ruiz de Alarcón, Guillen de Castro, Calderon de la Barca, Moreto, and Rojas Zorrilla.


549 19th Century Spanish Prose (3) Cosmopolitanism, realism, and naturalism in the novel, short story, and essay as represented in major authors: Larra, Musenose Romance, Fernan Caballero, Alarcon, Viera, Palacio Velasco, Espronceda, Galdos, and Zorrilla. Content varies. May be repeated. Maximum 6 hrs with consent of department.

550 Techniques of Literary Analysis and Research Methods (3) Theoretical and critical essays on various techniques of literary analysis. Exploration of bibliographical and research materials.

551 Special Topics in Spanish or Spanish American Literature (3) May be repeated. Maximum 6 hrs.

554 Directed Readings (3)

561 Spanish American Colonial Literature (3) From pre-Columbian era through 18th century. Reading and analysis of selected works from Colonial Spanish American period and their Continental sources. Indigenous and Catholic authors. May be repeated. Maximum 6 hrs with consent of department.


572 Spanish American Narrative: Boom to Present (3) Critical study of major trends and movements that established Spanish American narrative during second half of 20th century. Content varies. May be repeated. Maximum 6 hrs with consent of department.

573 Regional Approaches to Interpreting Spanish American Literature (3) Interpretation of Spanish American literature taking into consideration regional differences attributable to such factors as race, geography, immigration, and political development. Key regions include Mexico and Central America, Caribbean, Andean countries, and the Southern Cone. Course readings vary between specific regional perspectives and transnational ones. May be repeated. Maximum 6 hrs with consent of department.

575 Spanish American Modernismo and Vanguardismo (3) Critical study of principal writers and literary works associated with Spanish American modernismo and vanguardismo published between 1880 and 1950. Concepts and expressions of modernity as
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

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 knowledge of research techniques to analysis of existing research literature in music education. 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, traditional and non-traditional instrumental ensembles. Limited to students majoring or concentrating in art, dance, or theatre. Prereq or coreq: 570. May be repeated. Maximum 2 hrs.


575 Professional Internship in Teaching (1-8) Teaching and teaching-related experiences in professional settings in public schools. Enrollment limited to post-baccalaureate students in professional year program. Prereq: Admission to Teacher Education program and consent of School of Music. May be repeated. Maximum 12 hrs. S/NC only. F, Sp.

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.

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

593 Special Problems in Music Education (3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

Music Ensemble

GRADUATE COURSES

502 Jazz-Saxophone Ensemble (1) May be repeated. Maximum 4 hrs.

503 Small Jazz Ensemble (1) May be repeated. Maximum 12 hrs.
Music General

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 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 Music Bibliography (3) Bibliographic methodology in music. F

511 Lecture Recital (2) E

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

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

Music History

GRADUATE COURSES

410 Music History Genre (3) Topics vary. May be repeated. Maximum 6 hrs.

420 History of Opera (3) Dramatic, vocal, and orchestral elements in opera of Italian, French, and German schools, 1800-present.

430 Symphonic Literature (3) Literature for orchestra from Baroque to present, evolution of symphony.

450 Composer Seminar (3) Life and works of single composer. Subjects vary.

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

Music Instrumental

GRADUATE COURSES

490 Instrumental Conducting (3) Development of knowledge and skills in instrumental conducting; study of various periods and composers and relationship of different styles to conductor's art; musical analysis and practice in conducting. Prereq: Music Education 320 or equivalent.

580 Band History and Literature I (3) Antiquity to 1900.

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

583 Recital for Instrumental Conductors (1) Problems in conducting recitals. Prereq: Consent of instructor. S/NC only.

584 Practicum for Instrumental Conductors (1) Intern experience in field other than area of major interest. S/NC only.

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

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

Music Jazz

GRADUATE COURSES

410 Advanced Improvisation (3) Further development of individual skills and solving individual problems in jazz improvisation. Prereq: 210 and 220.

420 Jazz Pedagogy (1) Methods and materials relating to teaching of jazz, designing and administering jazz programs, and rehearsal techniques for jazz ensembles. Prereq: Studio music and jazz major or consent of instructor.

520 Seminar in Jazz (3) Topic varies.

Music Keyboard

GRADUATE COURSES

420-30 Piano Literature I,II (3,3) 420-From 1750 to middle 19th century; 430-Middle 19th century to present.

460-70 The Organ and Its Literature I,II (3,3) Development of organ and organ literature from Middle Ages to present; problems of style and interpretation; pedagogical literature and methods; organ design. Prereq or coreq: Music History 220 and consent of instructor.

485-95 Suzuki Piano Method I,II (2,2) Psychological, procedures, and layout of Suzuki piano method. Must be taken in sequence. Prereq: Consent of instructor.

520 Piano Literature Seminar (3) Topics vary. May be repeated. Maximum 6 hrs.

Music Technology

GRADUATE COURSES

540 Computer Music Transcription (3) Projects in notation, playback, and publication of music incorporating elements of word processing, graphic design, sequencing, and page layout. Study of MIDI protocol as applied to computer music work station design. No credit toward M.M. concentration in Music Theory with technology emphasis. 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: 540 or equivalent.

560 Technology in Music Research (3) Use of technology for research projects in music analysis or pedagogy; development and execution of research project. Prereq: 550.

Music Theory

GRADUATE COURSES

430-40 Counterpoint I,II (3,3) 430-Study of species counterpoint in modal and tonal styles, works of Palestrina and J.S. Bach. 430 - Prereq: 210 Theory III and 230 Advanced Ear Training IV with grade C or higher. 440 - Prereq: 430 with grade C or higher.

450 Choral Arranging (2) Analysis of scores and writing of arrangements for choruses. Prereq: 210 Theory III and 240 Advanced Ear Training IV with grade C or higher, or consent of instructor.

520 Analytical Techniques (3) Analytical techniques, contemporary approaches. Tonal and neotonal music. Prereq: Consent of instructor.

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

593 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) 410-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.

490 Church Music Methods, K-12 (3) Development of child's voice through teenage years, vocal/choral techniques for various age groups through high school, choral literature for the youth church choir, non-vocal musical activities appropriate to various age groups as used in church music programs (e.g., Offf, handbells, rhythm activities, etc.).

495 Choral Conducting Seminar (3) Topics vary. May be repeated. Maximum 6 hrs.

520 Performance Techniques for Singers (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 4 hrs.

540 Opera Production (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

550-60 Advanced Vocal Pedagogy I,II (2,2) 550-Study of vocal production, examination of different types of voice. 560-Study of teaching materials, observation of studio teaching, analysis of vocal problems in selected students, and supervised teaching.

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) Expansions and continued refinement of conducting technique; development of choral rehearsal skills. Prereq: Consent of instructor.

594 Project in Choral Conducting Performance (1-3) Public performance, critical document recording project. Prereq: Consent of instructor. May be repeated.

595 Choral Conducting Seminar (3) Score reading and preparation; problems of interpretation, performance practices, and conducting techniques. Prereq: 590 or consent of instructor. May be repeated.

Nuclear Engineering

(College of Engineering)

MAJOR DEGREES

Nuclear Engineering ................. M.S., Ph.D.

H. L. Dodds, Head

Professors:

Dodds, H. L. , Ph.D. .............. Tennessee
Mihalczew, J. T., Ph.D. .......... Tennessee
Miller, L. F., Ph.D. .............. Texas A&M
Mynatt, F. R., Ph.D. .......... Tennessee
Shannon, T. E., Ph.D. .......... Tennessee

Uhrig, R. E. (Distinguished Prof.), PE, Ph.D. ................................ Iowa State
Upadhyaya, B. R., PE, Ph.D. ........... California

Associate Professors:

Groer, P. G., Ph.D. .............. Vienna
Hines, J. W., Ph.D. .......... Ohio State
Pevy, R. E., PE, Ph.D. .......... Tennessee
Ruggles, A.E., Ph.D. .......... Rensselaer
Scott, T. H., PE, Ph.D. .......... Florida
Townsend, L. W., Ph.D. .......... Idaho

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.

All entering students must have, as a minimum, competency in mathematics through ordinary differential equations, competency in atomic and nuclear physics, and competency consistent with a course in introductory nuclear engineering. If these competencies do not exist, the student must take appropriate courses for undergraduate credit. The department head is the contact for all interested students, both those with nuclear engineering degrees and those from other disciplines.

THE MASTER'S PROGRAM

A graduate program leading to the Master of Science is available to graduates of recognized undergraduate curricula 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 then 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 reports 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 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 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 program 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.

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 on an in-state tuition basis. The M.S. program in Nuclear Engineering is available to residents of the state of Mississippi. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Student Services.

GRADUATE CREDIT FOR UNDERGRADUATE COURSES

400-level courses in nuclear engineering may be used for graduate credit. However, students must not recognize more than 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 nuclear materials, dynamics and controls, alpha and beta spectroscopy, radiation fields and dosimetry. Prerequisite: Nuclear and Radiological Engineering Laboratory.
404 Nuclear Fuel Cycle (3) Mining, milling, fabrication, in-core management, reprocessing, waste disposal, regulatory and radiation health issues and requirements. Prerequisite: 470 or equivalent.
406 Radiation Shielding (3) Types of radiation sources, fundamentals of gamma ray and neutron attenuation, biological effects, approximate methods of shield design, discrete ordinates, and Monte Carlo. Prerequisite: 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. Prerequisite: 301 Fundamentals of Nuclear/Radiological Engineering.
431 Radiation Protection (3) External and internal dosimetry, biological effects of radiation, radiation detection, radiation risk assessment. Prerequisite: 301 Fundamentals of Nuclear/Radiological Engineering.
432 Radiation Risk Analysis (3) Radiation risk estimates for external and internal radiation, dose-response models, dose rate effects, prediction of radiation risks, radiation safety standards.
470 Nuclear Reactor Theory I (3) Fundamentals of reactor physics relative to cross sections, kinematics of elastic scattering, reactor kinetics, reactor systems and nuclear data, analytical and numerical methods applicable to general criticality problems, eigenvalue searches, perturbation theory, and multigroup diffusion equations. Prerequisites: 470 or equivalent.
471 Nuclear Reactor Theory II (3) Thermal spectrum computational methods: homogeneous effects in fast and thermal spectra; considerations in reactor core design; equations and mechanisms of neutron transport in a heterogeneous reactor core; neutron diffusion; neutronic variables; power distribution calculations and reactivity control methods. Prerequisite: 470.
481 Introduction to Reliability Engineering (3) Probabilistic failure models, parameter estimation (maximum likelihood, Bayes techniques), model identification and comparison, accelerated life tests, failure prediction, system reliability, preventive maintenance and warranties. Prerequisite: Senior standing or consent of instructor.
484 Introduction to Maintenance Engineering (3) Principles of maintenance and reliability engineering, and maintenance management. Information extraction from machine life measurements, rotating machinery diagnostics, nondestructive testing, life prediction, failure models, lubrication oil analysis, establishing preventive maintenance programs, and reciprocating equipment maintenance systems. Prerequisite: Senior standing in engineering and consent of instructor. (Same as Materials Science and Engineering 454.)
494 Special Topics in Nuclear Engineering (3) Problems related to recent developments and practice. Prerequisite: Senior standing and consent of instructor. May be repeated. Maximum 3 hours.
500 Thesis (1-15) P/NP only.
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student is using 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
511-12 Transport Processes in Nuclear Engineering (3.3) Theory of non-ideal solutions, transport phenomena, and nuclear engineering. Total credit is 3. Prerequisites: Physics 232.
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. Prerequisite: 521.
543 Selected Topics in Nuclear Criticality Safety (3) Criticality safety computational and experimental methods for reactor, fabrication, storage, reprocessing, and transport applications; overview of safety practices and regulatory requirements. Prerequisite: 421 or consent of instructor.
550 Radiation Measurements Laboratory (3) Physics and electronics associated with radiation detection and measurement, methods of data analysis. Applicability of particular detector measurement and fundamentals of radiation detection instrumentation operation. Prerequisite: 551.
552 Radiological Assessment and Dosimetry (3) Technical aspects of radionuclides in environment, food chain pathways, internal dosimetry, and external dosimetry. Prerequisite: 551 or consent of instructor.
553 Radiation Risk Analysis (3) Methods for radiation risk prediction, survival analysis, parameter estimation, real data analysis, extrapolation techniques. Prerequisite: 552 or consent of instructor.
571 Reactor Theory and Design (3) Analytical and numerical techniques for neutronics modeling of nuclear systems. Forward and adjoint Boltzmann transport equations. Multiplying factor diffusion theory. Corequisite methods and codes. Prerequisite: 470 or consent of instructor.
572 Nuclear System Design (3) Design and analysis of a nuclear system, interface with non-nuclear aspects of system design system reliability and economics; class project. Prerequisite: Consent of instructor.
576 Expert Systems in Engineering (3) Application of expert systems in engineering: logic and rationale, developing expert systems, programming, advanced topics. Prerequisite: 570 or consent of instructor. (Same as Mechanical Engineering 576 and Engineering Science 576.)
577 Neural Networks in Engineering (3) Neural network technology for use in intelligent systems; rationales for neural computing, structure of neural computing systems, programming. Prerequisite: Consent
of instructor. (Same as Mechanical Engineering 577 and Engineering Science 577.)

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

579 Advanced Monitoring and Diagnostic Techniques (3) Fundamentals of machinery monitoring and diagnostic and application of advanced statistical and artificial intelligence based techniques such as ridge regression, principal component analysis (PCA), linear and non-linear partial least squares (PLS), neural networks, and fuzzy logic. Prereq: Graduate standing or consent of instructor.

581 Reactor Shielding (3) Application of analytic deterministic solutions of Boltzmann transport equation to shield design problems. Spherical harmonics, moments method, discrete ordinates, adjoint calculations, coupled analysis, and fast reactor shield design. Prereq: 400 or equivalent.

582 Monte Carlo Analysis (3) Analysis of radiation transport problems in radiation shielding by Monte Carlo method, use of MCNP code system: Random sampling, evaluation of integrals, analog particle transport, techniques of variance reduction, forward and adjoint moments of analysis, importance function biasing, splitting/weight window, and fault tree analysis and associated dependent failure analysis. Prereq: Consent of instructor.

585 Process System Reliability and Safety (3) Qualitative and quantitative techniques for assessing and improving process systems reliability and safety. Fault tree analysis and associated dependent failure analysis. Prereq: Consent of instructor. (Same as Chemical Engineering 565.)

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/N only.

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

511-12 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.

653 Theory of Information Processing (3) Modern system theoretical methods for evaluating system performance from dynamic measurements. Prereq: 522 or equivalent.

671 Advanced Topics in Applied Artificial Intelligence (3) Recent advances in engineering applications of artificial intelligence. Prereq: 577. (Same as Mechanical Engineering 671 and Engineering Science 671.)

697 Special Topics in Nuclear Engineering (3) Investigation of new developments. Prereq: Consent of instructor.

Nursing
(Graduate School)

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:

Allgood, Martha R., Ph.D. ............. New York
Creasia, Joan L., Ph.D. .............. Maryland
Droopleman, Patricia G., Ph.D. ....... Tennessee
Farr, Glen, Ph.D. ......................... Tennessee
Groer, Maureen, Ph.D. .............. Illinois
Mozingo, Johnie N., Ph.D. .......... Walden
Pierce, Joan U., Ph.D. .............. Utah
Seavor, Carol, Ed.D. ................. Massachusetts
Thomas, Sandra P., Ph.D. ........... Tennessee

Associate Professors:

Davis, Mitzi, Ph.D. .............. Tennessee
Ellison, Kathy Jo, Ph.D. ............. Alabama (Birmingham)
Fenske, Mildred M., Ph.D. ........... Vanderbilt
Hall, Joanne, Ph.D. ................. San Francisco
McQuire, Sandra E.D. .............. Tennessee
Wehle, Debra C., Ph.D. ............... South Carolina

Assistant Professors:

Bell, Donald, M.S.N. .......... Tennessee
Brown, Allie J., M.S.N. (Alabama (Birmingham)
Brown, Mary Lynn, Ph.D. ......... Tennessee
Chen, Shu-li, Ph.D. ................. Utah
Conlon, Kathleen P., M.S.N. ....... SUNY (Buffalo)
Dyess, Rachel E., M.S.N. ......... Tennessee
Evans, Ginger W., M.S.N. ......... Tennessee
Fox, Marie X., M.S.N. .............. Texas
Helton, Sally M., M.S.N. .......... Texas Women's University
Kollar, Mary, Ph.D. ............. Tennessee
Nalbo, Maureen, Ph.D. .......... Tennessee
Pierce, Margaret, M.S.N. ......... Tennessee
Preston, John, M.S.N. .......... Tennessee

THE GRADUATE 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, nurse anesthesia, 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 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, mental health nursing, and nurse anesthesia 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 500 or above if native language is not English.
4. Applicants for nurse anesthesia require an interview.
5. Hold a Bachelor's degree in Nursing (BSN) from a National League for Nursing accredited program.
   a. Hold or be eligible for licensure to practice nursing in Tennessee.
   b. 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.
   c. Have completed a health assessment and physiology course within the past five years.
   d. Have completed 3 hours of graduate level statistics.
   OR
   Hold a bachelor's degree in a discipline other than nursing (master's entry student or RN) from an accredited college or university.
   a. Have a cumulative undergraduate GPA of at least 3.0 on a 4-point scale.
   b. Have satisfactorily completed the following prerequisite courses: chemistry (8 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; 3 hours of graduate level statistics prior to enrollment in graduate research course.
   c. This option not available to nurse anesthesia or nurse administration students.
6. 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 terms 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 personal 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 rubeola immunization or sufficient titer for immunity; TB status.
4. Each student must present evidence of current 2-person CPR certification.
5. Non-registered nurse students 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, UT College of Nursing, 1200 Volunteer Blvd., Knoxville, TN 37996-4180; phone: 865 974-7606.

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 thesis option must register for 582 Scholarly Inquiry for Advanced Practice Nursing.
Program Requirements

All students must complete a minimum of 33 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

Elective (6 credits)—Required for students not required for any course
504 Advanced Health/Physical Assessment
505 Advanced Clinical Pharmacology
515 Advanced Pathophysiology for Nursing Practice

Advanced Practice Core (9 credits)*
504 Advanced Health/Physical Assessment
505 Advanced Clinical Pharmacology
515 Advanced Pathophysiology for Nursing Practice (not required for any course)

Required for those who have completed courses in nursing (Supervision of Clinical Practice or Instrumental Nursing)
506 Advanced Anesthesia Pharmacology
516 Advanced Pathophysiology: Neurological and Cardiovascular with Anesthesia Implications
517 Advanced Pathophysiology: Respiratory/Renal with Anesthesia Implications
518 Advanced Pathophysiology: Obstetrics/Regional Anesthesia
521 Basics of Nurse Anesthesia
522 Integrated Health Science for Anesthesia
523 Advanced Principles of Nurse Anesthesia Practice

Research (6-9 credits)
501 Nursing Research: Methods, Design & Analysis
500 Thesis
582 Scholarly Inquiry for Advanced Practice Nursing

Concentration (18-17 credits)—choose one
530-31 Adult Health Nursing I, II
544-45-46: Clinical Nurse Anesthesia
47-48-49 Practicum/Seminar I, II, III, IV, V, VI
550-51 Nursing of Women and Children I
560-61 Mental Health Nursing I, II
570-71-72 Family Nurse Practitioner I, II, III, IV
590-91 Nursing administration I, II

Elective (6 credits)—Required for students in nursing administration concentration only.

*Not required for nursing administration concentration.

Research (6 credits)—Required for students in supervision of clinical practice

Students who enter the program as non-nurses must complete the following undergraduate nursing courses in addition to meeting the requirements listed above:

311 Foundations of Professional Nursing Practice
319 Pathophysiology of Health Deviations I
333 Health Assessment
341 Health Promotion
351 Pharmacology I
361 Health Maintenance & Restoration across the Life Span
381 Professional Leadership Issues I
392 Health Promotion & Maintenance in the Community
406 Pharmacology II

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 complete 505, 382, 452, 482 and 490 and complete or successfully challenge the following:

311 Foundations of Professional Nursing Practice
319 Pathophysiology of Health Deviations I
333 Health Assessment
351 Pharmacology I
361 Health Maintenance & Restoration across the Life Span
403 Health Promotion & Maintenance in Childbearing Families
406 Pharmacology II
421 Health Maintenance & Restoration in Mental Health
451 Professional Leadership Issues I
461 Health Restoration across the Life Span

A total of 10 credits can be obtained by successful completion of the NLN ACE Examination. See undergraduate catalog for other challenge options. RNs who are in the process of completing a BSN at UT with the intent of enrolling in the MSN program follow the same plan with the addition of 417.

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 may, 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 "F" for the course.
2. If a student achieves a final grade of "D" or "P" 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, unacceptably poor 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 at 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 required.
3. Have a minimum cumulative 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 history and theory 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 Examination scores, and TOEFL scores to the Graduate School.
12. Complete Graduate Program Data Form with essay to the Director of the PhD program 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 3
- 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 2
- 611 Advanced Nursing Seminar 2
- 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, child 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 comprehensive examination 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 a university setting with his/her major concentration. Please refer to Human Ecology for specific requirements.

POST-MASTER'S CERTIFICATE IN ADULT HEALTH NURSING

The College of Nursing offers a post-master's certificate program for nurses who need additional training in adult health nursing. Required for admission is a master's degree in nursing.

Course requirements are 530, 531, and 583, plus additional hours as determined by the college. The total hours will vary depending on the student's academic record, clinical experience and objectives. Students must complete a minimum of 12 credits. Typically students will complete 16-20 hours of course credit.

POST-MASTER'S CERTIFICATE IN NURSING OF WOMEN AND CHILDREN

The College of Nursing offers a post-master's certificate program for nurses who need additional training in women's health and children. Required for admission is a master's degree in nursing.

Course requirements are 550 and 551, plus additional hours as determined by the college. The total hours will vary depending on the student's academic record, clinical experience and objectives. Students must complete a minimum of 12 credits. Typically students will complete 16-20 hours of course credit.

POST-MASTER'S CERTIFICATE IN MENTAL HEALTH NURSING

The College of Nursing offers a post-master's certificate program for nurses who need additional training in mental health nursing. Required for admission is a master's degree in nursing.

Course requirements are 560 and 561, plus additional hours as determined by the college. The total hours will vary depending on the student's academic record, clinical experience and objectives. Students must complete a minimum of 12 credits. Typically students will complete 16-20 hours of course credit.

POST-MASTER'S CERTIFICATE IN FAMILY NURSE PRACTITIONER

The College of Nursing offers a post-master's certificate program for nurses who need additional training in family nurse practice. Required for admission is a master's degree in nursing.

Course requirements are 570, 571, and 572, plus additional hours as determined by the college. The total hours will vary depending on the student's academic record, clinical experience and objectives. Students must complete a minimum of 12 credits. Typically students will complete 16-20 hours of course credit.

POST-MASTER'S CERTIFICATE IN NURSING ADMINISTRATION

The College of Nursing offers a post-master's certificate program for nurses who need additional training in nursing administration. Required for admission is a master's degree in nursing.

Course requirements are 590 and 591, plus additional hours as determined by the college. The total hours will vary depending on the student's academic record, clinical experience and objectives. Students must complete a minimum of 12 credits. Typically students will complete 16-20 hours of course credit.

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 on an in-state tuition basis. The M.S.N. program in Nursing is available to residents of the state of Oklahoma (concentration in nursing of women and children). Additional information may be obtained from the Admissions Specialist in the Office of Graduate Student Services.

GRADUATE COURSES

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

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/C only. E

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 psychological concepts with implications for advanced practice nursing. Didactic (2.5) and lab (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


509 Graduate Seminar in Public Health (1) (Same as Public Health 509, Exercise Science 509, Nutrition 509, and Social Work 509;)

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 application to advanced practice nursing.

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

516 Advanced Pathophysiology: Neurological/Cardiovascular with Anesthesia Implications (2) Review of anatomy and physiology and integration of pathophysiology involved in patients requiring anesthetic care for cardiac surgical procedures (both children and adults) with and without cardiopulmonary bypass, interventional surgical procedures for vascular and mass occupying lesions, patients requiring somatosenory evoked potential monitoring, and patients requiring anesthesia for noncardiac and non-neurological procedures who present with either neurological and/or cardiovascular comorbidities.

517 Advanced Pathophysiology: Respiratory/Reproductive with Anesthesia Implications (2) Review of anatomy and physiology and integration of pathophysiologic involvement in administration of anesthesia for patients who present with respiratory or reproductive pathology. Pathological implications of acute and chronic renal failure, renal transplantation, pulmonary disease states: obstructive and restrictive diseases, one lung ventilation, and acute pulmonary disease states and their management.
510 Advanced Pathophysiology: Obstetrics/Regional Anesthesia (2) Examination of anatomy and physiology of regional anesthesia and its application to obstetrics. Also, advanced obstetric nursing. Coreq: 510. 2 hrs and 4 labs. F

519 Midwifery Seminar (1) Exploration of state of science in midwifery. Coreq: 510. 1 hr and 4 labs. F

520 Advanced Practice Nursing and Health Delivery Systems (3) Nursing's role in the delivery system. Coordination of care for the patient. Coreq: 520. 2 hrs and 4 labs. F

521 Basics of Nurse Anesthesia (6) Comprehensive orientation to principles and practice of anesthesia. Coreq: 520. 2 hrs and 4 labs. F

522 Integrated Health Science for Anesthesia (3) Fundamental principles of chemistry and physics related to practice of nurse anesthesia. Coordination of principles to clinical anesthesia practice. Coreq: 520. 2 hrs and 4 labs. F


530 Adult Health Nursing I (6) Advanced nursing practice for health promotion, restoration, and maintenance of young, middle-aged, and older adults. Coreq: 530. 2 hrs and 4 labs. F

531 Adult Health Nursing II (6) Continuation of 530. Delivery, restoration, and management of health care for adults and communities. Coreq: 530. 2 hrs and 4 labs. F

543 Nurse Practitioner (9) Exploration and application of holistic nursing concepts to care of people with common and chronic health problems. Coreq: 543. 2 hrs and 4 labs. S

550 Nursing of Women and Children I (8) Advanced practice nursing for women and children; clinical experience in role of nurse practitioner or clinical specialist in varied settings. Coreq: 550. 4 hrs and 8 labs. Su

551 Nursing of Women and Children II (8) Continuation of 550. Role definition of nurse practitioner and clinical specialist in health maintenance and restoration for women and children. Coreq: 551. 4 hrs and 8 labs. F

552 Parent Child Nursing Field Work and Seminar (6) Seminar and intensive clinical practice designed to facilitate further development of specialized knowledge and skills used for advanced parent-child nursing practice. Coreq: 552. 1 hr and 4 labs. F

557 Nurse Midwifery Seminar I (1) Exploration of art and science of midwifery, nature and scope of midwifery practice in various settings. Coreq: 557. 1 hr and 4 labs. F

558 Nurse Midwifery Seminar II (1) Exploration of psychological, developmental, and sociocultural theories as related to infant care and care of women in labor. Coreq: 558. 1 hr and 4 labs. F

559 Nurse Midwifery Seminar III (1) Exploration of state of science in midwifery, innovative practice options, and related research issues in midwifery practice. Coreq: 559. 1 hr and 4 labs. F

560 Mental Health Nursing I (6) Theories of advanced therapeutic interventions for clients experiencing actual and potential mental health problems; advanced practice nursing, role of nurse in specialty mental health; clinical practice with clients of various ages in acute care and community settings. Coreq: 560. 4 hrs and 8 labs. F

561 Mental Health Nursing II (6) Continuation of 560. Advanced practice nursing in community settings for families with actual and potential mental health problems. Coreq: 560. 4 hrs and 8 labs. F

565 Teaching Practicum I (1-6) Individually designed teaching experience in collegiate nursing program or nursing practice setting. Objectives to be developed collaboratively by student and faculty. Coreq: 565. 4 hrs and 8 labs. F

566 Educational Principles and Strategies (3) Exploration and analysis of selected education, curriculum, teaching-learning, measurement, and evaluation strategies and techniques. Coreq: 566. 4 hrs and 8 labs. S

570 Family Nurse Practitioner I (4) Application of advanced health/physical assessment and diagnostic reasoning in nursing management and primary care and of individuals and their families with actual and potential acute health problems; clinical experience in role of family nurse practitioner in various settings. Coreq: 570. 4 hrs and 8 labs. F

571 Family Nurse Practitioner II (5) Continuation of 570. Nursing management and primary care of individuals and their families in all developmental life stages; clinical experience in variety of settings. Coreq: 571. 5 hrs and 8 labs. 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 advanced practice in family nurse practitioner; clinical experience in role of family nurse practitioner in various settings. Coreq: 572. 7 hrs and 14 labs. F

577 Special Topics (1-3) Topic determined by faculty and student interest. Coreq: Consent of instructor. May be repeated. Maximum 6 hrs. E

582 Scholarly Inquiry for Advanced Practice Nursing (3) Utilization of research process through experiential learning or critical evaluation of science in area of interest. Conducted under faculty guidance and culminating in scholarly paper. Coreq: 582. 3 hrs and 6 labs. F

583 Directed Clinical Practice I (1-9) Additional opportunities for advanced practice nursing. Objectives to be developed collaboratively by student and faculty. Coreq: Enrollment in or completion of graduate level courses in clinical nursing. Maximum 9 hrs. F

585 Seminar in Gerontology (1) (Same as HumanEcology 685) Concepts in aging. Coreq: 585. 1 hr and 4 labs. F

590 Nursing Administration I (5) Exploration, analysis, application, and evaluation of organizational, management, and leadership theories and financial principles to delivery of nursing services. Coreq: 590. 5 hrs and 10 labs. F

591 Nursing Administration II (5) 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. Coreq: 591. 5 hrs and 10 labs. F

593 Independent Study (1-3) Coreq: Consent of instructor. May be repeated. Maximum 6 hrs. E

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

601-02 Theory Analysis and Construction I, II (3,3) faculty. Coreq: 590 or equivalent. F

605-06 Nursing Research Seminar I, II (3,3) Selected topics pertaining to proposal development and research experience. F,Sp

607 Qualitative Nursing Research (3) Exploration and analysis of philosophical bases, theoretical implications, methods, and data analyses of qualitative nursing research. Sp

608 Quantitative Nursing Research (3) Exploration and analysis of philosophical bases, theoretical implications, methods, and data analyses of quantitative nursing research. Coreq or coreq: Graduate level statistics course. F

609 Research Practicum I (1-3) Supervised individual or group research experience under guidance of faculty. Coreq: Consent of instructor. May be repeated. Maximum 12 hrs. F

610 Nursing Science Seminar (2) (2) Critical Analysis and synthesis of literature in selected focus area within nursing science. Coreq: Admission to doctoral program in nursing or consent of instructor. F

611 Advanced Nursing Seminar I (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. F

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 entrepreneurship. F

614 Nursing Preceptoring (3) Individually designed practicum. Field, or internship experiences in areas of administrative, educational, research, or clinical practice settings. Coreq: 614. F

615 Nursing Management of Complex Systems: Academic Institutions (3) Basic structure and dynamics of leadership in nursing education: application of management and nursing theories in academia, faculty practice models, research and publication issues, promotion and tenure, faculty governance, and administrative responsibilities and strategies. Coreq: 615. F

620 Directed Research (3) Exploration of theoretical considerations and research methodologies in nursing research. Coreq: Consent of instructor. May be repeated. Maximum 6 hrs. Sp

625 Independent Study (1-6) Coreq: Consent of instructor. May be repeated. Maximum 6 hrs. Sp

Nutrition

(College of Human Ecology)

MAJORS

DEGREES

Human Ecology .................................................. Ph.D.

Nutrition ............................................................. M.S., M.S.M.P.H.

Michael B. Zemel, Head

Professors:

Beauchene, Roy E. (Emeritus), Ph.D. ........................................ Kansas State
Carruth, Betty Ruth, Ph.D. ......... Missouri
Namey, T. C., M.D. ........ Washington (St. Louis)
Sachan, Dilee E., 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
Brooks, M. D. (Memphis), M.S. ....... Alabama
Haughton, B., Ed.D. ................. Columbia
Karstad, Michael, Ph.D. ............ Loyola
Mossa, Nigra, 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), Ed.D. .... Memphis

The Master's Program is available in Nutrition, with a concentration in nutrition science or public health nutrition.

A graduate degree combined with a Didactic 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. The Didactic Internship is currently granted accreditation by the Commission on Accreditation for Dietetics Education of The American Dietetic Association, 216 W. Jackson Blvd., Chicago, IL 60606-6995, Tel: 312 899-5400. Students may also select an interdisciplinary minor in gerontology.

ADMISSION REQUIREMENTS

A complete file for review includes the Graduate School application form, 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, 229 Jessie Harris Building, University of Tennessee, 37996-1900. Forms may also be obtained from the Department's website at http://nutrition.he.utk.edu/.

Admission into the graduate program in the department is dependent 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 16 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 511, 512, 513, 514, 515, 541 and the minor in public health. Six hours of Thesiss 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 38 hours with at least 20 hours of coursework in the department. NTR 511, 512, 540, 541, 2 hours from 542-544 and 3 hours of graduate level statistics are required. Students in public health nutrition must take 511, 512, 513, 514, 515 and the minor in public health. Six hours in one area outside the department are required. A minimum of 24 hours at the 500 and 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 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 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 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. 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), Biostatistics (PH 540), 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 cellular/ molecular nutrition, human nutrition, nutritional epidemiology, and experimental nutrition. 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 500 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 15 hours of college 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 faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/WC only. E
588 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) Personal participation in and analysis of state or regional community nutrition program. 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

518 Nutrition and Aging (3) Nutritional problems of adults; nutritional requirements, dietary intake; effects of nutrition on aging. Prereq: Advanced Nutrition or consent of instructor. Su

520 Nutritional Ecology (2) Examination of issues in natural, political, physical, and social environments that impact availability of food and nutrients in U.S. food supply. F

521 Physiological Basis for Diet and Disease (2) Allergic 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 models in nutrition education research. Prereq: 508 or consent of instructor. Su

530 Molecular Application in Nutrient-Gen Interac tion (1) Theories and applications of gene regulation methodologies. Examination with DNA and RNA. RNA and DNA isolation and analysis to illustrate nutrient regulation of gene expression. Combination of lab/lecture. F

540 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 5 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) Prereq: Consent of instructor. 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. E

603 Current Trends in Food and Socio-cultural Change (2) Critical evaluation of research. Prereq: 508 or consent of instructor. F/A

Ornamental Horticulture and Landscape Design

(College of Agricultural Sciences and Natural Resources)

MAJOR

DEGREE

Ornamental Horticulture and Landscape Design................................ M.S.

Robert N. Trigiano, Interim Head

Professors:

Albrecht, M. L., Ph.D. ................................ Ohio State
Angle, R. M. (Liaison), Ph.D., Washington State
Callahan, L. M. (Emeritus), Ph.D. .......... Rutgers
Craner, G. D. (Emeritus), Ph.D. .......... Ohio State
Graham, E. T. (Emeritus), Ph.D. .......... Penn State
Gilliland, D. L., Ph.D. .................... Iowa State
Gunter, R. N., Ph.D. .................... Oregon State
Trigiano, R. N., Ph.D. .................... NC State
Williams, D. B. (Emeritus), Ph.D. .......... Penn State

Associate Professor:

Rogers, S. M., M.L.A. ..................... Georgia

Assistant Professors:

Garten, S., Ph.D. ..................... Minnesota
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 Graduate Program 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://ohld.ag.utk.edu, 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, and 503. Two of these hours must be 500. Six of these hours may be satisfied by Botany 412, 521, 522, Plant and Soil Sciences 471, 532, Animal Science 571, Ecology and Evolutionary Biology 520, or Information Sciences 560, Human Resource Development 521, 522, 524, 562, Art 481, or Geography 439.

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 in 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 ornamentals. Prereq: 220, 330, and Plant and Soil Science 210, or consent of instructor. 2 hrs and 1 lab. Sp

428 Public Horticulture (2) In-depth study of public horticulture industry. Diversity of public horticulture
429 Field Study of Public Horticulture Institutions (3) Extended 10-12 day field study of various public horticulture institutions, community gardens, arboretums, historical gardens, zoos, conservatories, botanical gardens, and nature preserves. Travel journal and course portfolio required. Prereq: 426. Application and travel fee required. Sp

440 Advanced Turfgrass Management (4) Principles and scientific basis of turfgrass culture: adaptation, ecology, physiology, soil fertility, and grass nutrition, climatic influences on turfgrass 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 administration in landscape services industry. Interaction with industry through special presentations. Prereq: 350 or consent of instructor. F

461 Advanced Landscape Design (3) Comprehensive application of landscape design skills to variety of project experiences: landscape planning and analysis, planting design, and materials estimating. Prereq: Fundamentals of Landscape Design and Supplemental Landscape Design Graphics. 3-2 hr labs. Sp


494 Professional Horticultural Communications (3) Communication for public horticulturists through written, oral and visual media. Communication skills using appropriate writing techniques and grammar for print media, brochure design using desktop publishing, slide show development, oral presentations, and video use for educational and informational presentations in ornamental horticulture. Prereq: Agriculture 290 Microcomputer Applications to Problem Solving and senior standing.

500 Thesis (1-15) F/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. May be repeated. S/N only. E

503 Non-Thesis Project (1-2) Library, field, or laboratory project under supervision of faculty member. Not for thesis candidates. May be repeated. Maximum 4 hrs. E

507 Professional Development Seminar (1) (Same as Agriculture and Natural Resources 507. Animal Science 507, Biosystems Engineering 507, Biosystems Engineering Technology 507, Food Science and Technology 507, and Plant and Soil Sciences 507.) S/N only. F

509 Thesis Proposal Preparation (1) (Same as Agriculture and Natural Resources 509, Animal Science 509, Food Science and Technology 509, and Plant and Soil Sciences 509.) S/N or letter grade. Sp

511 Plant Disease Fungi (4) (Same as Entomology and Plant Pathology 510.)

521 Flowering Physiology (1) General phenomenology, photoperiodism, thermo- and photomorphogenesis, interactions of external factors, juvenility, and hormonal regulation. Prereq: Introductory Plant Physiology or equivalent. 3 hrs weekly for 5 weeks. Sp/A

522 Stress Physiology (1) Introduction to abiotic plant stress physiology based on 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 oligonucleotides, cloning primers. DNA profiling techniques (DAF, ASAP) isolation and purification of amplified products. Data analysis of relationships between organisms. Prereq: 8 hrs biological/botanical sciences, 8 hrs chemistry, consent of instructor. 1 hr and 4 labs weekly for 5 weeks. Sp/A

524 Protein Gel 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/botanical sciences, 8 hrs chemistry, consent of instructor. 1 hr and 4 labs weekly for 5 weeks. Sp/A

525 Plant Microtechnique (1) Practical light and scanning electron microscopy methods for investigating aspects of plant development, histochemistry and pathological structures in ornamental forest and crop species. Prereq: 8 hrs biological/botanical sciences and consent of instructor. 1 hr and 4 labs weekly for 5 weeks. Sp/A

527 Management and Administration of Public Horticulture Institutions (3) Management of resources in nonprofit institutions, support organizations and community gardens. Prereq: Fundamentals of Horticulture and Basic Landscape Design. 3 hrs weekly for 5 weeks. Sp/A

528 Public Garden Operations and Management (3) Analysis of year-round operations and management of public gardens. Case studies: time and labor management, budget development and management, implementation of volunteer programs, information dissemination methods for public outreach, management of gardens and facilities using the University of Tennessee Institute of Agricultural Gardens as model. Prereq: 426. F, Sp/A

590 Seminar (1) Presentations and discussion of topics. May be repeated. Maximum 2 hrs. E

592 Internship (1-2) Application of horticulture and design principles and practices in supervised, professional setting, approved by department. S/N or letter grade. E

593 Problems in Ornamental Horticulture and Landscape Design (1-3) Independent study. Current topic related to technology, science or design. May be repeated. Maximum 6 hrs. E

Pathology
See College of Veterinary Medicine and Comparative Pathology, Experimental Medicine

Philosophy
(College of Arts and Sciences)

MAJOR

Philosophy .................................................. M.A., Ph.D.

DEGREES

John Hardwig, Head

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 one foreign language, normally 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 (normal, 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 Philosophy or the Director 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 on an in-state tuition basis. The M.A. and Ph.D. programs in Philosophy are available to residents of the states of Alabama, Kentucky, or Texas; the Ph.D. program to residents of Louisiana, Missouri, Virginia or West Virginia; and the M.A. program to residents of Delaware or Oklahoma. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Student Services.

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)

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 metaethics 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.

450 Philosophy of Biology (3) Current issues: nature of natural selection, adaptation, and fitness; level of selection debate; nature of species; interaction of environment and organism, and others. Prereq: Upper division coursework in philosophy or biology or consent of instructor.

472 Philosophy of Language (3) Problems of meaning, reference and truth. Relation between words and world. How sentences manage to be about the world. What is true? Prereq: 3 philosophy courses 200 level or above.

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.

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) S/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/NP only.

510 Philosophical Research (3) Paper workshop (writing, revising papers, getting papers ready to publish). Does not count toward hours required for degree. May be repeated. S/NP only.

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

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

524 Topics in Twentieth-Century Philosophy (3) Intensive critical work on major philosopher or school. May be repeated. Maximum 9 hrs.

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

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

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

544 Topics in Applied Ethics (3) Single author, tradition, or topic in ethical theory, application to issues in health, business, technology, ecology, and other practical fields. May be repeated. Maximum 9 hrs.

546 Orientation to Medical Ethics (3) Survey of ethical theories in application to issues in medical ethics.

547 Ethical Issues in Mental Health (3) Values in "mental health" and "mental illness," informed consent in psychiatry, competence, patients' rights, involuntary hospitalization and treatment, and behavior control therapies.

548 M.A. Clinical Practicum (3) Series of clinical rotations at one or more local health care institutions. Open only to graduate students concentrating in medical ethics. Prereq: 547 and consent of Medical Ethics Committee and the UTMC Graduate Education Committee.

575 Topics in Metaphysics and Epistemology (3) May be repeated. Maximum 9 hrs.

577 Topics in Philosophy of Mind (3) Relation of mental to physical and of role of words in discourse for mental activities, thinking and feeling. May be repeated. Maximum 9 hrs.

585 Special Topics (3) May be repeated. Maximum 9 hrs.

587 Advanced Clinical Medical Ethics (3) Critical concepts in medical ethics, relationship of theory to practice, and professional roles and responsibilities for health care ethics consultants. Open only to Ph.D. students concentrating in medical ethics. Prereq: Consent of Medical Ethics Committee.

588 Ph.D. Clinical Practicum (9) Series of clinical rotations at one or more local health care institutions. Open only to Ph.D. students concentrating in medical ethics. Prereq: Consent of Medical Ethics Committee.

590 Topics in Social and Political Philosophy (3) Philosophical problems concerning social and political life: family, state, freedom, justice, major theoretical responses: anarchism, social contract, Marxism. 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) Prereq: Consent of Medical Ethics Committee. May be repeated. Maximum 9 hrs.

624 Topics in Contemporary Philosophy (3) May be repeated. Maximum 9 hrs.

640 Topics in Ethics or Value Theory (3) May be repeated. Maximum 9 hrs.

646 Topics in Applied Ethics (3) Prereq: Consent of Medical Ethics Committee. May be repeated. Maximum 9 hrs.

PHYSICS AND ASTRONOMY

MAJOR

DEGREES

Physics M.S., Ph.D.

Soren Sorensen, Head

Professors:

Barnes, F. E., Ph.D. ........................................... California

Bingham, C. R., Ph.D. ........................................... Tennessee

Bliss, W. E., Ph.D. ............................................. Michigan

Breinig, M., Ph.D. .............................................. Oregon

Bugg, W. M., Ph.D. ............................................ Tennessee

Burgdoerfer, J. (Distinguished Prof.), Ph.D. ......... Frie Universitat Berlin

Callcott, T. A., Ph.D. ........................................... Purdue

Childers, R. W., Ph.D. ......................................... Vanderbilt

Crater, H. W. (UTSI), Ph.D. ............................... Yale

Eguitz, A. G., Ph.D. ............................................ Brown

Eiston, S. B., Ph.D. ........................................... Massachusetts

Georgiou, S., Ph.D. ............................................. Manchester

Guidry, M. W., Ph.D. ........................................... Tennessee

Handler, T., Ph.D. ............................................. Rutgers

Hart, E. L., Ph.D. .............................................. Cornell

Kamyshkov, I., Ph.D. ........................................... ITEP (Russia)

Lewis, J. W. L. (Distinguished Prof.) (UTSI), Ph.D. .......... Mississippi

Macek, J. (Distinguished Scientist), Ph.D. ...... University of Wisconsin

Mahon, G. D. (Distinguished Scientist), Ph.D. ........ California

Nazariewicz, W., 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. J. (Willis Lincoln Chair of Excellence), Ph.D. .......... Maryland

Riehleger, L., Ph.D. ............................................. Vactorville

Stilh, C. C. (Liaison), Ph.D. ..................................... Cornell

Sorensen, S. P., Ph.D. ........................................... Copenhagen

Strayer, M. R., Ph.D. ........................................... MIT
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 Physics 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 geophysics, geology, 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 the department.

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 theoretical 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 condensed matter and surface physics may substitute Chemistry 572 for Physics 551, and should complete at least 6 semester hours from Chemistry 500-670.

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 are 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 planetary systems. Topical and interdisciplinary, consideration of quasars, pulsars, black holes and current developments in field. Acceptable for major credit in physics. Prereq: Physics 232 and consent of instructor.

490 Special Topics in Astronomy (1-3) Topics of current interest in astronomy. May be repeated with consent of department. Maximum 6 hrs.

Physics

GRADUATE COURSES


421 Modern Optics (4) Transmissions 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 for Physical Science and Mathematics Majors or Honors. Fundamentals of Physics for Physics Majors or Fundamentals of Physics: Wave Motion, Optics, and Modern Physics and consent of instructor. 3 hrs and 3 labs.


461-62 Modern Physics Laboratory (3,3) 461 - Introduction to fundamental and modern techniques in experimental physics, and to theory and practice of measurement and data analysis. Selected experiments in nuclear, atomic, molecular and solid state physics, and modern optics. Prereq: Electronics Laboratory and either Fundamentals of Physics: Modern Physics or 411, 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, 6 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 research 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 16 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 not be used toward degree requirements. May be repeated. S/NC only. E

505 Physics of Fluids (3) Fluid physics, overview of fluid mechanics and associated computational techn-
niques; general description of laminar and turbulent flows; subsonic, supersonic and hypersonic flows; flow fields; stability; subsonic; Prereq: 511-12 or consent of instructor.

506 Experimental Methods (3) Principles, real operational behavior, and hazards of laser types, radiation detectors and monitors, electronics, image stretchers, image converters, image dissectors, streak cameras, and fast-framing cameras; high-vacuum systems including cryogenic-based devices, data acquisition techniques, including computer-controlled detection, digital electronics methods and microcomputer data acquisition and registration methods.

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

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

511-12 Theoretical Physics (3,3) Classical theoretical physics, with limited use of mathematics. Prereq: 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 space-time, 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: 522 or consent of instructor.

561 The Theory of Relativity (3) Geometry of space-time, Lorentz transformations, field equations and continuum mechanics; Einstein's field equations, Schwarzschild solutions, the classical test of general relativity. Prereq: 522 or consent of instructor.


573 Numerical Methods in Physics (3) Numerical methods for solution of physical problems, use of digital computers, error analysis, numerical solutions of equations. Must be taken in sequence. (Same as Mathematics 517-18.)

574 Group Theory for Physicists (3) Introduction to abstract group theory, discrete and continuous groups, representation theory, Noether's theorem, 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

596 Seminar in Physics (1-3) Seminar topics. May be repeated with consent of department. Maximum 9 hrs.


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


605 Laser Spectroscopy (3) Applications of lasers to spectroscopy of atomic and molecular systems; absorption, stimulated emission, fluorescence, hyperfine structure, isotope effects, laser induced fluorescence, laser cooling and trapping. Prereq: 521, 541.

606 Nonlinear Optics (3) Nonlinear optical susceptibilities, wave propagation in nonlinear media, summation and difference frequency generation, harmonic generation, 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 atoms; photon optics, counting and higher-order coherence; atomic scattering phenomena. Prereq: 521.

611 Advanced Quantum Mechanics & Field Theory (3) Second quantization, quantization of electromagnetic field, emission, absorption, and scattering of light, bremsstrahlung, pair creation and annihilation, quantum field theory methods in condensed matter physics, and quantum optics. Topics vary according to instructor. Prereq: 522 and 542 or equivalent. Prereq or coreq: for 522, 542 or consent of instructor.

612 Advanced Topics in Quantum Field Theory (3) Renormalization, Lamb shift, anomalous magnetic moments, gauge theories, electroweak theory, quantum chromodynamics, grand unified theories, and advanced topics in laser physics and quantum optics. Topics vary according to interest of students, instructor and present state of physics. Prereq: 561 or 511 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 fields; third quantization; elementary processes in QED, perturbative methods; higher-order processes and renormalization; general quantization of gauge fields; applications in QED and in SU(2) x U(1) theory, quantum chromodynamics (QCD), the family of GUTS (grand unified theories), TOE's (theories of everything, including quantum gravity). Prereq: 522 or consent of instructor.

621-22 Nuclear Structure (3,3) General properties of nuclei; two-body scattering problems; saturation and symmetry properties of nuclear forces; theory of light nuclei, nuclear spectroscopy; special nuclear models, theory of nuclear reactions, theory of beta-decay. Prereq: 571-72.

626-27 Elementary Particle Physics (3,3) Survey in elementary particle physics covering experimental methods, conservation laws, invariant 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: 532, 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, beta-ray theory, theory of atomic spectra, molecular structure and valence 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, celestial dynamics in astrophysics, boundary value problems in electromagnetism, atomic and nuclear structures, band structure in solid state physics, transport problems in statistical mechanics, Monte Carlo simulation of liquids, fitting and interpolation of data, correlation analysis, or optimization strategy. Prereq: 522, 531, 542, and 572.


Plant and Soil Sciences

(College of Agricultural Sciences and Natural Resources)

MAJOR

DEGREES

Plant and Soil Sciences ........................................... M.S., Ph.D.

Fred L. Allen, Head

Professors:

Thesis Option

A written thesis based on original research is required. 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. Prior to 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, the 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 12 of these hours must be in courses numbered 501 and above. The student must take at least 12 of the 24 hours in Plant and Soil Sciences courses, excluding 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: 500 Scientific Communication (1 hr); 503 Seminar (1 hr); 511 Soil-Plant Relations (3 hrs). The student must also present an oral 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: 512, 513, 514, and 516. All students a concentration in plant breeding and genetics or in crop physiology and ecology 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, 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 graduate coursework is required. At least 20 hours must be in courses 501 and 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:

- 500 Scientific Communication (1 hr); 503 Seminar (1 hr); 511 Soil-Plant Relations (3 hrs).

All students pursuing a concentration in soil science must also take at least 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 28 hours must be completed in courses numbered above 500 inclusive of doctoral research and dissertation, of which 6 must be in courses numbered above 600. 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 committee 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 formation, observing and describing morphology of agricultural and forested soils, chemical and physical properties, classification. 3 weekend field trips. Prereq: Soil Science. 2 hrs and 1 lab. F

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 environmental component and soil properties affecting land use. Soil as resource in development planning: considerations of nonengineering aspects of site 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 solid, 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

431 Physiology and Ecology in Agroecosystems (3) Plant physiology and ecology principles related to crop production and management. Plant physiology and ecology principles related to crop production practices for seeds to harvest and handling. Interaction of crops with environment and sustainable agroecosystems. Prereq: Crop Science. 2 hrs and 1-2 hr lab. F

432 Bioclimatology (3) Solar energy budget; interactions between global, regional and local climates and biophysical systems: quantification of macro- and microclimates; microclimates and their modification; estimation of evapotranspiration and data collection and analyses; biological responses to deterministic stress, climate variation and change and their effects on biological systems. Prereq: Agriculture and Natural Resources 250, Computer Applications to Problem Solving, or equivalent, 1 yr physical or biological science, junior standing. Sp

433 Agricultural Pesticides (3) Regulation of pesticides: development, manufacture, transportation, marketing and use. Structure, 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 and cool 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 1-2 hr lab. F

436 Field and Forage Crops (3) Agronomic principles of crop production and management for crop improvement, cropping systems, tillage, fertilization, pest, weed, and disease 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 types of plant reproduction systems and application. Discussion of heritability estimates, genetic advances through selection and theory upon which breeding methods are based. Prereq: Introduction to Crop Science and World Crops or Crop Science. 2 hrs and 1 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 material to scientific and general audiences. Preparation of abstracts for scientific presentations. Required of all entering graduate students during their first year of graduate study.

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 course requirements. May be repeated. S/N only. E

503 Seminar (1) Presentations and discussion of current scientific material. May be repeated. Maximum 3 hrs. F, Sp

507 Professional Development Seminar (1) (Same as Agriculture and Natural Resources 507, Animal Science 507, Biosystems Engineering 510, Biosystems Engineering Technology 507, Food Science and Technology 507, and Ornamental Horticulture and Landscape Design 507.) S/N only. E

509 Thesis Proposal Preparation (1) (Same as Agriculture and Natural Resources 509, Animal Science 509, Food Science and Technology 509, and Ornamental Horticulture and Landscape Design 509.) S/N or credit/no credit. E

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 plant growth; importance of plant nutrients 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, surface and chemical structure of soils, soluble complex formation, mineral solubility, equilibria, geochemistry, modeling, ion exchange equilibria, surface functional- ity 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 unsaturated-saturated soils: geostatistical analysis of soil heterogeneity, properties, multi-scale pore processes, anisotropy, hysterisis, analytical, and numerical solution 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 ecology, biochemical cycling of important elements, organic matter dynamics, and applications of agricultural and environmental biology and biochemistry. Prereq: Soil Science 2 hrs and 1-3 hr lab. F, A

530 Integrated Pest Management (3) (Same as Entomology and Plant Pathology 530.) F, A

532 Environmental Crop Physiology and Ecology (3) General and specific relations among environmental factors, crop organisms, and agricultural systems. Interrelationships of atmospheric gases in photosynthesis, evapotranspiration and foliar injury. Role of crop growth regulators and dormancy and responses to stress, physiological crop growth and reproduction. Interactions of physiology and germplasm in crop production, theory and application of qualitative methods in crop physiology. Prereq: Consistent of instructor. Sp, A

536 Ecology of Grazing Land Systems (3) Multi-disciplinary, field-oriented course. Components and functions of grazing land systems and how these vary in different ecosystems; research needs, objectives and techniques in soil-plant-animal research; forage-livestock ecology and systems in grazing lands (croupland, pastureland, rangeland and forestland); vital forages in conservation practices, wildlife habitats, and sustainable agriculture, and industries involved with forages and livestock. Two-week field trip, inclusive report and examination. Prereq: Consent of instructor. Sp

551 Organismal Plant Genetics (3) Discovery of genotypes, polyphyletism, extrachromosomal inheritance, apomixis, intraspecific hybridization, systems, mutations, crossing, and caging; environmental and genetic control of inheritance. Prereq: General Genetics, 417 or equivalent. F


571 and Design and Analysis of Biological Research (3) Statistical methods of current significance; scientific research. Prereq: 516 or equivalent. F, A

593 Special Problems in Plant and Soil Science (1-3) May be repeated. Maximum 6 hrs. E

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

601 Special Topics in Soil Science (1-3) Thermodynamics of soil solutions, clay structure and surface chemistry, soil mineralogy, plant mineral nutrition, and microbial processes in water movement and use by plants, soil structure, soil thermal properties, interaction in the soil-plant environment. May be repeated. Maximum 6 hrs. E

603 Special Topics in Crop Physiology and Ecology (1-3) Interaction of plant systems and the environment, plant growth and development, physiology, and plant psychology. Prereq: 507. E

613 Advanced Topics in Soil Science and Fertility (2) Topics of current significance; scientific literature. Prereq: 513 or equivalent. Sp, A

614 Advanced Topics in Soil Biology and Biochemistry (2) Topics of current significance; scientific literature. Prereq: 516 or equivalent. F, A

615 Advanced Topics in Soil Science, Genetics, and Morphology (2) Topics of current significance; scientific literature. F, A

633 Plant Metabolism (3) Metabolism of chemical compounds involved in the production of plant growth regulators, naturally occurring plant metabolites, and herbicides. Prereq: Botany 521 or 522 and organic chemistry or biochemistry. Sp, A

653 Advanced Plant Breeding (4) Development and utilization of concepts of quantitative parameters, breeding, heterosis, methods of selection, in vitro breeding, interspecific hybridization, stability parameters, genetic resistance and vulnerability to pests and environmental stresses. Prereq: 453 and 571 or equivalent consent of instructor. 3 hrs and 1 lab. Sp, A

Political Science

(Major in Arts and Sciences)

MAJORS

DEGREES

Political Science ......................................................... M.A., Ph.D. Public Administration ........................................... M.P.A., J.D.-M.P.A.

Patricia Freeland, Head

Professors:

Cunningham, Robert B., Ph.D. ............ Indiana University, Robert, Ph.D. ............. Oklahoma State University, Patricia K., Ph.D. ............. Wisconsin (Milwaukee)

Gant, Michael M., Ph.D. ............... Michigan State University, Robert A., Ph.D. ......... New York University, William, Ph.D. ............. Oklahoma State University, William, Ph.D. ............. Ohio State University, Otis H. (Distinguished Prof.), Ph.D. ............. Johns Hopkins University, Thomas D. (Emeritus), Ph.D. ............. Iowa State University, David M. (Emeritus), Ph.D. ............. Texas A

Associate Professors:

Foltz, David H. (Liaison), Ph.D. ............. Tennessee State University, David, Ph.D. ............. SUNY (Binghamton)

Kelly, Janet, Ph.D. ............... Wayne State University, Anthony J., Ph.D. ............. Kansas State University, Robert L., Ph.D. ............. Yale University, Zobh, Yang (Liaison), Ph.D. ............. Kentucky State University

Assistant Professors:

Lapinski, Daniel, Ph.D. ............. Duke University, Van Cott, Donna, Ph.D. ............. Georgetown University

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 recommendations 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 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 1000 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:
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 curriculum, 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 596, Workshops in Computer Applications. Exceptions to this requirement will be considered on an individual basis.

The M.P.A. is a non-thesis program requiring 33 hours. Specific requirements include the following:

1. Core Curriculum (24 hours)
   a. General perspectives (9 hours) - 550 Public Administration; 552 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; or 566 Ethics, Values, and Morality in Public Administration.
   b. Analytical skills (6 hours) - 512 Quantitative Political Analysis; 514 Research and Methodology in Public Administration.
   c. Management skills (6 hours) - 560 Public Budgeting and Finance; and any two of the following: 562 Public Management; 564 Human Resources Management; 566 Policy Analysis.
   d. Specialization (9 hours)
      A specialization is designed by the student in consultation with the coordinator of the M.P.A. degree program. Possible specializations include general government, public health, budgeting and finance, planning, natural resources, program evaluation, criminal justice, public relations, personnel, and others.
   e. Recommended Internship (6 hours)

Internships are arranged in consultation with the coordinator of the M.P.A. degree program.

2. Final Examination
   A written final examination, which may be followed by an oral examination, is required.

3. Final Examination
   A written final examination, which may be followed by an oral examination, is required.

4. Dissertation
   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.

5. Final Examination
   A written final examination, which may be followed by an oral examination, is required.

6. Dissertation
   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.

7. Final Examination
   A written final examination, which may be followed by an oral examination, is required.

8. Dissertation
   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.

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 conferment of both the Doctor of Jurisprudence and Master of Public Administration. 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 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 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. 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.

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 bachelor'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 successfully pass written comprehensive examinations in two broad subfields of political science, 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 a 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 two broad subfields in which the students take examinations.
Polymer Engineering

See Materials Science and Engineering

Psychology

(College of Arts and Sciences)

MAJOR DEGREES

Psychology ........................................ M.A., Ph.D.

James E. Lawler, Head

Professors:

Burghardt, Gordon M. (Distinguished Prof.), Ph.D. .......... Chicago
Cahn, William H., Ph.D. ....................... California
Fine, Harold J. (Emeritus), Ph.D. .......... Syracuse
Handel, Stephen J., Ph.D. ....................... Johns Hopkins
Henderson, Leonard, Ph.D. ................. Michigan State
Jones, Warren H., Ph.D. ................. Oklahoma State
Lawler, James E., Ph.D. ....................... North Carolina
Lawler, Kathleen A. (Liaison), Ph.D. ......... North Carolina
Lounsbury, John W., Ph.D. ................. Michigan State
Lubar, Joel F., Ph.D. ............................ Chicago
Malone, John C., Ph.D. ....................... Duke
Martinez, Kenneth R. (Emeritus), Ph.D. ....... California
Obstfeld, Howard R. (Distinguished Prof.), Ph.D. ........... Illinois
Polito, Howard R. (Distinguished Prof.), Ph.D. ............... Michigan
Samejima, Fumiko, Ph.D. ..................... Keio University
Saudargas, Richard A., Ph.D. ............... Florida State
Sharpe, Raymond R. (Emeritus), Ph.D. .......... California
Shin, Sung Hyun (Emeritus), Ph.D. ............ Stanford
Smith, Michael H., Ph.D. ..................... California State
Sun, Alexander, Ph.D. ........................... California State
Travis, Cheryl B., Ph.D. ...................... California (Davis)
Verplanken, William S. (Emeritus), Ph.D. ............. California (Davis)
Wahler, Robert G. (Liaison)................. Washington
Wiberley, J. Albert (Emeritus), Ph.D. ......... Syracuse

Associate Professors:

Baldwin, Debora R. (Liaison), Ph.D. .......... Kent State
Johnson, Michael G., Ph.D. ............... Johns Hopkins
McIntyre, Anne, Ph.D. ...................... Yale
Moran, Wesley G., Ph.D. ...................... Tennessee
Nash, Michael R., Ph.D. ...................... Ohio State
Welsh, Deborah, Ph.D. ....................... Massachusetts

Assistant Professor:

Gordon, Kristina C., Ph.D. .................... North Carolina

THE DOCTORAL 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 must 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. The 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, Statistics 531-32, or an equivalent sequence; 505 or 420; six semester hours of Thesis 600; and twelve hours of 500- or 600-level foundation courses. Students must earn a grade of B or better in all courses that are offered to count toward the 30-hour total. Students must also propose, conduct, and successfully defend an original piece of research in the form of a master's thesis.

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. All students must submit scores from the Graduate Record Examination (general and subject).

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.

The basic requirements are:

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 (565 or equivalent and 4 courses from the following: 510, 511, 512, 513, 543, 546 or 547, 550, 560, and 570 or 571).
3. Six semester hours of research practicum (508).
5. Two 600-level graduate seminars.
6. Six semester hours of graduate level courses outside the Psychology Department.
7. Predissertation research project involving the collection of original data or the original analysis of existing data, reported in publishable form and accepted by the student's advisory committee.
8. Comprehensive examination, determined and evaluated by the student's doctoral committee. This examination is comprised of an integrative review or theoretical paper and an oral exam or additional questions.
9. Twenty-four hours of dissertation research (600).
10. An original piece of research in the form of a doctoral dissertation, proposed, conducted, and defended.

Clinical Psychology

This program is designed to lay the groundwork for a career as a clinical psychologist capable of working in both academic and applied settings. The program emphasizes the theoretical foundations of psychology as well as supervised experience oriented toward the development of practical skills. The program embodies a model of clinical psychology in which practice and research are integrated.

Clinical program students must complete a predissertation research project by the end of the second year.

After forming the doctoral committee, students must then pass a comprehensive examination administered and evaluated by the committee. This examination is comprised of two papers, one addressing a topic of the student's choice, and the second addressing an understanding of one individual's personality and cognitive functions. All doctoral students must complete a minimum of 78 hours of graduate level courses, including courses required by their program; at least 6 hours in courses outside of psychology; and at least 24 hours of dissertation research (Psychology 600). Finally, students must complete an acceptable doctoral dissertation and conduct a satisfactory oral defense of the dissertation.

Requirements are as follows:

1. Apprenticeship with one faculty member during the first year, two days each week.
2. Predissertation research project completed before forming a doctoral supervisory committee, reported in written form acceptable to two members of the faculty or, if reviewed and accepted for publication or external presentation, by one member of the faculty.
3. Supervised clinical placement two days each week during the second
GRADUATE COURSES


449 Group Facilitation (3) Study of theory and technique through supervised experience in small groups. Prereq: General Psychology or consent of instructor. May be repeated. Maximum 6 hrs.

400 Sensory Processes & Perception (3) Survey of physiological and psychological theories of perception. Audition and vision. Prereq: General Psychology or consent of instructor, Statistics in Psychology or Statistical Reasoning or Introduction to Statistics or graduate standing.

415 Psychology of Religion (3) History of psychology of religion: various philosophical and empirical orientations. Psychological function of religion for individuals and society. Prereq: General Psychology or consent of instructor.

420 History and Systems of Psychology (3) History of psychological thought. Classical approaches and recent developments. Prereq: General Psychology or consent of instructor or graduate standing.

424 Psychology and the Law (3) Psychological aspects of legal systems. Prereq: General Psychology or consent of instructor. (Same as Legal Studies 424.)

430 Health Psychology (3) Survey of psychological factors related to health and illness: stress, personality, and environment. Applications of psychological treatments to physical illness. Prereq: General Psychology or consent of instructor.

434 Psychology of Gender (3) Biological, psychological, and social factors in gender. Importance of gender roles and stereotypes for behavior and experience. Prereq: General Psychology or consent of instructor. (Same as Women's Studies 434.)

440 Organizational Psychology (3) Social-psychological analysis of organizations, role-theory and systems theory. Prereq: General Psychology and Social Psychology or consent of instructor.


450 Comparative Animal Behavior (3) Prereq: Psychology 179.

505 Research Design (3) Techniques for planning and conducting research in controlled and natural settings: experiments, quasi-experiments, observational studies, surveys, and program evaluations. Development of questions and hypotheses. Design of studies to maximize validity. Prereq: Consent of instructor. Sp

507 Foundations of Applied Psychology (3) Fundamental methods for application of psychology principles and techniques in community, organizational, and industrial settings, and related ethical and theoretical issues. Prereq: 505 and consent of instructor.

508 Readings and Special Issues in Psychology (1-3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E

509 Research Practicum (1-3) Required of first-year graduate students in psychology. May be repeated. Maximum 9 hrs. E

510 Topics in Psychology (3) Intensive examination of selected issues in psychology. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

511 Developmental Psychology (3) Normal processes of human socialization, physical, cognitive, and emotional development from conception through infancy, childhood, and adolescence. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. F

512 Life-Span Development (3) Theories and research concerning normal human development throughout life, adulthood, and old age. Prereq: Consent of instructor.

513 Foundations of Psychology: Biological Factors, Perception, Learning, Thinking, Motivation (565); Psychology of religion: various philosophical and empirical aspects of legal systems. Prereq: Consent of instructor. May be repeated. Maximum 5 hrs. E

515 Colloquium in Experimental Psychology (1) Research and practical issues in experimental psychology. Prereq: Consent of instructor. May be repeated. Maximum 4 hrs. F,Sp

516 Colloquium in Ethology (1) Current research and theory. May be repeated. Maximum 9 hrs. (Same as Ecology and Evolutionary Biology 516.) S/N only. E

526 General Vertebrate Neuroanatomy (3) Lecture and laboratory. Structure and function of central and peripheral nervous system. Prereq: 461, 469, or equivalent and consent of instructor.

527 Behavioral Neurology (3) Disorders of nervous system, organic brain dysfunctions. Diagnosis and treatment. Prereq: Consent of instructor.

528 College Teaching in Psychology (3) Concepts, techniques, and materials for teaching psychology at college and/or university level. Supervised practice. Prereq: Consent of instructor. S/N only.


544 Advanced Animal Behavior (3) (Same as Biology and Evolutionary Biology 545.)

546 Ethological Psychology (3) Basic ethology and cognitive psychology: evidence for or against human behavior. Prereq: Consent of instructor.

547 Conceptual Foundations of Evolution and Behavior (3) Critical evaluation of seminal writings on theory and methods in comparative analysis of behavior. (Same as Ecology and Evolutionary Biology 547.)

550 Social Psychology (3) Survey of theory and research concerning interpersonal interaction and individual behavior in social context. Prereq: Consent of instructor. F

554 Laboratory in Psychometrics (3) Further learning about psychometrics theories: item response theory (modern test theory), factor analysis, and applications of those methods using computer programs to simulated or empirical data. Prereq: 555. May be repeated. Maximum 6 hrs.

555 Psychometrics (3) Basic concepts: factor analysis, test theory, probability models and their applications, computerized adaptive testing and other topics. Prereq: Statistics 537-538 or equivalent. May be repeated. Maximum 6 hrs.

557 Applied Psychological Measurement (3) Issues and techniques in applying psychological measurement in organizational, clinical, and community research. Prereq: Statistics 537-538 or equivalent or consent of instructor. May be repeated. Maximum 6 hrs.

558 Interviewing and Observation (3) Sensitizing students to own feelings and beliefs and to feelings of interviewee, and analyte of language content, style, and language. Exploration of important aspects of interviewee's life. Prereq: Admission to doctoral program in clinical psychology or consent of instructor. Coreq: 555.
559 Laboratory in Interviewing and Observation
(1) Prereq: Admission to doctoral program in clinical psychology or consent of instructor. Coreq: 558.

560 Psychology of Learning (3) Review of current evidence from research involving human and nonhuman animals. Prereq: 400 and consent of instructor. May be repeated. Maximum 6 hrs.

565 History and Systems of Psychology (3) History of philosophy concerning psychology. Major systems of psychology which emerged during 20th century. Prereq: Graduate standing. Sp

567 Personality: Theory and Research I (3) Advanced survey of psychodynamic and neo-Freudian approaches to personality. Related research. Prereq: Admission to clinical program or consent of instructor. F

570 Personality: Theory and Research II (3) Advanced survey of behavioral and humanistic approaches to personality. Related research. Prereq: Admission to clinical program or consent of instructor. Sp

573 Descriptive and Theoretical Psychopathology (3) Current psychiatric taxonomic systems. Theories of etiology for various diagnostic categories. Examples from written case vignettes and recorded interviews. Prereq: Admission to doctoral program in clinical psychology or consent of instructor. F

574 Psychopharmacology (3) Connections between pharmaceutical and psychology. Prereq: Consent of instructor. F

575 Object Relations (3) European and American conceptions of normal and psychopathological development of object relations. Significance for psychotherapy, psychoanalysis, and psychoanalytic theory. Prereq: Admission to doctoral program in clinical psychology or consent of instructor. Sp

580 Research Questions and Designs (3) Question-asking process in research and strategies or designs through which answers might be derived. Prereq: Admission to doctoral program in clinical psychology or consent of instructor. Sp

593 Independent, Off-campus, or Foreign Study (1-15) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/N only. Sp

594 Psychological Assessment I (3) Basic concepts and techniques of adult assessment: intelligence tests and personality tests. Prereq: Admission to doctoral program in clinical psychology or consent of instructor. Sp

595 Psychological Assessment II (3) Basic concepts and techniques of adult assessment: intelligence tests and personality tests. Prereq: Admission to doctoral program in clinical psychology and 594 or consent of instructor. Sp

596 Laboratory in Psychological Assessment (1) Prereq: Admission to doctoral program in clinical psychology or consent of instructor. Coreq: 594 or 595. May be repeated. Maximum 4 hrs. S/N only. Sp

600 Doctoral Research and Dissertation (3-15) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. S/N only. Sp

601 Seminar in Psychology (3) Prereq: Consent of instructor. May be repeated by two different instructors. Maximum 12 hrs. Sp

607 Seminar in Applied Psychometrics (3) May be repeated. Maximum 9 hrs. Prereq: 550, 557, and consent of instructor. F

610 Seminar in Applied Psychology (3) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. F

613 Seminar in Existential-Phenomenological Psychology (3) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. F

617 Seminar in Cognitive Science (3) Prereq: 543 and consent of instructor. May be repeated. Maximum 12 hrs. F

623 Seminar in Methods of Naturalistic Research (3) Prereq: 546 or consent of instructor. May be repeated. Maximum 12 hrs. F

635 Ethical, Legal, and Professional Issues in Psychology (3) Research, human services, teaching and public policy. Prereq: Admission to doctoral program in psychology or consent of instructor. (Same as Counseling Education and Counseling Psychology 635 and Psychoeducational Studies 635.) S/N only.

670 Psychotherapy I (3) Theories and principles. Prereq: Admission to doctoral program in clinical psychology or consent of instructor. F

671 Psychotherapy II (3) Theories and principles. Prereq: Admission to doctoral program in clinical psychology and 670 or consent of instructor. Sp

673 Laboratory in Psychotherapy (2) Prereq: Admission to doctoral program in clinical psychology or consent of instructor. Coreq: 670 or 671. May be repeated. Maximum 6 hrs. S/N only.

683 Seminar in Behavioral Medicine (3) Current research and theory concerning relationships between behavior and health. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

695 Field Placement in Clinical Psychology (3) Prereq: Admission to doctoral program in clinical psychology and consent of instructor. May be repeated. Maximum 24 hrs. S/N only. E

696 Advanced Psychology Clinic Placement (1-3) Prereq: Admission to doctoral program in clinical psychology or consent of instructor. May be repeated. Maximum 24 hrs. S/N only. E


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 opportunity 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 Israeli portion of Levant from 1850 to present. Founding of modern state of Israel in 1948 and political complexities of Middle East. Israeli 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 Nozick to nineteenth-century German Idealists. (Same as Philosophy 411.)

412 Classical Indian Systems of Philosophy: The Moksha Tradition (3) Investigation of selected writings and philosophical problems of traditions of Samkhya, Yoga, Vedanta, Buddhism, and Jainism. Prereq: 374 or 376 or consent of instructor.

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 (3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

498 Seminar in Religious Studies (3) For advanced study in religious studies; required for majors. Selected specific topics: nature and function of myth in religion, problem of evil, transcendence, theories of religion, hermeneutics, integrating various disciplines involved in study of religion. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.


506 Historical and Comparative Studies of Religions (3) Description and analysis of religious traditions, phenomena, and themes. May be repeated. Maximum 6 hrs.

507 Religion, Power and Society (3) Studies of religious institutions: issues of gender, race, class, ethnicity, caste, slavery, religion and the state, globalization, and human rights. May be repeated. Maximum 6 hrs.

513 Religion, the Arts, and the Media (3) Material and expressive culture, religion and journalism, mass communication technologies, popular culture, issues of representation, cultural studies methodologies. 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.


520 Readings in the Study of Religion (1-6) May be repeated. Maximum 12 hrs.

532 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
Social Work

(College of Social Work)

UNITED STATES

Assistant Professors:

Spicuzza, Frank, M.S.S.W. .......Tennessee
Rocha, Cynthia, Ph.D. Washington (St. Louis)
Orme, John, Ph.D.......Washington (St. Louis)
Nugent, William, Ph.D...................FloridaState
Guo, Shenyang, Ph.D........................Michigan
Galambos, Coleen M.,
Egan, Marcia, Ph.D.........,..................Maryland
Cruthirds, C. Thomas, Ph.D...........................LSU
Combs-Orme, Terri,
Dullmus, Catherine, Ph.D. .......SUNY (Buffalo)
Dulmus, Catherine, Ph.D. .......SUNY (Buffalo)
Davies, Cindy, Ph.D. .......... .. .UCLA
DeCoste, Vaughn, Ph.D. .......... .Florida International
Evans, Theora A., Ph.D. .......... .Minnesota
MacMaster, Samuel A.,
Ph.D. ..................... Case Western Reserve
Page, Timothy F., Ph.D. .......... .Washington (St. Louis)
Morgan, Mary, Ph.D. .......... .Washington (St. Louis)
Staudt, Mariyi, Ph.D. .......... .Washington (St. Louis)

Associate Professors:

Shatz, Eunice (Emeritus), Ph.D........Brandeis
Rubenstein, Hia (Emeritus),Ph.D.......Chicago
Otten, James D. (Emeritus), D.S.W ..Alabama
Nooe, Roger M., Ph.D............................Tulane
Hirayama, Hisashi (Emeritus),
Fryer, Gideon W. (Emeritus), Ed.D........Case Western Reserve
Faver, Catherine, Ph.D............Tulane
Faver, Catherine, Ph.D. .......... .Tulane
Davis, Cindy, Ph.D. .............. .UCLA
Cummings, Sherry, Ph.D.....................Georgia
Cummings, Sherry, Ph.D. .......... .LSU
Cummings, Sherry, Ph.D. .......... .Georgia
Cummings, Sherry, Ph.D. .......... .UCSF

Assistant Professors:

Bowie, Stan L., Ph.D. ............. Barry
Cummings, Shery, Ph.D. .......Georgia
Davis, Cindy, Ph.D. .......... .UCLA
DeCoste, Vaughn, Ph.D. .......... .Florida International
Evans, Theora A., Ph.D. .......... .Minnesota
MacMaster, Samuel A.,
Ph.D. ..................... Case Western Reserve
Page, Timothy F., Ph.D. .......... .Western Michigan
Ro besie, Mary, Ph.D. .......... .Washington (St. Louis)
Staudt, Mariyi, Ph.D. .......... .Washington (St. Louis)

Clinical Associates/Field Practice
Coordinators:

Allen, Sandra (Memphis),
M.S.S.W. ......................... Tennessee
Bailes, 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 grade point average of 2.7 or higher in these courses.

2. A minimum GPA of 3.0 or above in the applicant's undergraduate degree program. Applicants falling below this average may request consultation to discuss ways that they can meet the requirements.

3. Personal qualifications acceptable for entrance into the professional practice of social work.

4. 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 B.S.W. from an accredited program, (2) an overall undergraduate GPA of 3.0 or higher, 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 36 hours of study in either of the college's concentrations - clinical social work practice or social work 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.

Application for admission to the advanced standing program is through the regular admission process.

Extended Study

Planned part-time programs are available in all three locations 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. Information regarding scholarships administered by the College is made available after admission.

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. Students must successfully complete a comprehensive exam or thesis defense.

4. Students must have 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. It 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; 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 and small groups, particularly with clients from high-risk and vulnerable groups. The concentration emphasizes the theoretical and empirical knowledge and practice skills in differential assessment, clinical interventions and practice evaluation. The concentration also emphasizes knowledge and skills directed toward effective clinical practice.
pates 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 courses must be approved by the dean. This coursework must be completed within the six-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 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 each of them and their social policy, organizational, 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 as part of their training. The Center 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 66 hours beyond the master's degree including: a) completion of 27 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 27 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 24 hours of foundation coursework are completed and elective coursework begun during the first year of study. Social Work 670 and the elective requirement are 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 part-time basis.

Specific courses required are 601, 602, 612, 613, 640, 650, 670, 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, at the Knoxville location, may pursue a specialized minor in gerontology. This interdepartmental/interdisciplinary minor gives the student the opportunity for combining the knowledge about aging in American society with his/her major concentration. Please refer to Human Ecology for specific requirements.

POST-MASTER'S CERTIFICATE IN MANAGEMENT AND COMMUNITY PRACTICE

The College of Social Work offers a 15-credit hour post-master's certificate program designed for social workers desiring supervisory, management, administration and community practice training and education to enhance career advancement or career redirection. Required for admission is a master's degree in social work or a closely related field.

Course requirements are 541, 543, 547, and two courses selected from 550, 551, 552, 555.

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 on an in-state tuition basis. The M.S.S.W. and Ph.D. programs in Social Work are available to 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 Student Services.

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) P/NP only. E

501 Foundations of Social Work Practice I (3) Survey of history, mission, and identity of profession. Basic theory, professional values and ethics, and methods generic to social work practice at various systems levels. Assessment, planning, communication, intervention, and evaluation skills.

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

503 Foundations of Social Work Practice II (3) Generalist practice with family and small group systems. Ecological understanding of the development of such systems and their adaptation to environment. Various social work roles and intervention strategies pertaining to client systems.

504 Foundations of Social Work Practice III (3) Basic theory, methods, and strategies in implementing planned change within and among larger social systems: task groups, human service organizations, and community systems. Various practice roles: planner, program developer, supervisor, administrator, advocate and task group leader.

506 Social Work Research (3) Research methodologies with respect to evolution and application to social theory and practice. History and philosophies of science; problem formulation, research design, ethics, instrument use and construction; data collection; analysis and reporting; and evaluation and utilization of research.

508 Practicum in Social Work Research (3-6) Supervised practice in application of research methods to social work. May be repeated. Maximum 6 hrs. S/NC only.

509 Graduate Seminar in Public Health (1) Same as Public Health 509, Exercise Science 509, Nutrition 509, and Nursing 509.

514-15 Human Behavior in the Social Environment I, II (3,3) Major social science theories that inform social work profession's understanding of human behavior and social systems from ecological perspective. Interactions among biological, social, psychological, and cultural systems on development across life cycle. Effects of ethnic, racial, economic, gender, and sexual orientation variables. 514—Life cycle from infancy through adolescence. 515—From young adulthood through senescence.

516 Social Welfare Policy and Services (3) Development of contemporary social policy at local, state, national, and international levels. Contribution of social work professionals to policy-making process through which macrosocial change is effected and through which aggregate social welfare services are proposed, authorized, financed, and programmed. Theories of complex organizations applied to social welfare service delivery settings.

518 Social Work and Oppression (3) Sources, dynamics, and impact of oppression in U.S. society as manifested in both social/eco/ecological systems and personal experience. Connections among various forms of oppression—sexism, classism, and heterosexism, and forces that perpetuate such conditions.

521 Clinical Social Work Practice with Individuals (3) Theories, knowledge, and skills for clinical practice with individuals from an ecological perspective. Therapeutic process and intervention strategies, incorporating content from psychodynamic and cognitive practice models, and specific client problems.

523 Clinical Social Work Practice with Families (3) Concepts related to understanding and analyzing family dynamics and interactional patterns from perspective of major family therapy models. Techniques of intervention in terms of application to families with varied system and individual problems and to families from varied social and cultural backgrounds.

525 Clinical Social Work Practice with Groups (3) Theoretical and historical approaches to social work with groups and clinical principles underlying specific types of group work used in clinical practice and associated leader interventions.

526 Evaluating Clinical Practice (3) History and philosophies, conceptual approaches, techniques and methods in the practice of clinical practice as applied to implementation and evaluation of direct services to clients.

530 Seminar in Clinical Social Work (2) Topics in theory and practice of clinical social work with individuals, couples, families and groups. May be repeated. Maximum 6 hrs.

532 Short-Term Interventions (3) Theory and practice of planned short-term, emergency, and crisis interventions.

533 Social Work Interventions with Couples (3) Theories regarding contemporary marital/partnering lifestyles, problem areas in relationships, methods and skills for problem resolution.

534 Social Work Interventions with Children and Adolescents (3) Various practice modalities for assessing and intervening with children and adolescents.

535 School Social Work (3) Place of school as community institution and resource. Methods, processes, and techniques employed in school social work.

541 Leadership and Management in Human Services (3) Management practices and leadership skills required in development and management of human service delivery systems. Issues regarding human resources management, resource allocation, strategic planning, and organizational dynamics.

543 Financial Management and Resource Development (3) Administrative decision-making related to financial planning and resource allocation in human service organizations. Knowledge and skills in budgeting, allocating, expenditure control, fundraising, grant writing, marketing, and evaluation.

547 Evaluation Research (3) History and philosophical and practical approaches to evaluation research as applied to development and evaluation of social work programs and issues pertaining to strengths and limitations of various evaluation methods, microcomputer application of data, and measurement of program goals and objectives.

550 Seminar in Management and Community Practice (3) Topics in theory and practice of management and community practice. May be repeated. Maximum 6 hrs.


552 Community Organization (3) Locality development, planning and social action as practice models for development of resources to meet human needs.

555 Current Issues in Management and Community Practice (3) Major trends affecting delivery of human services and requisite knowledge and problem solving skills needed to address them: board/leadership development, coalition building, conflict management, and team development.

556 Social Gerontology (3) Physical, psychological and social aspects of aging, and major social policies and programs.

559 School Social Work (3) Place of school as community institution and resource. Methods, processes, and techniques of school social work supervision and consultation.

560 Substance Abuse (3) Survey and analysis of social, cultural, medical and psychological factors underlying substance abuse systems. Drug abuse and addiction; recent research and practice innovations.

557 Social Gerontology (3) Physical, psychological and social aspects of aging, and major social policies and programs.

561 Social Work and Aging (3) Community organization and management as practice models for development of resources to meet human needs.

562 Community Organization (3) Locality development, planning and social action as practice models for development of resources to meet human needs.

564 Social Gerontology (3) Physical, psychological and social aspects of aging, and major social policies and programs.

565 Social Work Practice with Families (3) Concepts related to understanding and analyzing family dynamics and interactional patterns from perspective of major family therapy models. Techniques of intervention in terms of application to families with varied system and individual problems and to families from varied social and cultural backgrounds.

567 Social Work Practice with Groups (3) Theoretical and historical approaches to social work with groups and clinical principles underlying specific types of group work used in clinical practice and associated leader interventions.

570 Evaluation Research (3) History and philosophies, conceptual approaches, techniques and methods in the practice of clinical practice as applied to implementation and evaluation of direct services to clients.

571 Social Work Practice with Individuals (3) Theories, knowledge, and skills for clinical practice with individuals from an ecological perspective. Therapeutic process and intervention strategies, incorporating content from psychodynamic and cognitive practice models, and specific client problems.

581 Clinical Social Work Practice with Families (3) Concepts related to understanding and analyzing family dynamics and interactional patterns from perspective of major family therapy models. Techniques of intervention in terms of application to families with varied system and individual problems and to families from varied social and cultural backgrounds.

583 Independent Study (1-6) Individualized study, student selects, designs, and completes examination of special issue or problem. May be repeated. Maximum 6 hrs.
Advanced individual study, under faculty guidance, of Directed Study research. S/NC only. Conceptual and methodological critiques of existing Critical Literature Reviews (3) Techniques and year required Ph.D. courses or consent of instructor. Intervention, administration and planning. Prereq: First Advanced seminar in theory and model building in direct intervention and controversy; legislative changes. Nutrition programs, and Healthy Start. Current issues. Grant; Title XIX, Medicaid), Head Start, WIC and other families: Social Security Act (Title IV, Child Welfare Programs and Legislation for Children and resource policy concentration includes 504, 505, 563, and 565. The energy, environment and resource policy concentration includes 560, 563, 661, 662, and 665. The political economy concentration includes 504, 540, 541, 543, 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 Programs and Curriculum Committee in Sociology. New students are admitted in fall semester only and applications must be received by the Graduate Student Services 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. Sociology 534, 592, and Statistics 532 are recommended. 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 Programs and Curriculum 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 practice. 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. Sociology courses at the 400 level may also be taken with the approval of the student's committee.

THE DOCTORAL PROGRAM

Coursework
Twenty-four hours of coursework beyond the master's degree are required (exclusive of S/NC 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 622, 534, 563, 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 curriculum may construct an individualized course of study subject to the approval of the student's doctoral committee and the Programs and Curriculum Committee. Sociology courses at the 400 level may not be taken without the consent of the student's advisor and the Programs and Curriculum Committee. Six hours may be taken in related fields without petitioning the Programs and Curriculum 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 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 academic programs allows legal residents of some states to enroll in certain programs at UT 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 Student Services.

GRADUATE COURSES

405 Sociology of Sport (3) Social meaning, organization, and process 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 roles and statuses 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 groups, cleavages, and patterns of conflict. Analysis of their operation and impacts. Recommended prereq: 350. (Same as Legal Studies 451.)

451 Criminal Justice (3) Critical assessment of criminal justice apparatus and its components. Brief examination of police; criminal courts and institutions, and programs; prison problems, and parole. Analysis of their operation and impacts. Recommended prereq: 350. (Same as Legal Studies 451.)

455 Society and Law (3) How laws and legal processes are affected by social change; social impact of legal sanctions, relations between law and social justice. (Same as Legal Studies 445.)

459 White-Collar Crime (3) Distinctive nature and dynamics of white-collar crime, victims and costs of white-collar crime, organizations as white-collar offenders, causal theories, and dynamics of responses to white-collar crime by private and public parties.

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 appropriate technology. (Same as Urban Studies 464.)

465 Social Values and the Environment (3) Human dimensions of ecosystem management and public policy. Applied focus on social values activated within specific biophysical and social settings. Prereq: 110 Social Problems and Social Change or 120 General Sociology or consent of instructor.

471 Sociolinguistics (3) (Same as English 471 and Linguistics 471.)

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 term before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

504 Sociological Foundations of Political Economy (3) Survey of contemporary sociological theories of political economy, sources of political and economic power, and conflict.

505 Foundations of Criminology (3) Critical overview of contemporary developments in criminology. Theories of crime causation and theories of responses to crime. Prereq: 350 or equivalent.

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.

521 Sociological Theory (3) Assessment of what sociological theory is; major figures and their approaches to understanding society.

531 Research Methods in Sociology (3) Research design, measurement, sampling, quantitative and qualitative data, 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 Change (3) Basic theory and research on dimensions of social unrest in human collectivities and efforts of collectives to change existing society.

543 Sociology of Development (3) Sociological theories and studies of development: modernization, colonialism, dependency, comparative impact of various development paths upon selected aspects of social structure and change.

551 Delinquency and the Social Structure (3) How study of delinquency and juvenile justice is affected by changing structures of childhood and adolescence, changing demographic and institutional influences, and changing views about responsibility and punishment.

560 Environmental Sociology (3) Systematic treatment of current research in environmental sociology. Social impact analysis and conflicts over environmental issues.

563 Demographic Techniques (3) Standard rates and measures of demographic variables, life table analysis, increment-decrement models, and survey techniques of population analysis.

580 Advanced Rural Sociology (3) (Same as Rural Sociology 580.)

585 Seminar in Gerontology (1) (Same as Human Ecology 555, Counselor Education and Counseling Psychology 555, Exercise Science 555, Nursing 555, Public Health 555, Preventive Medicine 555, Sociology 555, Social Work 555.)

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.

599 Readings (3) Selected topics. May be repeated. Maximum 6 hrs.

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

622 Sociological Theory II (3) Distinct schools of sociological theory and contributions of their principal exponents. Prereq: 521 or consent of instructor.

629 Supplementary Readings in Sociological Theory (3) Individual guidance. Preparation for comprehensive examination. Prereq: Consent of Instructor. S/NC only.

633 Survey Design and Analysis (3) Systematic exploration of survey problems through student participation in design and analysis of survey. Prereq: 531 or consent of instructor. (Same as Child and Family Studies 633.)

636 Field Research (3) Research experience in selected field sites using techniques of interviewing, participant observation, and other methods of field research. Prereq: 531 or consent of instructor.

639 Supplementary Readings in Methodology (3) Individual guidance. Preparation for comprehensive examination. Prereq: Consent of department. S/NC only.

644 Political Sociology (3) Critical examination of theories of state and political processes.

645 Advanced Studies in Political Economy (3) Topical seminar. Prereq: 504 or consent of instructor. May be repeated. Maximum 6 hrs.

649 Supplementary Readings (3) Prereq: Consent of department. May be repeated. Maximum 6 hrs. S/NC only.

653 Sociology of Law (3) Intensive examination of selected topics in sociology of law. Prereq: 505 or consent of instructor.

655 Advanced Studies in Criminology (3) Intensive examination of selected topics in criminology. Recommended prereq: 505. May be repeated. Maximum 6 hrs.

661 Theory and Methods of Human Ecology (3) Historical and contemporary studies of interaction between human and their environment. Prereq: Consent of instructor.

662 Urban and Regional Sociology (3) Historical and contemporary studies of South and Appalachian region with comparisons to other regions.

665 Advanced Studies in Energy, Environment and Natural Resources Policy (3) Topical seminar covering particular lines of research and theory within area. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

679 Advanced Studies in Social Psychology (3) Selected contemporary research issues related to social psychological theories. Prereq: 541 or consent of instructor. May be repeated. Maximum 6 hrs.

695 Advanced Special Topics (3) Topic of special interest or student-initiated courses that will not be regularly offered. Prereq: Consent of department. May be repeated. Maximum 6 hrs.


Spanish

See Modern Foreign Languages and Literatures

Speech Communication

(College of Communications)

MAJORS

DEGREES

Communications ..................... M.S., Ph.D.

John W. Haas, Head

Professors:

Julian, Faye D. (Liaison), Ph.D. ..... Tennessee

Leather, Lorin W., Ed.D. ......... Tennessee

Yocom, G. Allan (Emeritus).

Ph.D.

Louisiana State

Associate Professors:

Ambrester, M.L., Ph.D. .......... Ohio
The Department of Speech Communication 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 in Speech Communication also provide opportunities for students in a variety of disciplines to investigate how oral language can effect changes in the knowledge, the understanding, the ideas, the attitudes, or the behavior of other human beings.

### GRADUATE COURSES

466 Rhetoric of the Woman's Rights Movement to 1920 (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 466.)

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.)

505 Research Methods (3) Understanding of wide array of data collection and analysis procedures used in speech communication research. Development of project thesis proposal.

510 Orientation to Teaching Assistantship (1) Curriculum, classroom management, and other issues associated with teaching at college level. For departmental GTAs.

525 Seminar in Interpersonal Health Communication (3) Current research in health communication support groups, medical ethics, medical narratives, doctor-patient communication, or interpersonal communication theoretical perspectives in medicine.

550 Organizational Culture (3) Clarification of complex nature of organizational culture to communicate meaning and its usefulness to organizational effectiveness: challenges created by today's changing organizations and workforces.

560 Special Topics in Speech Communication (3) Contemporary topics. Approval by department head and supervising faculty member. Credit given only upon fulfilling all requirements set by department. May be repeated. Maximum 8 hrs.

580 Contemporary Rhetorical Theory (3) Current theoretical contributions to rhetoric: Burke, Perelman, Weaver, feminist and critical scholars.

590 Directed Reading and Research (3) May be repeated. Maximum 8 hrs.

591 Foreign Study (1-15) Independent study outside U.S. Prior to departure student must have plan of study approved by department head and supervising faculty member. Credit given only upon fulfilling all requirements set by department. May be repeated. Maximum 15 hrs.

592 Off-Campus Study/Internship (1-6) Independent study outside traditional classroom setting: community involvement and/or work experiences. Credit given only upon fulfilling all requirements set by department. May be repeated. Maximum 6 hrs.

593 Independent Study (1-6) Independent study by individual under direction of faculty member. Must obtain approval of faculty member and department prior to study.

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 Practical Strategies for Process Improvement Institute 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. 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.

Individuals 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 applica-
tion forms and further information may be sent to the Director of Graduate Studies, Department of Statistics, Stokely Management Center, University of Tennessee, Knoxville, TN 37996-0532 or mleitnake@utk.edu or http://bus.utk.edu/stat.

### 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 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 selected from 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 IGSF 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 a broad knowledge of the field, 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 Examining Committee. No formal comprehensive examination is required of students earning a Statistics minor along with a master's 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 member of the IGSP faculty. For students seeking doctoral degrees or the M.S. in Statistics, the committee member must be a faculty member in the Statistics Department.

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.

For information contact
msyoungsr@utk.edu or http://bus.utk.edu/stat/igsp.

BUSINESS ADMINISTRATION CONCENTRATION

For complete listing of program requirements, see Business Administration.

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, 651, and 592.

CERTIFICATE IN APPLIED STATISTICAL STRATEGIES

The Department of Statistics offers a certificate program in applied statistical strategies. The program is designed for the part-time student, and several of the courses are offered through distance education. The 12-credit certificate is available by completing two required courses, 571-72, and two electives, of the following: 573, 575, 579, and 585 or 566 or other graduate statistics courses as approved by the Statistics Graduate Program Committee chair.

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.

GRADUATE COURSES


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

502 Registration for Use of Facilities (3-15) Required for the student who wishes to be 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


531 Survey of Statistical Methods II (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 and multiple regression. Use of computing facilities required. Credit not given for both 521 and 537. Prereq: 1 yr. college mathematics. F

532 Survey of Statistical Methods (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 methodology, integrated with considerable use of major statistical computing system. Probability and probability distributions, forming and testing hypotheses using parametric and nonparametric inference methods. Matrix-based simple linear regression and correlation. Credit not given for both 531 and 537. Prereq: 1 yr. undergraduate mathematics and 1 undergraduate statistics course. F

538 Statistics for Research II (3) General linear model; analysis of variance. Diagnostic and influence techniques. One-way, factorial, blocking and nested designs, planned versus post hoc contrasts, effect sizes, and the Scheffe test; random effects. Prereq: 537 or 532. Sp

561 Introduction to Computing for Data Management and Analysis (1) UT computing environment for beginning statistics graduate students. Use of operating system commands, editing, file management, statistics software. Use of U of T computing facilities required. Coreq: 531, 537, 539, or 571 or 573, or consent of instructor. F

563 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: 563. Sp

566 Statistical Techniques in Industrial Processes (3) Applications of control charts, process capability analysis, attribute and variable control charts, sampling plans and other statistical techniques in industrial setting. Attributes and variables control charts, process capability analysis, aspects of sampling, statistical estimation of variance components, problems of measurement, special industrial applications. Prereq: 571 or equivalent. F


573 Design of Experiments (3) One-way ANOVA, multiple range tests, equal and unequal variances, transformations; factorial experiments, completely randomized designs; analysis of covariance, split-plot and nested designs, fractional factorial designs. Prereq: 571. Sp

575 Applied Time Series (3) Fundamental concepts of time series analysis: Box-Jenkins approach, stationary and non-stationary models, forecasting model identification, seasonal models, transfer function models, and spectral theory. Prereq: 538 or 572 or consent of instructor. Sp

578 Categorical Data Analysis (3) Log-linear analysis of multidimensional contingency tables. Logistic regression, theory, applications, and use of statistical software. Prereq: 1 yr graduate-level statistics, regression analysis and analysis of variance, or consent of instructor. Fall


583 Special Topics in Applied Statistics (1-3) May be repeated. Maximum 9 hrs.

585 Principles of Statistical Process Management (1-3) Statistical and other techniques applied to management of organizational processes. Prereq: Consent of department head.

587 Graduate Seminar (1) Directed readings and active participation in colloquium program of Department of Statistics and of student's minor program. Prereq: Consent of statistics department director of graduate studies. May be repeated. Maximum 2 hrs. S/NC only. F

592 Internship (1-6) Supervised off-campus experience in application of statistical principles and methods in business, industry, or government. Written and oral report. Prereq: 4 courses in graduate-level statistics or consent of statistics department director of graduate studies. May be repeated. Maximum 6 hrs. S/NC only.

593 Independent Study (2-6) Faculty directed readings and investigations of specified topic in probability or statistics. Written report and oral presentation. Prereq: 2 courses in statistics and of statistics department director of graduate studies. May be repeated. Maximum 6 hrs. S/NC or letter grade.

595 Statistical Consulting Practicum (1-6) Supervised experimentation on campus researchers, manage data, and develop and perform analyses specific to designs and hypotheses. Discussion of activities in regular seminar meetings. Final written report and/or data analysis. Prereq: 572 or 538. May be repeated. Maximum 6 hrs.

622 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 with numerical methods for linear models and generalized linear models, nonlinear statistical methods, matrix computations and special matrices, essentials 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.

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: 564 and 572 or 538, or consent of instructor.

679 Multivariate Statistical Modeling (3) Modern information based techniques and model selection in multivariate analysis, informational facts of significance of the model, analysis of variance, multivariate regression and variable selection, multivariate cluster analysis, common principal component model, factor analysis model, covariance through eigenvalues, variable selection, mixture-model cluster analysis. Prereq: Matrix algebra and 554, or matrix-based linear models with experience in interactive computing, or consent of instructor.

683 Special Topics in Statistics (1-3) Presentation of specialized topics in statistics. May be repeated. Maximum 6 hrs.

591 Graduate Seminar in Applied Statistics (3) Reading of literature and discussion of open problems of importance to industrial design of experiments, modeling, process control, model selection, and reliability. Prereq: Consent of instructor. S/NC or letter grade.

The Theatre (College of Arts and Sciences)

MAJOR

Theatre.................................................M.F.A.

Assistant Professor:

Blake Robison, Head

Professors:


Associate Professors:


Assistant Professors:


The Department of Theatre offers the Master of Fine Arts degree with a major in Theatre, which is normally to be completed in three consecutive years of full time residence. Theatre 501 is the first year of residence. Three additional hours at the 500 level are required from history, literature, or dramaturgy.

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 6 hours in the projects courses. Theatre 401, Principles of Design is required in the first year of residence.

Performance

At least 12 hours each of 520 Master Class in Performance: Acting; 523 Master Class in Performance: Movement; and 525 Master Class in Performance: Voice.

Coursework in this concentration is conducted in a conservatory environment. In the third year, students are expected to inter with either the resident professional Clarence Brown Theatre Company or another regional professional theatre.

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
501 Introduction to Graduate Research in Theatre (3) Research tools and methods for theatre artist and scholar.

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/WC 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 strategies of major playwrights, using variety of analytical approaches from Aristotelian to deconstruction.

520 Master Class in Performance: Acting (3) Master class in acting techniques. Theatre MFA students only. May be repeated. Maximum 18 hrs.

523 Master Class in Performance: Movement (3) Master class in movement techniques. Theatre MFA students only. May be repeated. Maximum 18 hrs.

550 Technical Design (3) Technical problems and solutions in scenery construction using traditional and modern techniques with application of unusual materials, consideration of budgeting, safety, and structural integrity. Prereq: 581-582.

582 Production Planning (3) Theatre management techniques useful in structuring orderly, effective production; survey of applicable computer programs.

583 Stage Machinery (3) Design of safe, effective machinery for movement of stage scenery. Prereq: 581-582.

585 Production Workshops (1-6) Directed experience in production collaborations. Prereq: Consent of Instructor. May be repeated. Maximum 12 hrs.

599 Project in Thesis (1-6) Available to theatre MFA students only. Prereq: Minimum of 30 hrs toward MFA degree and consent of advisor. May be repeated. Maximum 9 hrs.

Theory and Practice in Teacher Education

(Major of Education)

MAJORS

DEGREES

Education M.S., Ed.S., Ed.D., Ph.D.

L. Knight, Head

Professors:

Alexander, J. Estill. (Emeritus), Ed.D. ........................................ Kentuck

Bennett, Susan M., Ed.D. .................................................... Columbia

Brozo, William G., Ph.D. ....... South Carolina

Christensen, Mark A. (Emeritus). Ph.D. ........................................ Kansas

Coleman, Laurence J., Ph.D. ...... Kent State

Davis, A. R., Ph.D. ......... Ohio State

Davis-Wiley, Patricia, Ed.D. ......... Houston

Hargis, Charles H. (Liaison), Ed.D. .................. Colorado State

Harriss, G. A., Jr. (Emeritus), Ph.D. ........... Michigan

Hatch, J. Amos, Ph.D. ........... Florida

Huff, P. (Emeritus), Ph.D. ........... Ohio State

Hull, Howard N. (Emeritus), Ed.S. .... Peabody

Jost, Karl J., Ed.D. ...... Oklahoma

Knight, Lester N., Ph.D. ........ Texas

Lindsay, LaVerne B., Ed.D. ........ Mississippi State

Long, Vena M., Ph.D. .......... Missouri (Columbia)

Rowell, C. Glenn, Ed.D. .... George Peabody

Schindler, W. Jean, Ph.D. ...... Kent State

Turner, T. N., Ed.D. ............ Penn State

Watkins, J. Paul (Emeritus), M.S ........ Tennessee

Associate Professors:

Barclay, McLaughlin, Ph.D. ........... Michigan

Cagle, Lynn C., Ed.D. ............ Georgia

Chance, Charles A., Ph.D. ..... Ohio State

Gilrane, Colleen P., Ph.D. ......... Illinois

Hannum, Michael C. ............ Ed.D. .......................... Northern Colorado

Hodge, R. L., Ph.D. .............. Texas

Judge, Sharon L. .... Ph.D. ........ California (Santa Barbara)

Meleard, Claudia T., Ph.D. ........ Ohio State

Puckett, Kathleen S., Ph.D. ........ Tennessee

Assistant Professors:

Bell, Sherry M., Ph.D. ............... Tennessee
than merely dispense content. Central to the teaching/learning process, the focus on integration is similar to how children learn in the arts, language arts, and ESL education as separate entities. The emphasis is on how these disciplines are taught in context of different cultures.

The secondary content teaching area's mission is the preparation of teachers for instruction in arts, ESL, English, foreign language, mathematics, social science and science. The emphasis is on how knowing each individual child's learning style, abilities, and interests.

The early childhood education area is focused on the preparation of teachers for the education of all young children in inclusive settings. The context in which children live (i.e., urban, rural) influences their development and learning. Young children are defined as children from birth to age eight, including children living in poverty, those of color, with disabilities, with advanced development and typically developing children.

The secondary content teaching area's mission is the preparation of teachers for instruction in arts, ESL, English, foreign language, mathematics, social science and science. The emphasis is on how these disciplines are taught in context of different cultures.

The secondary content teaching area's mission is the preparation of teachers for instruction in arts, ESL, English, foreign language, mathematics, social science and science. The emphasis is on how these disciplines are taught in context of different cultures.
English Language/ ESL

GRADUATE COURSES

455 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.

555 Foreign Language in the Elementary Schools Practicum (3) Experiences designing, implementing and assessing second language instruction in elementary school setting. Prereq: 557 or consent of instructor.

556 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: 576 or consent of instructor.

578 Teaching English as a Second Language (3) Instructional methods; utilization of assessment procedures to diagnose English linguistic proficiency; materials for non-native speakers K-12 classroom. Prereq: 578 or consent of instructor.

587 Teaching Foreign Languages in Secondary Schools (3) Advanced instructional techniques and evaluation procedures; materials analysis and preparation, trends, issues, and research in modern foreign languages and Latin. Prereq: Consent of Instructor.

687 Advanced Studies in Foreign Language Education (3) Research, curriculum, assessment, trends and issues in foreign language education. Prereq: 587 or consent of instructor.

Mathematics Education

GRADUATE COURSES

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

522 Programs and Materials in Elementary School Mathematics (3) Examination, development and use of materials for creating an active learning environment for learning mathematics in elementary and middle schools. Prereq: 530, 543, or equivalent.

530 Teaching Mathematics to Young Children: Kindergarten through Grade 3 (3) Unit planning, daily planning, grouping and other strategies of teaching mathematics. For those with little preparation in teaching elementary school mathematics.

543 Teaching Mathematics in Middle School: Grades 4-8 (3) Unit planning, daily planning, grouping and other strategies of teaching mathematics. Prereq: 530 or equivalent.

581 Seminar in Mathematics Education (3) Current issues influencing instruction in mathematics in schools, elementary through college. Related teaching methodologies. Opportunities for work on special problems. Prereq: 485 or equivalent.

582 Teaching Enrichment Mathematics in Middle and Junior High Schools (3) Topics to enrich middle and/or junior high mathematics. Geometric, laboratory, and problem solving activities. Special attention to metric system. Opportunities for individual projects. Prereq: 485 or equivalent.

583 Teaching Mathematics in Senior High Schools and Community Colleges (3) Topics appropriate for high school and community/junior college mathematics curriculum. Special problems related to enrichment, problem solving, and use of microcomputer. Opportunities for special projects. Prereq: 485 or equivalent.

584 Teaching Probability & Statistics (3) Teaching of probability and statistics in schools, elementary through college. Prereq: 485 or equivalent.

586 Teaching Advanced Studies in Mathematics Education (3) Analysis of current research in mathematics education and implications of research for classroom practice. Prereq: Two graduate courses in mathematics education.

Science Education

GRADUATE COURSES

496 Teaching Science Grades 7-12 (3) Methods, materials, recent trends in science and environmental education programs for secondary schools. Prereq: Admission to teacher education.

506 Science Education Studies in Natural Environments (3) Systematic study of nature for K-12 inquiry-based instruction in off campus natural setting. Group and individual observational and empirical studies. Web-based lesson plans designed upon return to campus.

531 Teaching Science in Elementary and Middle Schools (3) Recent trends in methods, materials and content in teaching elementary school science.
Course in teaching elementary school science or consent of instructor. Su,F

565 Instructional Trends and Issues in Science Education (3) Analysis of current trends in science instruction, instructional issues facing elementary, secondary, and community college science teachers, and application of learning theory to teaching biological, physical, and environmental sciences. Prereq: 496, teaching methods, or equivalent. Su

572 Nature of Mathematics and Science Education (3) Teaching and assessment of mathematics and science based upon student conceptions of nature of mathematics and science. Su

598 Curriculum Trends in Science Education (3) Analysis of elementary and secondary curriculum projects for biological, physical and environmental sciences. Impact of current learning theories on future curriculum development projects. Prereq: 496, or Early Childhood Education 422 Early Childhood Teaching Methods, or equivalent. Prereq or coreq: 565 or consent of instructor. Sp

628 Advanced Studies in Science Education (3) Analysis of current research in science education and implications of research for classroom practice. Prereq: 596. May be repeated. Maximum 6 hrs. Sp,A

696 Research Trends in Science Education (3) Analysis of current research trends in science education and relationships between trends and broader educational community. Prereq: 628. Sp,A

Social Science Education

GRADUATE COURSES

454 Teaching Strategies and Issues in Social Studies Education (3) Goals, objectives, techniques, materials, and evaluation; directed observation in public school setting; preparation of teaching plans and materials; simulated teaching experiences. Prereq: Admission to teacher education. Su

521 Teaching Social Studies in Elementary and Middle Schools (3) Planning and techniques. Trends in curriculum, development of concepts and generalizations, integration of social sciences. Prereq: Course in teaching of social studies or consent of instructor. Sp

525 Strategies, Programs and Materials for Teaching Elementary Social Studies (3) Analysis of new and innovative social studies program materials and techniques. Exploration of current trends in social studies education. Prereq: Prereq. Previous course in teaching of social studies or consent of instructor. Sp

585 Teaching Secondary School Social Studies (3) Strategies, projects, materials, and programs in social studies. Prereq: Undergraduate course in teaching of social studies. F,Su

599 Seminar in Social Studies Education (3) Research, trends, and issues in secondary social studies. Sp

621 Seminar in Social Studies Research and Theory (3) Status of research and theory. Needed research, related research from other fields, and application of research. Prereq: Recent course in teaching of social studies or consent of instructor. E

Special Education

GRADUATE COURSES

419 Psychology and Education of Students with Mild Disabilities (6) Nature and characteristics of persons with mild handicaps and educational strategies appropriate for these persons. Prereq: Special Education Principles, Special Education Strategies, and admission to teacher education program. Coreq: 420. F

420 Field Experience in Modified Programs (3) Practicum in teaching in modified programs: planning, developing, implementing and evaluating instruction. Prereq: Special Education Principles, Special Education Strategies, and admission to teacher education program. Coreq: 420. S/NC only. F

431 Field Experience in Comprehensive Programs (3) Prereq: Special Education Principles, Special Education Strategies, and admission to teacher education program. Coreq: 430. S/NC only.

432 Psychology and Education of Students with Moderate/Severe Disabilities (6) Nature and characteristics of persons with moderate/severe disabilities and educational strategies appropriate for these persons. Prereq: Special Education Principles, Special Education Strategies, and admission to teacher education program. Sp

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. Sp

456 Speech and Language Basis of Learning Disabilities in the Classroom (3) Normal communication development; understanding of speech and language impairments in school-age students; integration of compensatory skills into existing curriculum, especially for high incidence special education students.

470 Psychology of the Exceptional Child (3) Varieties of exceptional children; general characteristics and intervention strategies. Enrollment limited to those in fifth-year program. S/NC only.

504 Clinical Experience in Teaching and Supervision of Exceptional Children (3-9) Placement in professional settings in public schools or agencies under supervision of master practitioners. Enrollment limited to those in fifth-year program. S/NC only.

553 Assessment of Exceptional Students (3) Current issues related to assessment; advanced study of evaluation models for special education; dynamic and other innovative assessment approaches; advanced study of application to educational programming; basic statistics and application in assessment.

555 Characteristics of Affective/Motivational Functioning in Children with Disabilities (3) Definition, methods, identification and symptoms of children with affective/motivational disabilities or troubles. Comparison to normal development and that of children labeled disturbed or behavior disordered.

556 Instructional Systems for Affective/Motivational Education for Children with Disabilities (3) Educational strategies and methods of instruction; simulation, demonstration, and media. Teaching techniques, materials, and teacher/pupil/family interactions. Therapeutic forms of education through art, music, role play, puppetry, bibliotherapy, and group interactions. Prereq or coreq: 555 or consent of instructor.

557 Positive Preventive Discipline (3) Instructional, classroom strategies: preventive/proactive strategies for use in classroom which positively effects efficiency of classroom. Research on how curriculum can encourage appropriate interactions of children and youth. Prereq: Admission to elementary education, secondary education, or social foundations as related to goals of students' programs. May be repeated. Maximum 6 hrs. S/NC or letter grade. E

558 Neuromuscular and Health Disorders: Educational Implications (3) Neuromotor impairments, physical disabilities and special health conditions, autism. 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. Implications of maladjustment. Practices for promoting social and emotional development. Prereq: 451 and 452 or equivalent or consent of instructor.

565 Instructional Systems for the Gifted and Talented (3) Instructional methods and systems evaluated in terms of effectiveness in various educational environments. Prereq or coreq: 564 or consent of instructor.

575 Creative Problem-Solving Strategies for Special Educators (3) Techniques for solving problems encountered by special educators in any setting.

586 Seminar in Research Techniques in Special Education (3) Evaluation of appropriate research methodologies with handicapped populations.

587 Seminar: Issues and Theories in the Education of the Exceptional Child (3) Analysis of timely research and theoretical issues. Prereq: Research course or consent of instructor.

590 Application of Microcomputer Technology in Special Education and Vocational Rehabilitation (3) Application of microcomputer technology with all categories of exceptionalities and across all chronological and functioning age ranges. Microcomputer adaptive software, special software, accessing devices, teaching strategies, and strategies for cognitive development.

620 Internship in Research in Special Education and Rehabilitation (3-9) Placement with professional engaged in theoetrically-based research: public school, institutions, 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.

Theory and Practice in Teacher Education

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


517 Seminar in Theory and Practice in Teacher Education (3) Curriculum, instructional technology, elementary education, secondary education, or social foundations as related to goals of students' programs. May be repeated. Maximum 6 hrs. S/NC or letter grade. E

518 Educational Specialist Research and Thesis (3) May be repeated. P/NP only. E

526 Drama and Story Telling in Teaching (3) Use of techniques of drama and storytelling to improve impact of teaching and to teach more effectively. Prereq: Classroom experience or admission to teacher education program.

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.

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

595 Special Topics (1-3) May be repeated. S/NC or letter grade. E

596 Clinical Experience in Assessment and Instruction (3) Academic remediation applied in laboratory settings; tasks related to teaching: assessment, prepara-
Transportation

See Marketing, Logistics and Transportation

Urban and Regional Planning

(College of Arts and Sciences)

MAJOR

DEGREE

Urban and regional planning or related fields. Graduates are candidates for positions in regional, city, county, and metropolitan planning agencies; in local, state, and federal agencies concerned with physical, economic, and administrative planning; in private business and organizations dealing with development problems; and in private consulting. The Master of Science in Planning program is accredited by the Planning Accreditation Board, a joint undertaking of the American Institute of Certified Planners and the Association of Collegiate Schools of Planning.

THE MASTER'S PROGRAM

Admission Requirements

Applicants are to submit an application for admission to the Graduate School, and two letters of reference from faculty familiar with their prior academic work and a statement describing personal career objectives directly to the department. If the applicant has prior work experience in planning, a reference letter from the supervisor is also required. The Graduate Record Examination scores are requested of all applicants whose undergraduate GPA is below 3.0. Other applicants are encouraged to submit them. Students who have not taken an appropriate undergraduate statistics course will be required to take one.

Degree Requirements

The M.S.P. program requires completion of at least 48 hours of graduate credit, at least 30 of which must be in planning. Each student is required to develop an area of concentrated competence beyond the core curriculum. After selecting the area of concentration, usually by the end of the second semester, the student takes courses from a prescribed set in the subject area. Further enhancement of the concentration is gained by selecting thesis or major study with consent of instructor. Concentration courses are drawn from the planning curriculum and from other departments in the University. Concentrations are available in land use planning, environmental planning, real estate development planning, transportation planning. Each student has the latitude to propose an alternate specialization consisting of at least 9 hours of coursework, subject to approval of a faculty committee. Each student is required to demonstrate competence in individual research. This may be done in one of two ways:

Thesis Option: Complete a thesis for 6 hours credit

Non-Thesis Option: Complete a major study with acceptable documentation. To be eligible for the major study option, the student must have completed at least 12 hours of graduate coursework in planning with at least a 3.5 cumulative grade-point average. The student meeting these criteria may present a proposal to his/her committee for a major study that will include at least 6 hours of subsequent coursework. The proposal shall justify the selection of the topic, describe the approach to the study, and describe the nature of the final product. The topic must be normative in nature and expected to reinforce or complement the student's concentration.

Successful completion of both comprehensive exams is required before graduation. The exam will normally be taken after completion of the core requirements in the second year. Based on the material generally used by the American Institute of Certified Planners (AICP), this requirement provides an additional capstone experience as well as preparation for meeting AICP professional certification requirements.

Student academic progress is monitored by the faculty. A student failing to maintain an acceptable grade-point average may be placed on probation or dismissed from the program.

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 on an in-state tuition basis. The M.S.P. program is available to residents of the states of Arkansas, Virginia, or West Virginia. Additional information may be obtained from the Academic Affairs Specialist in the Office of Graduate Student Services.

GRADUATE COURSES

401 The City in the U.S. (3) Development and character of U.S. cities. Controversial 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 planning, State of the art, process, comprehensive plan, implementation devices. Planning issues in sociology. Not for credit for M.S.P. degree.


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 Fall term before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

510 Fundamentals of Planning (3) History of planning, structure and development of urban areas, operations of current planning, trends and issues.

515 Theory of Planning (3) Analysis of nature and objectives of planning process; role of planner and planning function in public decision-making. Prereq: 510 or consent of instructor.

520 Planning Research Methods (3) Overall structure of social science research in planning practice; familiarity with structure of planning literature information sources, systematic retrieval techniques, processes and tools, practice in posing research questions relevant to planning.

521 Information Systems and Networks in Planning (3) Use and impact of computer-based information systems and local/area networks in planning and public
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 preveterinary course requirements listed below. These may be completed at any accredited college or university that offers courses equivalent to those at The University of Tennessee. Preveterinary course requirements must be completed by the end of spring term of the year in which the student intends to enroll. Biochemistry requirements must have been satisfactorily completed within five years of the time the applicant wishes to enter the program.

Subject Area          Semester Hours

English......................... 6

Humanities and Social Sciences* 8

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 procedures for making application for admission may be obtained beginning June 1, 2001 from the Office of the Associate Dean, The University of Tennessee College of Veterinary Medicine, P.O. Box 1071, Knoxville, TN 37910-1071.

Note: The deadline for receipt of the completed application materials is November 1. Non-Tennsasian 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 and spring semesters with the summer break following years one and two. The final two years of the professional curriculum begins immediately following semester six and is a continuous clinical rotation experience extending over 54 weeks.

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. Considerable integration 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 team-taught on an organ system basis.

The final year (three semesters) is devoted to intensive education in solving animal disease problems involving extensive clinical experience 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 exercises in semesters one through six; three weeks of dedicated clinical experiences in the Veterinary Teaching Hospital in semesters three through five; and up to 10 credit hours of graduate courses without enrolling in the Graduate School in required externships. Students enrolled in the D.V.M. program may register for up to 10 credit hours of graduate courses without enrolling in The Graduate School during these hours will be credited toward the D.V.M. degree. Elective study offers a unique educational alternative for 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 peramedical 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 leads 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 institutional units, including Animal Science (nutrition, physiology, genetics and animal management), Microbiology (bacteriology, virology and immunology), Ecology and 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, individually facilitated for self-discovery of new information. Week-long sessions based on specific clinical case or problem, and integration of basic science and clinical material. S/N only.

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. S/N only.

811 Infection and Immunity II—Bacteriology and Mycology (3) Fundamental aspects of microbiology and cell biology relative to pathogenesis of bacterial and fungal diseases of veterinary importance: antimicrobial actions and mechanisms of bacterial resistance. General approaches to diagnosis, treatment and prevention.

813 Infection and Immunity I—Immunology (2) Basic biology and practical aspects of immunology: cells of immune system, immune function and dysfunction, immunopathology, diagnostic testing and specific diseases involving immune system.

814-16 Clinical Correlations and Ethics I, II (1,2) Correlations between basic science material from concurrent courses and topics of veterinary medicine. Thought through the practical spectrum of current veterinary ethical issues. 816—Student-led discussions follow faculty presentations.


821-22 Veterinary Anatomy I, II (6,6) Integrated approach to study of developmental, macroscopic (gross), and microscopic anatomy of common domestic animals. Dissections of embalmed specimens of common domestic species for comparative purposes. Microscopy relates structure with function. Study of developmental anatomy related to normal anatomy to inherited anomalies.

823-24 Physiology III (4,4) Introduction to concepts and problems in physiology which form basis for clinical applications and for formal training in pharmacology, medicine, pathology, and surgery. Cellular, neural, cardiovascular, renal, respiratory, digestive, endocrine, and reproductive physiology.

827 Special Problems in Animal Science (1-8) Extramural and specially designed study for students interested in select topics in anatomy, histology, and physiology.

831 Physical Diagnosis (1) Basic care, feeding, restraint, and handling domestic animals. Introduction to physical examination and diagnostic techniques used by veterinarian.

832 Anesthesiology (2) Principles of anesthesiology: pharmacology of anesthetic agents, and introduction to anesthetic techniques in veterinary medicine.

833 Epidemiology and Evidence Based Medicine (2) Epidemiology of diseases in animal populations. Use of knowledge (evidence) gained from management of clinical patients in past to improve future clinical decision making processes.

834 Hematopoietic System (2) Pathophysiology and diagnosis of disorders involving bone marrow and blood cells, platelets, and blood coagulation in domestic animals; interpretation of laboratory test results using illustrative clinical cases.


836 Toxicology (2) Principles of toxicology, molecular mechanisms, pathologic processes and clinical features of animal diseases caused by common toxic agents.

837 Food Hygiene and Zoonoses (2) Host-agent relationships, public health aspects of veterinary medicine and role of veterinarians in ecology and food hygiene.

840 Integumentary System (3) Pathophysiology, special pathology, medicine and surgery of diseases of integumentary system. Laboratory examination, pathology, diagnosis and treatment.

841 Reproductive System (4) Pathophysiology, special pathology, medicine and surgery of diseases of male and female reproductive systems and mammary glands.

842 Alimentary System (4) Pathophysiology, special pathology, medicine and surgery of diseases of alimentary system.

843 Musculoskeletal System I (3) Pathophysiology, clinical description and basic treatment modalities of common diseases and conditions of skeletal system of small animals; development of basic diagnostic and therapeutic skills.

844 Musculoskeletal System II (3) Pathophysiology, special pathology, medicine and surgery of diseases of musculoskeletal system. Advanced principles, radiographic interpretation and surgical procedures.

845 Veterinary Nutrition (2) Principles of nutrition, and nutrition of animals in health and disease. Applied nutrition relating to individual small or large animal patient or to herd situations.

846 Multiplespecies Medicine (4) Anatomy, pathophysiology, medicine, and surgery of exotic species, laboratory and zoo animals and reptiles. Species and diseases seen by practicing veterinarian. Current topics on foreign animal diseases.

851 Urinary System (3) Pathophysiology, special pathology, medicine, and surgery of diseases of urinary system. Urinary system in health and disease.

852 Cardiovascular System (2) Pathophysiology, special pathology, medicine and surgery of diseases of cardiovascular system. Anatomic, physiologic and pharmacologic principles which provide basis for treatment.

853 Endocrine System (2) Pathophysiology, medicine and surgery of diseases of endocrine system.

Mechanisms of endocrine and metabolic diseases: therapy and prevention.

854 Respiratory System (3) Pathophysiology, special pathology, medicine and surgery of diseases of respiratory system. Upper and lower respiratory systems: infectious and noninfectious diseases.

855 Radiology (3) Basic, advanced and special techniques in radiology with interpretation and use of radiologic and related techniques in diagnosis and treatment of animal diseases.

856 Special Senses (2) Pathophysiology, special pathology, medicine and surgery of diseases of visual and auditory systems.

857 Nervous System (3) Pathophysiology, special pathology and medicine of diseases of nervous system: clinical neurology and neuropathology.

858 Neurology/Ophthalmology (4) Clinical training in specialty services: ophthalmology and neurology. Direct responsibility for diagnosis, patient care, and treatment of patients in both Large Animal and Small Animal Clinical Sciences.

861 Pharmacology I (2) Principles of pharmacokinetics and pharmacodynamic properties of veterinary drugs; mode of action and pharmacologic effects including important metabolic aspects, chemical and physical properties, side effects (toxicities) and clinical application.

862 Pharmacology II (2) Continuation of 861: modes of action, pharmacologic effects, and clinical application of drugs to control specific disease conditions.

864 Infectious Diseases (2) Pathogenesis and clinical findings of major viral, bacterial, and fungal infectious diseases of domestic animals: cattle, horses, swine, sheep, goats, dogs and cats; relevant case-based presentations.

865 Clinical Rotation I in Comparative Medicine (2) Clinical training in avian medicine, laboratory animal and zoo animal medicine, epidemiology, public health, and other related disciplines.

867 Special Problems in Comparative Medicine (1-8) Extramural and specially designed study for students interested in select topics in avian medicine, laboratory animal medicine, zoo animal medicine, epidemiology, public health, pharmacology or toxicology.

868 Introduction to Animal Behavior (2) Basic principles of normal and abnormal animal behavior in domestic animals: clinical case discussions to illustrate normal behavioral problems and current approaches to therapy.

870 Anesthesiology (4) Clinical training in sedation and anesthesia of companion animals, food animals and horses. Direct responsibility for diagnosis, care and treatment of clinical patients.

871 General Pathology (3) Principles of pathobiology: causes of disease, disturbances of cell growth and inflammation.

873 Infection and Immunity IV—Parasitology (3) Principles of parasitology: zoonoses, helminthology, and entomology and relationship to diseases in animals.

874 Oncology (2) Fundamental aspects of cell biology and pathological relative to etiology and natural behavior of various neoplasms of animals; general approaches to diagnosis, treatment and prevention of neoplasia.

877 Special Problems in Pathology (1-8) Extramural and specially designed study for students interested in select topics in morphologic pathology, clinical pathology, clinical microbiology and parasitology.

878-79 Elective Clinical Rotation I, II (2,2) Special rotations in applied clinical education in Small Animal Clinical Sciences, Large Animal Clinical Sciences, Comparative Medicine and Pathology. Novel experience not associated with required clinical rotations may be arranged.

881 Clinical Rotations in Small Animal Clinical Sciences (4) Clinical training in medicine, surgery and specialty disciplines for companion animals. Direct responsibility for diagnosis, care, and treatment of clinical patients.
882 Clinical Rotations in Small Animal Clinical Sciences II (4) Clinical training in medicine, surgery and specialty disciplines for companion animals. Direct responsibility for diagnosis, care, and treatment of clinical patients.

883 Clinical Rotations in Small Animal Clinical Sciences III (4) Clinical training in medicine, surgery and specialty disciplines for companion animals. Direct responsibility for diagnosis, care, and treatment of clinical patients.

886-89 Clinical Rotation in Radiology and Pathology I, II (4,4) Two weeks in each discipline. Clinical training in radiographic techniques and interpretation, including ultrasonography. Post-mortem examination and laboratory diagnostics: clinical pathology and introductory histopathology of biopsy specimens.

887 Special Problems in Small Animal Clinical Sciences (1-8) Extramural and specially designed study for students interested in select topics in medicine, surgery, anesthesiology, radiology and medical specialties of small (companion) animals.

890 Transition and Accreditation Seminars (2) Discussion of USDA, state, and local animal laws and regulations: preparation of animal movement forms, veterinary ethics, jurisprudence, basic practice management, and other topics involved in practice of veterinary medicine.

891 Clinical Rotations in Large Animal Clinical Sciences I (4) Clinical training in medicine, surgery, specialty disciplines and herd health of food animals and horses. Direct responsibility for diagnosis, care and treatment of clinical patients.

892 Clinical Rotations in Large Animal Clinical Sciences II (4) Clinical training in medicine, surgery, specialty disciplines and herd health of food animals and horses. Direct responsibility for diagnosis, care and treatment of clinical patients.

893 Clinical Rotations in Large Animal Clinical Sciences III (4) Clinical training in medicine, surgery, specialty disciplines and herd health of food animals and horses. Direct responsibility for diagnosis, care and treatment of clinical patients.

894-95 Externship I, II (2,2) Educational experiences in private practice, research facility, zoological preserve, aquarium, or other veterinary-related facility outside Veterinary Teaching Hospital; to provide experiences not frequently available in large referral veterinary teaching hospitals.
FACILITIES FOR RESEARCH AND SERVICE