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

**GRADUATE COURSES**

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

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

**530 Advertising Research (3)** Nature, scope, and applications of research function to advertising decisions. Market segmentation, copy appeals, media strategy. Prereq: Statistics 201 Introduction to Statistics or equivalent. Sp

**540 Advertising Planning (3)** Analysis of decision-making in budgeting, creative strategy, media strategy, research, evaluation, and agency-client relationships. Advertising response functions. Prereq: Consent of instructor or admission to program. Sp

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

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**Aerospace Engineering**
See Mechanical and Aerospace Engineering

**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

Mccow, 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

Tompkins, F. D., PE, Ph.D. .................. Tennessee

Wilk, 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

Buchemohle, 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

Raman, D. R., PE, Ph.D. .................... Cornell

Willerson, 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

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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 available to graduates in a recognized curriculum in agriculture or other 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**

Applications 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**
- **Coursework in computational methods** (mathematics, computer science, statistics, or any course containing appropriate computational components that may be approved by the department)
- Program electives
- Thesis 500

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**
- **Coursework in computational methods** (mathematics, computer science, statistics, or any course containing appropriate computational components that may be approved by the department)
- Program electives
- Thesis 500

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**
- **Coursework in computational methods** (mathematics, computer science, statistics, or any course containing appropriate computational components that may be approved by the department)
- Program electives
- Thesis 500

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: 18
- Coursework in computational methods (mathematics, computer science, statistics, or any course containing appropriate computational components and may be approved by the department): 9
- Program electives (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.

18 hours of courses at UT numbered greater than 500 (including 24 hours of course 600) and 6

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; fatigue; time analyses applied to design project components and assemblies. Prereq: Power Units and Machinery or consent of instructor. 1 hr and 2 labs. F

423 Irrigation and Waste Management System Design (3) Design of irrigation and agricultural waste management systems with consideration given to livestock waste characteristics, climate, water quantity, system characteristics, and impact on crop yield and water quality. Prereq: 315 Soil and Water Conservation, Engineering Science 341 Fluid Mechanics I, and Civil and Environmental Engineering 390 Hydraulics. 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

433 Bioprocess System Design and Analysis (3) Design of processing, storage and handling systems for agricultural materials. Mass and energy balances, production and quality characterization, equipment specifications, economic analysis, safety, and human factors. Design content: 3 hrs. Prereq/coreq: Processing Food and Biological Materials. 1 hr and 2 labs. F

451 Electronic Systems (4) Basic electronics with biological applications. Analysis and design of systems: stressing; sensing and controlling physical and environmental parameters; sensor selection and interfacing; signal conditioning; process control. Laboratory experiments and design projects. Prereq: Circuits and Electronic Mechanical 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 uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. SINC 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.) SINC only.

505 Professional Communications Seminar (1) Review of reports on successful research 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.) SINC only. E

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

510 Similitude in Design and Research (3) Dimensional analysis, similarity equations: theory, 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 invagination; reaction mechanisms and data control. Prereq: Thermodynamics, heat and mass transfer. F

543 Instrumentation and Measurement (3) Modern instrumentation techniques 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 special 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); equipment, management, and analysis of spatially-varying 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

557 Applied Microbiology and Bioengineering (3) (Same as Chemical Engineering 557, Environmental Engineering 557, and Microbiology 557.)

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. Prereq: Knowledge of computer programming language. 2 hrs and 1 lab. F

630 Feedback and Control Systems (3) Differential equations for physical systems: solutions, transforms, and system response. Types of control, frequency response, state 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 advanced 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 food handling. 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, hydraulics systems, hitching, and ballasting. Field and material capacity, field fluidity, cost analysis, and machinery replacement strategies. Functional analyses 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

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. SINC only. E

504 Professional Development Seminar (1) (Same as Biosystems Engineering 504.) SINC only.

505 Professional Communications Seminar (1) (Same as Biosystems Engineering 505.) SINC only. E

506 Physical Phenomena (3) Properties of materials, fundamentals of hydraulics, principles of electricity, thermal phenomena, applications in biological sys-
Agricultural and Extension Education

(College of Agricultural Sciences and Natural Resources)

MAJOR

Agricultural and Extension Education

... M.S.

ROY R. LESSLY, HEAD

PROFESSORS:

ROY R. LESSLY, ROY R. (LIAISON), ED.D. ANDREW WATERS, RANDOL G. PH.D. AND DELNERO, JENNIFER A. PH.D.

ASSISTANT PROFESSOR:

DELORENO, JENNIFER A., PH.D. AND DELNERO, JENNIFER A.

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, 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 approved by the department and a minimum of 6 hours taught 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 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 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. S/NC 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 does not apply for full-time credit. May not be used toward degree requirements. May be repeated. S/NC 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 major aims and objectives and programs. Prereq: 211 Foundations of Agricultural and Extension Education or consent of instructor. Sp

521 Extension Program Planning and Evaluation (3) Theories and models 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. Sp

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 professional educators develop, test and disseminate learning activities using electronic media, computer simulation, philosophy of system simulation, critical path, discrete and continuous systems. Prereq: Consent of instructor. 2 hrs and 1 lab. F,A

524 Simulation of Agricultural Systems (3) Synthesis and analysis of agricultural systems using computer simulation, philosophy of system simulation, critical path, discrete and continuous systems. Prereq: 506 and scientific computer programming. 2 hrs and 1 lab. F,A

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.

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

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; development and 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. Sp

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

533 Agricultural Leadership Development (3) Identification of styles, and roles of leadership; development of leadership techniques and skills required in working with organizations and youth groups. Methods of resolving conflict, of communicating, of guiding and evaluating; ethical considerations for leaders. Prereq: 435 Student Teaching in Agricultural and Extension Education, 511 or 521 consent of instructor.

540 Communications Techniques in Agriculture (3) Elements of effective use of mass media in agricultural and extension education. Effective technical writing and effective use of communication in public relations and information; presentation of subject matter in contemporary communication: Internet/World Wide Web, presentation software, computer graphics/multimedia and videocasting. Prereq: 435, 436 Student Teaching in Agricultural and Extension Education. 521 consent of instructor.
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
Geloff, D. G., Ph.D. .............Texas A&M
Jensen, K. L., Ph.D. ..........Tennessee State
Keller, L. H. (Emeritus), Ph.D. ......Kentucky
Kenkel, P. L., Ph.D. ..........Kentucky
Klinz, 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
Orr, R. H., Ph.D. ..............Illinois
Park, W. M., Ph.D. .............Virginia Tech
Pennecost, B. H. (Emeritus), J. D. ....Kentucky
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
Whately, 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 Department of Agricultural Economics and Rural Sociology offers a program of graduate study leading to the M.S. degree. The M.S. program may be completed under a thesis option with concentrations in agricultural economics or rural sociology. A non-thesis option is available with concentrations in agricultural economics or agribusiness. For specific information, contact the department head.

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 exams.

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, 4 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, borrower 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 priorities; economic rationale and effects of policy. Historical development and current characteristics of commodity, credit, food, and trade policy. Prereq: Introduction to 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 the food and farm sectors. Use of computer software to assist in decision making. Prereq: Agricultural Microeconomics and Introduction to Statistics or consent of instructor. F

470 Natural Resource Economics (3) Nature of natural resources; economic efficiency and the value of natural resources; resources and their conservation; alternative public policies for maintaining natural resource use; and the distribution of the benefits of that use. Prereq: Agricultural Microeconomics. 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 be used toward degree requirements. May be repeated. S/NC only. E

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

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

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

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

542 Advanced Agribusiness Production Decisions (3) Theoretical and empirical concepts in agricultural resource allocation; evaluation of both static and dynamic decisions; 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 markets, buyer behavior, industry structure, competition, and marketing environment. Prereq: 505 and Regression and Correlation Methods or equivalent. Sp

592 Internship in Agricultural and Extension Education (1-3) Practical field experience in selected setting under supervision of local practitioner and department representative. Prereq: Consent of instructor. Maximum 3 hrs. S/NC only. E

593 Special Problems in Agricultural and Extension Education (1-4) Special research and/or special reports based on supervised independent study. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

450 Agricultural Industry Analysis and Forecasting (3) Applications of advanced decision analysis concepts and tools to analyze management decision problems in the food and farm sectors. Use of computer software to assist in decision making. Prereq: Agricultural Microeconomics and Introduction to Statistics or consent of instructor. F

470 Natural Resource Economics (3) Nature of natural resources; economic efficiency and the value of natural resources; resources and their conservation; alternative public policies for maintaining natural resource use; and the distribution of the benefits of that use. Prereq: Agricultural Microeconomics. 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 be used toward degree requirements. May be repeated. S/NC only. E

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

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

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

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

542 Advanced Agribusiness Production Decisions (3) Theoretical and empirical concepts in agricultural resource allocation; evaluation of both static and dynamic decisions; 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 markets, buyer behavior, industry structure, competition, and marketing environment. Prereq: 505 and Regression and Correlation Methods or equivalent. Sp
Animal Science

(College of Agricultural Sciences and Natural Resources)

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
Blethen, J. K. (Emeritus), Ph.D. Ohio State
Chamberlain, C. C. (Emeritus), Ph.D.
Goan, H. C., Ph.D. Michigan State
Goodkin, J. D., Ph.D. Massachusetts
Hall, G. O. (Emeritus), Ph.D. Iowa State
Kattesh, H. G., Ph.D. Texas A&M
Kirkpatrick, F. D., Ph.D. Tennessee
Lane, C. D., Ph.D. Tennessee
Lidwell, E. R. (Emeritus), M.S. Tennessee
Mathio, C. F., Ph.D. Kansas State
McDonald, T. P. (Emeritus), Ph.D. Tennessee
McLaren, J. B. (Emeritus), Ph.D. Auburn
Meadows, D. G., Ph.D. Texas A&M
Miller, J. K. (Emeritus), Ph.D. Georgia
Montgomery, M. J. (Emeritus), Ph.D.

Associate Professors:
Backus, W. R., Ph.D. Tennessee
Grizzle, J. M., Ph.D. Florida
Harper, F., Ph.D. Rutgers
Heitmann, R. N. (Emeritus), Ph.D. Florida
Robbins, K. R., Ph.D. Illinois
Saxton, A., Ph.D. NC State
Shirley, H. V. (Emeritus), Ph.D. Illinois
Tugwell, R. L. (Emeritus), Ph.D. Kansas State

Assistant Professors:
Edwards, J. L., Ph.D. Florida
Pighetti, G., 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 506 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 in 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 in the first term with a minimum grade-point average of 3.0 for admission to the M.S. program.

The program requires the student to complete a comprehensive examination in the area of the student's major. In addition, the student must complete a thesis based on original research, the completion of 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, and 6 hours of thesis. Included in the course requirement 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 remainder of the coursework will be selected jointly by the student and the major professor depending on the student's area of concentration and professional objectives.

The advisory committee will consist of the major professor, a faculty member of Animal Science, who will act as chairperson of the committee, and a minimum of two other faculty members, one of whom may be outside of the Animal Science Department.

The advisory committee approves the student's coursework and research problem and conducts the final oral examination, which consists of a comprehensive oral examination and a defense of the thesis.

THE DOCTORAL PROGRAM

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

1. A minimum of 16 hours in related fields outside of animal science.
2. At least 24 hours 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 500 of 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 depending on the student's area of concentration and professional goal. The advisory committee approves the coursework and the dissertation research proposal and deter-
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
Fillauer, Charles H., Ph.D. .......... Indiana
Harrison, Faye V., Ph.D. .......... Stanford
Howell, Bonita L., Ph.D. .......... Kentucky
Jantz, Richard L., Ph.D. .......... Kansas
Klippe, Walter E., Ph.D. .......... Missouri
Königsberg, Lyle, Ph.D. .......... Northwestern
Logan, Michael H., Ph.D. .......... Penn State
Parmalee, Paul W. (Emeritus), Ph.D. .......... Texas A&M
Schoedel, Gerald F., Ph.D. .......... Washington State
*Suny Binghamton
Wheeler, Margaret C. (Emerita), Ph.D. .......... Yale

Associate Professors:

Kramer, Andrew (Liaison), Ph.D. .......... Michigan
Marks, Murray K., Ph.D. .......... Tennessee

Assistant Professors:

Ferreira, Mariana, Ph.D. .......... California
Qiro, 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., Ph.D. .......... Northwestern

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

THE MASTER'S PROGRAM

Students wishing to enter the Master of Arts degree program with a major in Anthropology should have an undergraduate GPA of 3.5 in the major, 3.3 overall, and hold a bachelor's degree from an accredited university with a major in Anthropology. Applicants with a major in a related field (biology, sociology, 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 at the same time. In addition, the department requires a letter of intent from the applicant indicating career goals and reasons for selecting the University of Tennessee, three letters of recommendation, and one sample of the prospective student's written work (a class paper or research report); these items should be sent directly to the Graduate Secretary, Department of Anthropology, SSH 250, University of Tennessee, Knoxville, TN 37996-0720.

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

M.A. Requirements

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

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

2. A minimum of 30 credit hours in graduate courses. Twenty-four hours must be in coursework graded A-F. Coursework must include three core classes taken in the first year:
   a. 510 Method and Theory in Cultural Anthropology
   b. 560 Theory in Archaeology
   c. 590 Method and Theory in Biological Anthropology

Additional coursework should be selected in consultation with the student's advisor and must include one additional course from two anthropology concentrations besides the student's primary concentration. At least 20 hours of coursework must be at the 500 level or higher.

3. During the first year, comprehensive Graduate Evaluation Examinations (GEEs) are required of all M.A. students and are based on the content of the core courses. These examinations are given 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 insure 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 normally, students will complete and defend their theses during the Spring semester of their second year.

8. Two copies of the thesis are required by The Graduate School. In addition, bound copies of the thesis are to be provided to the department and all 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 conferral of the M.A. degree. Students holding Master's degrees from other institutions 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. Applicants who are accepted into the Ph.D. program must be admitted to the Ph.D. program unless appointed as 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 specialized competence over which the student will be examined, a brief delineation of the fields by the student, approved by the members of the committee, is presented to the department head and the student's major professor. As early as possible, but no later than a full semester after admission to candidacy, the student shall formally present a written dissertation proposal to the department head and advisor. Research and Coursework: Every potential Ph.D. candidate must complete two consecutive semesters of full-time residence prior to taking the doctoral comprehensive examination. The student must complete the minimum coursework requirements of The Graduate School, including at least nine hours of 500- or 600-level courses outside of anthropology, chosen in consultation with the doctoral committee, particularly the outside member who represents the cognate area. Outside coursework may be taken in a single discipline or 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 a special language course 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 analyses 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 220. (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 larger cultural settings through use of archaeological, ethnohistorical, and contemporary cases. Prereq: 130 Cultural Anthropology or consent of instructor.

414 **Political Anthropology (3)** Organization and dynamics of power and politics in both stateless and state-level societies. Role of symbols, rituals, and ideologies in producing and reproducing power relations. Relationships between actors (individuals) and structures. Encapsulation of traditional political forms and systems 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 process of processing, processing, identification, and interpretation of artifacts from historical sites. Artifacts material from historic East Tennessee 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.

463 **Rise 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.

464 **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.

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

480 **Human Osteology (4)** Intensive examination of human skeleton. Prereq: 110 and consent of instructor. 3 hrs and 1 lab.

481 **Museology I: Museums, Purpose and Function (3)** (Same as Art 481.)

482 **Museology II: Exhibition Planning and Installation (3)** (Same as Art 482.)

484 **Museology III: Field Projects (1-12)** (Same as Art 484.)

485 **Oral Biology (4)** Intensive examination of human dentition and oral skeletal structures: dento-facial embryology, growth, histological, cultural, and pathological aspects. Prereq: 120 or consent of instructor.


494 **Primate Behavior (3)** Social organization and behavior of selected species, including group composition, 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

501 **Graduate Research (1-9)** Independent investigation of special problems in anthropology. May be repeated. Maximum 18 hrs.

502 **Registration for Use of Facilities (3-15)** Required for the student not otherwise registered during any semester when University facilities and/or faculty time before degree is completed. May not be used toward degree minimums. 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, organizing, 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.

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

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


582 **Paleoanthropology (4)** Fossil record from origin of hominins to appearance of hominin families. Functional morphology and phylogenetic relationships of fossil humans. Prereq: 480.

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

585 **Laboratory Studies in Biological Anthropology (3)** Topical coverage of laboratory methods in biological anthropology. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

589 **Anthropological Genetics (3)** Application of population and quantitative genetic theory to study of human and nonhuman primate populations. Prereq: Consent of instructor.
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, and case studies. Historical change in urban form and design.

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 world. Fertile Crescent; Indus Valley; Hindu, Buddhist, and Mughal architecture of India, China, and Japan.

413 Tennessee Architecture (3) History of settlement patterns and buildings in Tennessee. Reading assignments, lectures, discussion, and field trips. Historical research using primary material.

414 History of Architectural Technology (3) Building materials and construction techniques from antiquity to present.

415 Medieval Architecture (3) History of architecture from decline of Rome to beginning of Renaissance.

417 The International Style (3) Survey of architecture of early 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.
422 Modern Eastern Architecture (3) Twentieth century architecture in Russia, Czechoslovakia, Poland, Hungary, East Germany, Romania, Bulgaria, Yugoslavia.

425 Special Topics in Architecture (1-6) Faculty initiated courses. Topics vary. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. E

432 Computer Applications in Design II (3) Advanced computer aided design using three-dimensional modeling software. Design analysis using computer animation, rendering techniques, visualization, and video. Prereq: Computer Applications in Design I or consent of instructor. Sp

433 Computer Applications in Design III (3) Integration of three-dimensional modeling and technical analysis using computers and architectural design building. Independent studies under faculty direction. Prereq: Consent of instructor. Sp

434 Building Energy Analysis (3) Balancing heat flow through external wall of residential and small and large commercial buildings. Local climate evaluation. Site planning, building orientation, and internal wall treatment, infiltration control, and other design elements. Energy use quantification methods and economic analysis of energy efficient design. Architectural program analysis of external and internal load elements. Prereq: 341.

444 Advanced Environmental Control Systems (3) In-depth analysis and innovative concepts in design of heating, ventilation, and air conditioning. Prereq: 341.

445 Advanced Lighting (3) In-depth analysis and innovative concepts in lighting. Prereq: 342.

463 Architectural Development (3) Principles and practice of architecture. Impact of economics, finance and urban policy on design and development of real estate. Open to all students.

473 Architectural Photography (3) Photography as design, research, and presentation media. Application of photographic techniques, printing and processing. Color and black and white.

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 Modern Architecture: Histories and Theories (3) Historical theory of modern architecture; late 19th and 20th centuries through broad-based examination of question of modernity and specific case studies of buildings, projects, landscapes and theories.

504 Issues in Preservation (3) Architectural issues: preservation, restoration and conservation of historic structures. Prereq: Consent of instructor.

507 Architecture, Culture and Modernity (3) Scope of ideas generated in architecture's recent history to reveal and explain production and reception of architectural history and background necessary to understand philosophical aspects. Prereq: Consent of instructor.

509 Seminar in Architectural Technology (3) Technological aspects influencing building form. Role of technical and cost aspects of architectural, environmental, and building infrastructure as integrated systems supporting access use and expression of building.

511 Environmental Influences (3) Environmental factors which influence regional character of architecture. Natural forces associated with these factors, cultural interpretation and response regarding importance and impact.

513 Cultural Aesthetics (3) Principles underlying cultural character of architecture. Role of social, political, and economic forces which influence interpretation of factors creating building's character.

514 Seminar in Ethical Imperatives (3) Social, cultural, philosophical and moral issues which impact professional responsibilities. Attitudes, values, and ideas that address formation of professional ethics.

515 Seminar in Issues in Urban Design (3) Investigations of urban forms, patterns, and attitudes that have shaped towns and cities. Prereq: Consent of instructor.

516 Materials and Methods of Construction (3) Properties of interior and exterior building materials and their relation to construction methods and detailing. Theory of materials selection and application and role of materials and methods play in design process.

521 Principles of Architectural Form (3) Historical and contemporary architectural theory through investigation of literature and related examples. Theories of understanding and theories of application related to generation of architectural form and space in response to both cultural and environmental focus.

525 Special Topics in Architecture (1-3) Student- or instructor-initiated course. May be repeated. Maximum 9 hrs. S/NC or letter grade.

526 Directed Readings in Architecture (3) Readings on topics of interest; primary texts, history, theory, urban issues, technology and professional practice. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

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

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

534 Research Methods (3) Quantitative and qualitative methods of research in architectural inquiry. Systematic study and application of data gathering and speculative investigations in field of architectural research. Review and identification of techniques and methodologies and applications for architectural research and scholarship.

535 Advanced Topics in Architectural Technology (3) In-depth research and investigation of architectural technology, structure, enclosure, mechanical and other architectural technologies. Prereq: Consent of instructor.

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


591 Foreign Study (1-9)

592 Off-Campus Study (1-9)

593 Independent Study (1-9)

Art

(Majors of Arts and Sciences)

MAJOR

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

Norman Magden, Director

Professors:

Blain, Sandra J., M.F.A. ................. Wisconsin
Brakke, P., M.F.A. .................. Yale
Daehnert, H. (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. .................. Yale
Loland, W. E., M.F.A. .................. Tennessee
Livingston, P. R. (Emeritus), M.F.A. ...... Wisconsin
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 assistantship, if desired.

2. Three letters of recommendation from former professors or professionals in the field;

3. An undergraduate major in art or evidence of equivalent proficiency;

4. A portfolio to be evaluated by the faculty.
M.F.A. Requirements
A minimum of 80 hours is required:
1. Successful completion of 20 hours of study 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 500. The student must be 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 500. 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 insufficient, the faculty may recommend a work period without advancement toward the degree, probation with specific goals set for a specific time, or dismissal.

ACADEMIC COMMON MARKET
An agreement among southern states for sharing graduate programs allows legal residents of certain states to enroll in certain graduate programs at UT on an in-state tuition basis. The M.F.A. program in Art is available to 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 consent of the student's committee, the instructors involved, and The Graduate School. Prerequisite is an undergraduate Art History minor, or its equivalent, and reading knowledge of French, German, or Italian, unless waived by the Art History faculty.

Art
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 and development and implementation. Exhibition design and installation techniques, labeling, production, ticketing and storage. Prereq: 481 or consent of instructor. (Same as Anthropology 482.)
483 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 483.)
499 Special Topics (3) Student-instructor-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.
507 Professional Practices: Teaching Internship (1) Individual study in development of skills and methodology in 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.
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 chemistry, 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-instructor-initiated course offered at convenience of department. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.
521 Graduate Ceramics I (2-5) May be repeated. Maximum 10 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 course work and successful second year evaluation by graduate faculty. May be repeated. Maximum 20 hrs. S/N only.

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. 1850 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 course work and successful second year evaluation by graduate faculty. May be repeated. Maximum 20 hrs. S/N only.
Art History

GRADUATE COURSES

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

411 Art of 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 (3) Art in Italy and the Eastern Empire from the beginnings of Christian art to c. 1500. 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 courtly 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.

461 Art of Southern and Eastern Africa (3) Art traditions of eastern and southern regions of Africa. Sculpture, painting, pottery, architecture, 11th through 19th centuries. Some ancient stone and Iron Age traditions. Diverse ethnic and regional art traditions practiced in area from 19th century to present.

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 ferracotta sculpture and rock paintings, 11th through 19th centuries A.D. for later ancient kingdoms.

473 19th-Century American Painting (3) From West and Copley to emergence of "The Eight." Theoretical basis for modern movement. Analysis 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.


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.

491 Special Topics in Art History (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.

492 Special Topics in Art History (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.

511 Graduate Drawing I (2-6) May be repeated. Maximum 10 hrs.

512 Graduate Drawing II (2-6) May be repeated. Maximum 10 hrs.


532 Photography II (3-6) Individual development of photographic problems and techniques. Prereq: Photography I and consent of instructor. May be repeated. Maximum 12 hrs.

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

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

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

577 Studies in Media Arts as Art (3) Selected topics in theory and history of media as art form. Prereq: 321 and 331. May be repeated. Maximum 12 hrs.


585 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.

593 Independent Study (1-15) See College of Arts and Sciences. Prereq: Consent of instructor. May be repeated with consent of department. Maximum 9 hrs.

595 Visiting Artist Seminar (3) Contemporary art issues by different visiting artists. May not be used toward art history requirement. May be repeated. Maximum 9 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/NC only. E

Art Painting

GRADUATE COURSES

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

GRADUATE COURSES

462 Intaglio I (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.

464 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.

562 Screen Printing IV (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 12 hrs.

564 Screen Printing 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.

593 Independent Study (1-15) See College of Arts and Sciences. Prereq: Consent of instructor. Maximum 10 hrs.

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 300 level sculpture. May be repeated. Maximum 12 hrs.

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

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. Maximum 10 hrs.

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.

410 Drawing (2-4) Intermediate to advanced. May be repeated. Maximum 12 hrs.

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

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

440 Painting/Color I (3-4) Advanced painting using watercolor. May be repeated.

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

470 Fabric (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

DEGREES

Audiology ........................................... M.A.
Speech and Hearing Science ................. Ph.D.
Speech Pathology ................................. M.A.

Stephen Handel, Interim Head

Professors:

Asp, Carl W., Ph.D. ...................... Ohio State
Carney, Patrick J., Ph.D. .............. Iowa
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

Associate Professors:

Burchfield, Samuel B., Ph.D. .... Michigan State
Ferrell, Charles J., M.A. ............... Tennessee
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
Filipsen, Peter, Ph.D. ................. Wisconsin
Harkrider, Ashley, Ph.D. .......... Texas
McCullough, Gary, Ph.D. ........... Vanderbilt
Ruark, Jacki L., Ph.D. ................. Pittsbugh

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 506, 511, 526, 561, 582, 539 or 541, 520 or 524, and at least two seminars from the following courses: 522, 523, 531, 626, or 681 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.

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

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

The program normally consists of three or more calendar years of graduate study beyond the master’s degree with the first year being devoted primarily to formal coursework and the last year to full-time research culminating in the doctoral dissertation.

The total program is a minimum of 80 semester hours, including a minimum of:
1. 24 semester hours in dissertation 600.
2. 6 semester hours in a research tool.
3. 6 semester hours in a cognate area outside the department.
4. 24 semester hours in 600-level coursework within the department of which:
   a. a minimum of 6 semester hours in the topic of major interest;
   b. a minimum of 6 semester hours in topic(s) of related interest;
   c. 3 semester hours in cognition, and
   d. 3 semester hours in supervised teaching experience.

A comprehensive examination to demonstrate knowledge in the concentration area and an examination of research competence.

6. A final oral examination.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT 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 Sciences 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: Speech-Language Pathology, Audiology. Consent of instructor.
434 Clinical Practice in Speech-Language Pathology II (1-4) Prereq: 433 and consent of instructor. Enrollment for fewer than 2 hrs must be prior departmental approval.
440 Voice Disorders (3) Prereq: consent of instructor.
455 Problems in Speech Pathology (1-3) Consent of instructor.
461 Introduction to Language Pathology in Children (3) Consent of instructor.
473 Audiology II (3) Basic principles of clinical audiology; pure tone, speech, masking and overview of special auditory tests. Prereq: 371.
494 Aural Habilitation/Rehabilitation of the Hearing-Impaired (3) Prereq: 473 and consent of instructor.
500 Thesis (1-15) P/NP only. Consent of instructor.
502 Registration for Use of Facilities (3-15) Prereq: consent of instructor. May be repeated. Consent of instructor.
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: 506 or equivalent or consent of instructor.
506 and 507 with 304 or consent of instructor.
506 Neural Bases of Speech and Language (3) Prereq: 306 and 507.
508 Advanced Clinical Practice in Speech-Language Pathology (4) Consent of instructor.
511 Introduction to Research in Speech and Hearing (3) Analysis of research techniques, fundamentals of statistics, application of statistics, and completion of a research project.
512 Clinical Practice in Audiology (1-4) Prereq: 473 and 494. May be repeated. Consent of instructor.
513 Clinical Practice in Audiology: Off-Campus Sites (1-4) Prereq: Consent of instructor. May be repeated.
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 acoustical imittance measurement. Prereq: 473 or equivalent or consent of instructor.

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

548 Special Problem 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 audiometry. 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.

552 Seminar in Speech Pathology (2-3) Current significant research in speech pathology. Topics vary. Prereq: 577 or equivalent. May be repeated with consent of department. Maximum 9 hrs.

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

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

560 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/conceptual deficits. 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 equivalent or consent of instructor.


576 Electrophysiological Assessment of Auditory Function (3) Audiory-evoked potentials and their anatomical origin. Use of various evoked potentials in evaluation and localization 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. Praxis in electronystagmography. Prereq: 507, 542, 546, and 576 or equivalents or consent of instructor.

579 Psycholinguistic Concepts in Speech Pathology (3) Psycholinguistic concepts and information theory in understanding the normal acquisition of language and certain disorders of language. Prereq: 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 of hearing-impaired individuals, speech reading, school-based programs, programs for adults and the elderly; student research projects. Prereq: Phonetics and Acoustics of Speech, 473 and 494 or equivalents or consent of instructor.

595 The Verbotonal System: Auditory/Speech Perception (3) Innovative theory, therapy procedures, and SUVAR amplification/filters for diagnosis/evaluation/remediation of speech and listening skills of hearing-impaired children/adults: use of rhymes, movements and suprasegmentals; special audiological tests, acoustic filters, corrective 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 Acoustics of Speech, 473 and 494 or equivalents or consent of instructor.

600 Directed Research and Dissertation (3-15) PI/OP only, E

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

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

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


608 Seminar in Speech Science (2) Experimental areas: speech physiology, psychoacoustic analysis, recognition, perception and intelligibility of speech, communication theory, and psycholinguistic measurement 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: aberrations of voice, articulation, speaking time and rhythm, language development or use, and language symbolization. Prereq: Consent of instructor. May be repeated. Maximum 8 hrs.

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

656 Directed Research (1-4) Participation in ongoing or non-dissertational research. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

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

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

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

560 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
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. Current emphases include flight testing, aircraft design, aviation meteorology, air traffic control, and airport management.

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

Both thesis and non-thesis programs are available. The thesis 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:
Research and Development

**Specialization**

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

**Administration Specialization**

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

**NON-THESIS OPTION**

The non-thesis program will be permitted in special circumstances and involves satisfactory completion of the following requirements:

**Research and Development Specialization**

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

**Administration Specialization**

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

**ACADEMIC COMMON MARKET**

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

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**GRADUATE COURSES**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>500 Thesis (1-15)</td>
<td>P/NP only, E</td>
</tr>
<tr>
<td>501 Aviation Systems: An Overview</td>
<td>(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.)</td>
</tr>
<tr>
<td>502 Registration for Use of Facilities</td>
<td>(3-15) Required for the student not otherwise registered during any semester when the student uses University facilities and/ or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N/C only. E</td>
</tr>
<tr>
<td>503 Air Vehicles</td>
<td>(Current capabilities and future requirements for civilian and military air vehicles. Parameters significant for air vehicle type selection. Integration of air vehicle into aviation systems. Prereq: 501.)</td>
</tr>
<tr>
<td>504 Airports and the Community</td>
<td>(Structure of airports and their communities. Technology and economics of cargo, baggage, ticket and passenger handling. Airport management, economics and logistics. Interfaces with community. Plans, programs and developments for collecting and distributing passenger and freight from various types of airports. Types of airport developments and their projections. Prereq: 501.)</td>
</tr>
<tr>
<td>505 Governmental Policies for Aviation</td>
<td>(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.)</td>
</tr>
<tr>
<td>506 Aircraft Design</td>
<td>(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, team and decision-making processes. Prereq: 501.)</td>
</tr>
<tr>
<td>510 Special Topics in Aviation Systems</td>
<td>(Current problems. Prereq: Consent of instructor. May be repeated with consent.)</td>
</tr>
<tr>
<td>521-32 Experimental Flight Mechanics</td>
<td>(3-3) Experimental techniques for flight mechanics. Specialized equipment and laboratory. Student participation in experiments demonstrating acquisition of flight test data. Necessary theory supports class experiments. Tests cover broad range of aircraft performance, stability and control characteristics in addition to instrumentation and data reduction methods. 521—performance; 522—stability and control. Prereq: Aerospace Engineering 422.)</td>
</tr>
<tr>
<td>550 Project in Aviation Systems</td>
<td>(Enrollment limited to Aviation Systems students in non-thesis program. May be repeated. Maximum 3 hrs allowed toward degree.)</td>
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**Biochemistry and Cellular and Molecular Biology**

*(College of Arts and Sciences)*

**MAJOR**

<table>
<thead>
<tr>
<th>Degree</th>
<th>Major</th>
<th>Submajor</th>
<th>Title</th>
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<tr>
<td>M.S. Ph.D.</td>
<td>Biochemistry and Cellular and Molecular Biology</td>
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<td>Bruce D. Mckee, Head</td>
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**REQUIREMENTS FOR ADMISSION**

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

1. One year of general biology or the equivalent;
2. A minimum of 8 semester hours of approved biology courses beyond the introductory level and including the subject areas of genetics, cell biology and physiology;
3. Two years of chemistry including one year of general chemistry and one year of introductory organic chemistry with laboratory;
4. At least one semester of biochemistry;
5. One year of physics;
6. One year of calculus;
7. 70 Gradute Record Examination scores;
8. A minimum grade-point average of 3.0 out of 4.0.
Otherwise superior students, deficient in one or more of the above requirements, may be admitted at the discretion of the department's Graduate Recruiting Committee.

**THE MASTER'S PROGRAM**

1. Biochemistry and Cellular and Molecular Biology 511-12-13, 515-16, and 517.

2. Compilation 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 the 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.

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: Biology 240. General Genetics, Chemistry 350-360, Organic Chemistry and Lab.

403 Advanced Genetics Laboratory (2) Experiments illustrating methods in modern genetics: techniques in classical, cyto-, molecular and developmental genetics. Model organisms, Drosophila and mice. Prereq: General Genetics and Organic Chemistry.

410 Cellular and Comparative Biochemistry (4) Electrolyte behavior, chemistry and structure of proteins; enzyme behavior and biological function, catabolism and energy capture, synthetic metabolism, nucleic acid function, and biochemical genetics: regulation of biological processes. May not be counted if credit received for 401. Prereq: Chemistry 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 approaches to modern cell biology and computer technologies. Experimental modules: techniques used in cell isolation, purification, culturing, fluorescent microscopy, 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: 410 or 410. F, Sp.


471-81 Biophysical Chemistry (3,3) Physicochemical principles with applications to biological problems. 471—Thermodynamics; chemical equilibrium; solution chemistry; transport; electrochemistry; kinetics; enzyme catalyzed elementary quantum chemistry; interactions of light with biological molecules; optical and magnetic spectroscopy; light scattering; cases 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).

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

502 Registration for Use of Facilities (3-15) Required for the student 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.

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; regulatory mechanisms; protein biosynthesis, translation, and membrane proteins. 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. Sp.

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 intracellular organelles, structures, cytoskeleton and cell junctions and adhesions. Prereq: 511, Sp.

515 Experimental Techniques 1 (4) Modern experimental methodology and instrumentation lab: cell growth, spectrophotometry; microscopy; nucleic acid purification and analysis; enzyme assays; enzyme purification; electrophoresis; computer analysis of nucleic acid and protein sequences. Lecture on theory of laboratory to accompany lab periods per week. Primarily for departmental graduate students. Prereq: Consent of instructor.

516 Experimental Techniques 11 (3) Laboratory rotations. Students work in laboratory of faculty member on clearly defined project. Written proposal and oral report. Primarily for departmental graduate students. Prereq: 515. S/N only.

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

520 Special Topics (1-2) Selected directed readings or special course in topics of current interest. Consult department listing for offerings. May be repeated with consent of instructor. Maximum 6 hrs. S/N only.

525 Graduate Research Participation (3-12) Tutorial laboratory experience. May be repeated. Maximum 12 hrs. E.

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

552 Physiology of Hormones (3) Cellular and organismal action of hormones in vertebrate and invertebrate animals. Prereq: 450 or consent of instructor. Recommended prerequisite: 502 and 2 hrs and 1 lab.

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

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

562 Introduction to Electron Microscopy - Transmission Electron Microscopy (4) Practical applications 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 510.) 2-3 hrs lab. Sp.

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

570 Advanced Concepts in Cellular/Molecular Biology (3) Concepts related to cellular and 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.
Botany

(= College of Arts and Sciences =)

MAJOR

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

Edward E. Schilling, Head

Professors:

Caponetti, J. D. (Emeritus), Ph.D. .. Harvard
Clebsch, E. E. C. (Emeritus), Ph.D. .. Duke
DeSelmin, H. R. (Emeritus), Ph.D. .. Ohio State
Evans, A. M. (Emeritus), Ph.D. .. Michigan
Heiman, A. S. (Emeritus), Ph.D. .. Ohio State
Herndon, W. R. (Emeritus), Ph.D. .. Vanderbilt
Hickok, L. G., Ph.D. .. Massachusetts

Holton, R. W. (Emeritus), Ph.D. .. Michigan
Hughes, K. W., Ph.D. .. Utah
Mullin, B. C., Ph.D. .. North Carolina State
Petersen, R. H. (Distinguished Professor), Ph.D. .. Columbia
Schilling, E. E. (Liaison), Ph.D. .. Indiana
Schwarz, O. J., Ph.D. .. North Carolina State
Wale, P. L. (Emeritus), Ph.D. .. Texas

Associate Professors:

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

Assistant Professors:

Cruzan, M. B. C., Ph.D. .. SUNY (Stony Brook)
Small, R. L., Ph.D. .. Iowa State
von Armin, A. G., Ph.D. .. East Anglia (UK)

Lecturer:

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

The Botany Department offers the Master of Science and Doctor of Philosophy degrees with concentrations in anatomy, biology, cytology, cyto genetics, ecology, genetics, lichenology, morphology, mycology, pharmacology, physiology, psychology, pteridology, and taxonomy.

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

1. Satisfactory preparation of a written formulation and an oral defense to the student's committee of a research proposal suitable for a thesis. This must be completed before enrollment in Botany 500.
2. Successful completion of 30 hours of graduate credit, at least two-thirds of which must be at the 500 level or higher.
3. Satisfactory completion of two hours at the 600 level.
5. Presentation of a 30 minute departmental seminar.
6. Educational service in the form of teaching and/or ancillary services; consult major professor and department head.

Non-Thesis Option

1. Satisfactory completion of 34 semester hours of approved graduate courses of which 30 semester hours must be in botany including Botany 503. At least two-thirds of the hours must be at the 500 level or higher.
2. Satisfactory completion of two hours at the 600 level.
3. Educational service in the form of teaching and/or ancillary services; consult major professor and department head.
4. Satisfactory performance on a final written examination on all work offered for the degree. The student's committee may also require that an oral examination follow the written examination.

THE DOCTORAL PROGRAM

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

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

1. Satisfactory presentation of a research problem by means of a written proposal and an oral defense to the student's committee. This must be completed before enrollment in Botany 500.
2. Satisfactory performance on a written comprehensive examination.
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, lichenology, pteridology, agronomy, phytochemistry, plant morphology and systematics. May be repeated under different topic. Maximum 6 hrs.

404 Plant Molecular Biology (4) Current research in plant molecular biology: techniques and procedures. Genome structure, gene expression and regulation, transgenic and transgenic plants, 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) photomicroscopy, and graphic presentation for research and public presentation 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 Problems in Botany (1-4, 1-4) Prereq: consent of instructor. 531- May be repeated. Maximum 12 hrs.

544 Seminar in Botany (1) Readings and discussions of current literature and/or selected topics in botanical research. May be repeated. Maximum 6 hrs. S/N C only.

550 International Broadcasting (3) Broadcasting systems in other countries. Analysis of international broadcasting organizations. Intercultural communication and international broadcasting. Prereq: Consent of instructor.

553 Environmental Assessment and Sustainable Development (3) Metrics used by stations and consultants in broadcasting. Prereq: Consent of instructor. S, A

559 Advanced Evolutionary Ecology (3) Advanced concepts in evolutionary and ecological genetics. Biogeography, climate, population genetics, evolution and natural selection, population growth and regulation, competition, niche, experimental ecology, phylogenetics in ecology, biodiversity and conservation. Prereq: General Biology and General Ecology; one or more courses on organismal biology (ecology, evolution) at the upper undergraduate level or consent of instructor. Students cannot receive credit for both 559 and 599. (Same as Ecology and Evolutionary Biology 599.) Sp, A

560 Doctoral Research and Dissertation (3-15) P, SP only.

561-99 Research in Botany (1-9) Independent research under the guidance of a faculty member. Prereq: 510 or consent of instructor. May be repeated. Maximum 12 hrs.

565 Environmental Assessment and Sustainable Development in Third World Countries (3) (Same as Ecology and Evolutionary Biology 565 and Planning 835.)

562 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.

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. Sp

580 Seminar in Radio and Television (3) Salient issues in broadcast. Topics vary. International broadcasting, cable television, new technologies, corporate television, educational and public broadcasting, broadcasting and society. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. (Same as Information Sciences 581.) F


The Department of Broadcasting 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.

GRADUATE COURSES

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. Cable regulations and programming. Entry of telephone companies in distribution video. Analysis of all recent 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. Prereq: Consent of instructor.

556 Radio & Television Law and Regulations (3) Legal problems faced by broadcast managers. Philosophy of regulatory policy formation. Efforts at self-regulation. Sociopolitical restraints, effects of laws and regulations, and public pressure on stations, networks, cable and new forms of electronic media. Situation of broadcast among media in terms of regulations. Prereq: Consent of instructor or admission to program. Sp

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. Sp


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 37996-0522, 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, 200 Stokely Management Center, College of Business Administration, The University of Tennessee, Knoxville, TN 37996-0575, Tel: (865) 974-5050.

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 (32 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, 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 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, college and work, the MBA program application, two completed academic 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 (32 hours total) consists of: a 3-hour foundations course taken during the first three weeks of August of the first year; prior to the beginning of fall semester, a 3-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, leadership, 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, demand management, customer relationship management, supplier management, and resource 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 learning the topics 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 within a team setting is an important element of the learning process. Individualized support is provided for developing both written and oral communication skills.

Concentration and Electives

A concentration area may be indicated on the MBA Program Application or this declaration may be deferred until after matriculation. In any event, selection 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 following 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 the 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 not 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 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 a different student group. The programs share a common core 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 within the curriculum varies somewhat from program to program depending on the intended student group. All programs result 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 usually take the Graduate Management Admission Test (GMAT) (some exceptions are noted within the specific program descriptions). No specific 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 qualitative and quantitative work. Applicants must demonstrate because of the integrated nature of the executive track curricula, 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 provided 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 various business functions and a good basis in strategic thinking. Learning is expanded through applying 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 18 months. Classes meet all day on Saturdays and occasionally on Friday evening and/or 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. 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 residency periods in alternate months starting in January and ending in December. The May residency period, however, is a global business seminar of two weeks and is held in South America, Asia, Europe, or Australia. The on-campus work includes synchronous distance learning classes and requires substantial and regular contact with faculty and other participants. The project work in the executive MBA is a large-scale management project running throughout the year. Students work with managers in their own organizations to choose a project of significant scale and scope. Each student project has a faculty advisor.

Applications are accepted for January entry only. The early application deadline is June 1, and the final application deadline is September 15. The GMAT may be waived depending on work experience. Students will receive materials for study in mid-November preceding the January start date.

Additional information on the executive MBA can be found at www.emba.utk.edu.

Physician Executive MBA
The physician executive MBA is provided for a national audience of physicians. The students for whom this program is designed have an M.D. or D.O. with five or more years of work experience. The curriculum objectives are the same as those for the executive MBA, but the physician executive MBA, many of the functional skills are taught in the context of the health care industry and there is specialized content related to the health care environment. The physician executive MBA is the right choice for physicians who want to have a voice in the health care industry and in their own careers and are seeking a program that allows them to continue their practice while earning their MBA degree.

The physician executive MBA is three consecutive semesters completed in 12 months. Classes meet all day on Saturdays and occasionally on Friday evening and/or 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 physician 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 three 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 entered 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

**August - First Year**
- **BA 511** MBA Core I 3
- **BA 512** MBA Core II 15
- **IE/ME504** Product Development Process 1

**Fall - First Year**
- **BA 513** MBA Core III 9
- **IE/ME506** Product Selection and Evaluation 2
- **IE/ME508** Integrated Product, Process, and Manufacturing System Design 3

**Summer**
- **IE/ME509** Project Management 1
- **IE/ME509** Project Management 1
- **Engineering major** 9-12

**Fall - Second Year**
- **IE511** Business Planning and Commercialization 3
- **IE/ME509** Project Management 1
- **Engineering major** 9-12

**Spring**
- **IE/ME509** Project Management 1
- **Engineering major** 6-9

**Summer (first session)**
- **IE/ME594** Culminating Integrated Project Report 3

**TOTAL** 63-69

*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 with the number of vacancies in each department. The Graduate School requires the Graduate School Application, transcripts from all previous college work, and additional information from international students. The college requires the Ph.D. application, scores from the GMAT, and four written recommendations. All materials should be received by the College of Business Administration not later than March 1. Late applications are considered only if space is available.

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

**Program of Study**

The Ph.D. normally requires 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 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 normally approved 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...
research methodology, management science, computer science, econometrics, and psychometrics.

4. Concentrations: The concentration is the focal point of the Ph.D. program. Students are expected to master the literature and research techniques in the concentration area and to do quality research as evidenced by the preparation of an acceptable dissertation. A minimum of 12 semester hours of coursework is required, including at least 9 hours of doctoral seminars. Graduate work taken in the concentration at other institutions is considered by the temporary doctoral advisory committee in approving the specific coursework required. Available concentrations are: accounting, finance, logistics/transportation, management (operations management and strategic management), marketing, and statistics. See the appropriate fields of instruction for specific course requirements.

5. A minimum of 9 semester hours of graduate coursework is required in an area outside, but complementary to, the concentration. The student may choose a 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 opting in the cognate area by completing a one-session, 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). Graduate courses accepted from other institutions must be included. Under "Other Requirements," the date of acceptance of the research proposal by the doctoral committee should be indicated. The application must be approved by the student's doctoral committee and the Associate Dean before submission to the Graduate School.

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

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

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 required to complete a minimum of 9 hours of coursework during the probationary period, with a minimum of 3.0 grade-point average. Probation will be lifted if the student's grade-point average rises above 3.0 or if the student completes a minimum of 9 hours of coursework with a minimum of 3.0 grade-point average. The dissertation normally must be completed within three years of the student's advancement to candidacy.

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, II (3,6-3,6) Development of roles and responsibilities of accountant as business advisor. Assessment and deliberation of multiple business environments. 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 Process Redesign (3) Enterprise Resource Planning (ERP) software as primary tool for redesigning business processes. Management methods required to facilitate redesign. Change management, consensus management, project management, and implementation methodologies. Configuration of ERP module and business processes for 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, team building, and written and oral communication skills. Finance and accounting fundamentals, marketing, economics, and ethical and legal environment of firm. Personal leadership skills, and assessment of students' leadership abilities. Integration of value chain: demand management, operations management, process design and management, and management logistics. Prereq: 501 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 marketplace. Prereq: 511, 512, and 513 or consent of Assistant Dean of MBA Program.

551 Executive Core I (12) Continuation of core course 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 of business, Human resource and organizational behavior topics in context of business systems and objectives. Personal development for leadership: individual and group 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) and design of balanced scorecard and strategy maps in sponsoring organization. Work within firm under guidance of faculty to develop proposal which defines issue, scope of project, Proposal to be approved by company and faculty. Prereq: Admission to execu-
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
Counce, Robert M., Ph.D. .................. Tennessee
Cummings, Peter T. (Distinguished Scientist), Ph.D. ....................... Melbourne
Frazier, George C., Jr. (Emeritus), D.Eng. ......................... Johns Hopkins
Holmes, John M. (Emeritus), Ph.D. .... Tennessee
Mooe, Charles F. (Alumni Prof.), Ph.D. ......................... Louisiana State
Perona, Joseph J. (Emeritus), PE, Ph.D. ....................... Northwestern
Prado, John W. (University Prof.), Ph.D. ....................... Northwestern
Sheth, Atul C. (UTSI), Ph.D. ............. Northwestern

Associate Professors:
Brooks, Duane D., Ph.D. .................... Houston
Peterson, 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
Kerber, David J., Ph.D. ....................... Minnnesota

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 20 hours in graduate coursework including chemical engineering and related areas excluding thesis. The minimum requirements are 15 hours in chemical engineering; 2 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 600 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.
415 Computer Applications in Chemical Engineering (3) Programming and methods of cost estimating, discount analysis, and empirical modeling. Prereq: Computer Programming courses.
467 Honors: Engineering Internship in Process Control (4) Selected students work in small groups on industrial problems in process dynamics and control. Directed by faculty and engineers from host company. Prereq: Process Dynamics and Control and consent of instructor.
477 Honors: Applied Process Automation Laboratory (3) Interfacing flexible batch continuous processes to a computer. Top down analysis with bottom up implementation, hierarchical structures and object oriented concepts. Prereq: Computer Programming courses.
500 Thesis (1-15) Pr/NP only. E
501 Graduate Seminar (1) Prereq: Admission to graduate program. Repeatable. S/NC only. 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 as a degree requirement. May be repeated. S/NC only. E
505 Engineering Analysis (4) Formulation and solution of problems in chemical engineering and materials areas, ordinary and partial differential equations; types of ODE, PDEs and integral equations; numerical stability of various algorithms; application of linear algebra concepts to control and optimization studies; introduction to linear programming. Computer projects. Prereq: Graduate standing or consent of instructor. (Same as Mathematics 507 and Chemical Engineering 507.)
507 Application of Linear Algebra in Engineering Systems (3) Fundamental concepts of linear algebra to problems in engineering systems: steady state and dynamic systems. Geometric and physical interpretations of solutions of homogeneous and nonhomogeneous systems, LU, QR, and SVD decompositions of system matrices; eigenvalue problems and similarity transformations in solving difference and differential equations; numerical stability of various algorithms; application of linear algebra concepts to control and optimization studies; introduction to linear programming. Computer projects. Prereq: Graduate standing or consent of instructor. (Same as Chemical Engineering 507 and Mechanical Engineering 507.)
511 Advanced Chemical Engineering Thermodynamics (3) Phase equilibria in ideal and nonideal solutions; composition relationship between phases, solution behavior and application to macromolecules; introduction to microscopic approach to thermodynamics. F
514 Fluid Mechanics and Polymer Processing (3) (Same as Materials Science and Engineering 541.)
516 Diffusive and Stagewise Mass Transfer Operations (3) Analysis of mass transfer phenomenon, connected mass transfer and reaction, mass transfer operations in packed beds and agitated vessels, membrane separations. Equilibrium stage concepts applied to mass transfer operation, emphasizing nonisothermal and multiphase systems. F
517 Introduction to Transport Phenomena (3) Unified treatment of mass, momentum, and heat transfer. Differential and macroscopic balances in governing equations. Analogies between processes. Use of dimensionless approach in scaling systems up or down. Applications involving transfer and simultaneous chemical reactions. F
518 Chemical Reactor Analysis (3) Rate models for heterogeneous reactions, properties of porous catalysts, catalyzed deactivation, fluid-fluid and fluid-solid reactors. F
519 Process Modeling and Simulation (3) Theories and structures of models and art of simulation. Model development from basic principles. Model development from plant data. Use of models in operation optimization and control. Prereq: Consent of instructor. E
525 Applied Microbiology and Bioengineering (3) Crossdisciplinary course combining basic concepts in microbiology, biochemistry, reaction kinetics, and biochemical and environmental engineering. Commercial processes, biodegradations/wastewater treatment, analysis of basic bioreactor systems, biosensors, and immobilized enzyme systems. Fundamental laboratory techniques during 6-week laboratory period. (Same as Environmental Engineering 575, Biosystems Engineering 575 and Microbiology 576.)
526 Process System Reliability and Safety (3) (Same as Nuclear Engineering 565.)
527 Special Topics in Chemical Engineering (3) May be repeated. Maximum 8 hrs.
530 Technical Review and Assessment (3) Preparation of a critical review of literature in an area related to chemical engineering. Limited to candidates in nonthesis option. Prereq: Consent of advisor.
531 Advanced Chemical Engineering Thermodynamics and Molecular Dynamics (3) Statistical thermodynamics, molecular-based computer simulations, Monte Carlo and molecular dynamics; applications to supercritical fluids, macromolecules and biological systems. Prereq: 532.
534 Advanced Diffusion Operations (3) Fixed and fluidized operations and development of separation processes. Prereq: 542.
534 Advanced Topics in Polymer Processing (3) (Same as Materials Science and Engineering 642.)
535 Advanced Transport Phenomena (3) Theory of mass, momentum, and energy transport in reactive and non-reactive systems. Formulation of transport models useful for analysis and design of separation processes, and chemical and biochemical reactors. Prereq: 505, 547.
537 Advanced Topics in Process Dynamics and Control (3) May be repeated. Maximum 8 hrs.
542 Advanced Topics in Polymer Processing (3) (Same as Materials Science and Engineering 542.)
543 Introduction to Transport Phenomena (3) Unified treatment of mass, momentum, and heat transfer. Differential and macroscopic balances in governing equations. Analogies between processes. Use of dimensionless approach in scaling systems up or down. Applications involving transfer and simultaneous chemical reactions. F
544 Chemical Reactor Analysis (3) Rate models for heterogeneous reactions, properties of porous catalysts, catalyzed deactivation, fluid-fluid and fluid-solid reactors. F
545 Process Modeling and Simulation (3) Theories and structures of models and art of simulation. Model development from basic principles. Model development from plant data. Use of models in operation optimization and control. Prereq: Consent of instructor. E
546 Diffusive and Stagewise Mass Transfer Operations (3) Analysis of mass transfer phenomenon, connected mass transfer and reaction, mass transfer operations in packed beds and agitated vessels, membrane separations. Equilibrium stage concepts applied to mass transfer operation, emphasizing nonisothermal and multiphase systems. F
547 Introduction to Transport Phenomena (3) Unified treatment of mass, momentum, and heat transfer. Differential and macroscopic balances in governing equations. Analogies between processes. Use of dimensionless approach in scaling systems up or down. Applications involving transfer and simultaneous chemical reactions. F

Chemistry

MAJOR
Degree Requirements

Chemistry ........................................... M.S., Ph.D.

Michael Sepaniak, Head

Professors:

Adcock, J. L., Ph.D. .............. Texas
Alexandroff, S. D., S.D. (Hochschul-Cansele Prof. of Polymer Science), Ph.D., California
Baker, C. D. (Paul and Wilma Ziegler Prof.), Ph.D., Ohio State
Bartmess, J. E., Ph.D. ........ Northwestern
Bloor, J. E., (Emeritus), Ph.D. .... Manchester
Brotchie, W. H., Emeritus, Ph.D. ...... Illinois
Cambridge, J. P., Ph.D. .......... Kansas
Canon, R. N., Ph.D. .......... Tennessee
Dean, J. A. (Emeritus), Ph.D. .... Michigan

Eastham, J. F. (Emeritus), Ph.D. ...... California
Felgerle, C. S., Ph.D. ............... Colorado
Fielder, W. H., Emeritus, Ph.D. .... Minnesota
Grimm, F. A. (Emeritus), Ph.D. ....... Cornell
Guichon, G. (Distinguished Scientist), Ph.D. ....... Ecole Polytechnique and Paris VI
Kabalka, G. W. (Robert H. Cole Prof.), Distinguished Prof., Ph.D. .......... Purdue
Kleinhefer, D. C. (Emeritus), Ph.D. ...... Princeton
Kovac, J. D., Ph.D. ............... Yale
Leitzke, M. H. (Emeritus), Ph.D. ...... Wisconsin
Magill, L. J., Ph.D. ............... Tennessee
Magill, R. M., Ph.D. ............... Yale
Pagni, R. M., Ph.D. ............... Wisconsin
Peterson, J. R. (Emeritus), Ph.D. ........ California
Schweitzer, G. K. (Distinguished Prof.), Ph.D. .......... Illinois
Sepaniak, M. J., Ph.D. ............. Iowa State
Vanderook, W. A. (Paul and Wilma Ziegler Prof.), Ph.D. .......... Johns Hopkins
Wehr, E. L. (Emeritus), Ph.D. ........ Purdue
Williams, T. F. (Distinguished Prof.), Ph.D. .......... London
Woods, C. III, Ph.D. .......... NC State
Wunderlich, B. (Distinguished Scientist), Ph.D. .......... Northwestern

Associate Professors:

Barnes, C. E., Ph.D. .......... Stanford
Dadmun, M. D., Ph.D. .......... Massachusetts
Hinde, Robert J., Ph.D. .......... Chicago
Schell, P. M., Ph.D. .......... Indiana
Xue, Z. B., Ph.D. .......... California

Assistant Professor:

Gilman, S. C., Ph.D. .......... Penn State
Musefeldt, J. L., Ph.D. .......... Florida
Turner, J. D., Ph.D. .......... Oxford
Young, D. G., Ph.D. .......... Ohio State

Students majoring in Chemistry for the master’s or doctoral degree are required to present as a prerequisite one year each of general, analytical, organic, and physical chemistry with a satisfactory record. At least one-half year of inorganic chemistry is also recommended. Students lacking any of these prerequisites may be admitted with appropriate deficiencies that must be removed without graduate credit. Applicants are required to take the general Graduate Record Examination.

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

THE MASTER'S PROGRAM

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

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

1. Research and a thesis totaling 8-12 hours of graduate credit in Chemistry 501.
2. Participation in seminar (Chemistry 501) during the entire period of graduate study, including the presentation of at least one seminar. (No more than 2 hours may be applied to the course requirements.)
3. Prescribed remedial courses based on performance on entrance examinations.
4. Sufficient graduate coursework in chemistry (at the 400 level or above) and/or a related field to make an overall total of 30 hours, including one of the following sequences: 550-31, 550-31, 570-72-73, 590-11-12, or 510-11-12. At least 14 hours of this graduate coursework must be at the 500 level or above.

5. A final oral examination.

THE DOCTORAL PROGRAM

The department offers concentrations in eight areas for the Ph.D.: analytical chemistry, chemical physics (in cooperation with the Department of Physics), environmental chemistry, inorganic chemistry, organic chemistry, 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 sequences: 510-11-12, 530-31-32, 550-52-53-54, 570-71-72-73, and 590-54-55.

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 departmental requirements include passing the above degree requirements in chemistry with concentration in chemical physics plus a 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

430 Advanced Inorganic Chemistry (3) Atomic and molecular structure; bond theories, descriptive chemistry of elements, kinetics and mechanism of inorganic reactions, applications of modern techniques for characterization 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 473 and 474 or both 481 and 483. 473 - Properties of gases; first, second and third laws of thermodynamics; chemical equilibria; simple phase equilibria. Prereq: 443. 481 - 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

479-89 Physical Chemistry Laboratory (2, 2) Experiments on topics discussed in 471-81 or 473-83. Prereq: coreq: 471 or 473. 479 for 479 and 481 or 483. 1 lab. 479-E, 489-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 (3-18) Required for student to continue registration 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.

505 Special Problems (3) Specialized research or experimental work on 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 electrophoretic phenomena. Required background: Two semesters of physical chemistry.

512 Electroanalytical Chemistry (3) Fundamentals of electro 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 model, group theory, quantum approach to molecular orbital theory, valence bond, molecular, and metallic bonding. Ligand field theories, solid state. Required background: One semester of inorganic chemistry. F

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

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

540 Nuclear and Radiochemistry (3) Nuclear properties, radioactivity, radioactive decay processes, nuclear structure and models, nuclear reactions, radiation 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; subtlest effects on acidity and reactivity; introduction to reaction mechanisms. Required background: Two semesters of organic chemistry. F


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

553 Spectroscopic Characterization of Organic Compounds (3) Preparation for the graduate student to elucidate structure using spectroscopic methods: nuclear magnetic resonance, infrared, ultraviolet and mass spectrometry. Required background: Two semesters of organic chemistry. F

554 Organic Spectroscopy Laboratory (1) Use of IR, UV, MS and multinuclear FTNMR spectrometers. Development of problem-solving ability in area of spectroscopic characterization of organic molecules. Prereq: 560 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. Sp

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, chemical dynamics, transport theory. Required background: Two semesters of physical chemistry. Sp

590 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.


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

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 significance. Prereq: Two of 550-51-52 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 550-51-52 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


James D. Moran, III, Interim Head

Professors:

Banton, Priscilla, Ed.D............. Tennessee Bueller, 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.

ADMSSION REQUIREMENTS

A completed file for review includes a departmental application, Graduate Record Examination (GRE) scores for the general section, and listing 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 faculty evaluation of GRE scores, undergraduate/graduate GPA, rating forms, work experience, and the match between student’s goals and department’s focus.

Prerequisites for admission to the master’s program are 8 semester hours of upper division undergraduate social science. Prerequisites for program completion are a master’s degree from a regionally accredited institution or equivalent, completion of the 18 hour core in the CFS master’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 prerequisite requirements.

THE MASTER’S PROGRAM

The Master of Science degree with a major in Child and Family Studies provides a broad foundation in the understanding of how children develop and how families function in today’s society. Two concentrations are available in child and family studies or in early childhood education. The early childhood education concentration 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 provisional designation as a Certified Family Life Educator (CFLE) through the National Council on Family Relations. Specific coursework within each specialization 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 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 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, 525, 530, 640, 590; 3 hours of 500-level statistical methods or interpretation of research methods (requirement may be met with 569); and comprehensive examination (36 credits).

THE PH.D. CONCENTRATION

The department participates in the doctoral program with a major in Human Ecology, concentration in child and family studies. Two themes are highlighted: the integration of theoretical knowledge and practical application and integration of family and child studies and concentration in a selected area of study. A doctoral program that is concurrently specialized and integrative in nature reflects the complexity of the disciplinary subject matter, provides a broader context to formulate theoretical and intellectual questions, and broadens the empirical literature for addressing those questions.

Requirements include:
2. Completion of the doctoral core: 640, 634, 691 or 650.
5. Three credits of advanced statistics.
6. Minimum 3 credits in specialized research methods.
7. 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 services (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).
8. Minimum of 6 credits in a cognate area.
10. 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 student not otherwise registered during any semester when student uses University facilities and/or faculty time while degree is completed. May not be used toward degree requirements. May be repeated. SNC 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, and ecological theory. Analyses, 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 management, 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 in Play (3) Comparison and contrast of theoretical framework and research methodologies on play. Developmental perspective on play.

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


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 (2) Community program practicum in education for human development and family living. Prereq: Consent of instructor. S/N/C only. E

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/N/C only. E

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


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

580 Special Topics in Human Development or Family Studies (1-3) Individualized group in special 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 (1-3) Individualized study experience in special topic 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. E

610 Advanced Special Topics in Human Development or Family Studies (1-3) Study of research and theory 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. Maximum 6 hrs.

630 Advanced Developmental Processes (3) Sociocultural, cognitive/communication development during infancy and childhood. Normative and non-normative development. Prereq: 510 and 511. 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) Techniques and analysis in qualitative research in human development and family studies. Use of methods: in-depth interviewing, participant observation, and case studies. Prereq: Communications 642 or Psychology 513.


670 Secondary Analysis of Survey Data (3) Applied training in secondary analysis of survey data. Identification of data archives, accessing data, evaluation, and analysis of survey data. Nationally representative data sets relevant to study of families, youth, or children. SPSS analytic software. Prereq: 570 or equivalent. Statistics 532 or 537 or equivalent.

691 Analytic Reasoning (3) Analysis of quantitative methodologies and measurement 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. ............... M.S., Ph.D.

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

Gregory D. Reed, Head

Professors:

Bennett, R. M., Ph.D. .............. Illinois
Burdette, E. G. (Fred N. Peebles Prof.), Ph.D. .......... Illinois
Chatterjee, A., Ph.D. .......... NC State
Davis, W. T., Ph.D. .......... Tennessee
Deatherage, J. H., Ph.D. .......... Tennessee
Drum, E. C., Ph.D. .......... Arizona
Goodpasture, D. W., Ph.D. .......... Illinois
Grecco, W. L. (Emeritus), Ph.D. .......... Michigan State
Heathington, K. W. (Emeritus), Ph.D. .......... Northwestern
Humphreys, J. B. (Emeritus), Ph.D. .......... Texas A&M
Johnson, H. L. (Emeritus), M.S. .......... Tennessee
Miller, W. A. (Emeritus), Ph.D. .......... PE
Reed, G. D. (Liaison), PE, Ph.D. .......... Arkansas
Richards, S. H. (Emeritus), PE, Ph.D. .......... Iowa State
Smoot, J. L., PE, Ph.D. .......... VPI
Tschantz, B. A. (Contrada Prof.), PE, Sc.D. .......... New Mexico State
Walker, C. R. (Emeritus), M.S. .......... MT
Wegmann, F. J., Ph.D. .......... Northwestern

**Associate Professors:**

Chou, K. G., Ph.D. .......... Northwestern
Cox, D. T., Ph.D. .......... PE, Penn State
Han, L. D., Ph.D. .......... California
Miller, T. L., PE, Ph.D. .......... Tennessee
Richards, S. H., PE, Ph.D. .......... Tennessee
Robinson, K. G., Ph.D. .......... VPI

**Assistant Professor:**

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

The Department of Civil & 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 major course, 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.

Thesis Option: A minimum of 30 semester hours, including 6 hours of thesis, is required.

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

Environmental Engineering

For a Master of Science with a major in Environmental Engineering, normally a Bachelor's degree in a field of engineering is required. For a student who does not have an engineering background, the following minimum prerequisite courses will be required: Engineering Fundamentals 101, 102; Nuclear Engineering 203 or Mechanical Engineering 331; Basic Engineering 121, 131; Engineering Science and Mechanics 231; Statistics 251; Civil Engineering 390, 395, 380; Mathematics 141, 142, 231, 241; Chemistry 120. In general, these must be completed with a B average before courses for graduate credit can be taken.

The Department of Civil and Environmental Engineering offers both thesis and non-thesis options for work toward the Master of Science degree in Environmental Engineering. 

Thesis Option: The student must present a minimum of 30 semester hours of approved graduate courses. The major shall include 6 semester hours of thesis and a minimum of 12 semester hours of approved environmental engineering coursework. A minor may be selected but is not necessarily required.

Non-Thesis Option: The student must present a minimum of 33 semester hours of approved graduate courses. The major shall include a minimum of 16 semester hours of approved environmental engineering coursework. A minor may be selected but is not necessarily required.

Either option must be approved by the student's major professor. A student's program must include a minimum of 9 semester hours of advanced engineering design courses selected from a list provided by the student's committee.

Normally, the graduate program of study will be adjusted by the head of the department and the student's committee to suit the individual academic objectives.

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 process of planning, locating and design of highway facilities; both geometric and pavement design. Prereq: 210, 251, 352.

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

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

521 Pavement Design (3) Empirical and theoretical based methods of pavement design and analysis, strengthening existing pavements, pavement distress and economical design alternatives. Prereq: 321 and 339.

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


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.

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

490 Water Resources Project Design (3) Coherent development of multipurpose reservoir and dam project, site acquisition, system layout and design, earthen and gravity dam foundations, spillways and梳 filter; maintenance and operation principles; and dam safety concepts, dam break analyses. Prereq: 390, 395.

495 Water Resources Development and Management (3) Principles of water resource project development 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) 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 completion of course. 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.

540 Advanced Soil Mechanics and Foundations (3) Design of plate and strip foundations, spread footings, and composite foundations. Theory and design of continuous beams, floors, 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 Design (3) Coherent development of multipurpose reservoir and dam project, site acquisition, system layout and design, earthen and gravity dam foundations, spillways 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 resource project development 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) 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 completion of course. 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 based methods of pavement design and analysis, strengthening existing pavements, pavement distress and economical design alternatives. Prereq: 321 and 339.

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


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.
558 Finite Element Applications in Geotechnical Engineering (3) Applications of finite element method to typical problems in geotechnical engineering. Confining and unloading, slope stability analysis. Prereq: Consent of instructor. S/NC only.

559 Geotechnology Seminar (1) Seminar topics in geotechnical and geological engineering. Research contributions and case histories by graduate students and engineers from surrounding communities. Prereq: Graduate standing and consent of advisor. May not apply toward degree. May be repeated. S/NC only.

560 Construction Management I (3) Management and organization of heavy and building construction projects. Prereq: Construction Methods and Equipment.

561 Construction Management II (3) Management organization of heavy and building construction projects. Prereq: Construction Methods and Equipment.

562 Structural Systems (3) Structural system analysis and design; dead, live, wind, and earthquake loads on buildings; vertical and lateral load resisting systems; use of computers in analysis and design. Prereq: Introduction to Structural Design.

563 Statically Indeterminate Structures (3) Elastic analysis of indeterminate articular and rigid frames with moment, slope, and deflection using energy, slope-deflection, and moment distribution methods; plastic analysis of rigid frames; and stability analysis of compression members and portal frames. Prereq: Structural Analysis II.

565 Structural Dynamics (3) Analysis of free and forced vibrations, and transient response of structures having many degrees of freedom; elastoplastic behavior, design for structural systems; earthquake design and response of structures. Prereq: Introduction to Structural Design.

571 Behavior of Steel Structures (3) Behavior of structural steel members due to static and fatigue loading, including yielding, fracture, and fatigue. Prereq: 471.

572 Fracture Analysis (3) (Same as Geology 572.)

573 Prestressed Concrete (3) Properties of prestressing materials; methods of pretensioning and posttensioning; analysis and design of simple and continuous beams and slabs. Prereq: 471.

574 Behavior of Reinforced Concrete Members (3) Moment-curvature and load-deflection relationships for reinforced concrete beams; bending and axial load; shear and torsion; relation between research results and specifications for design. Prereq: 471.

576 Masonry Design (3) Clay and concrete masonry materials; unreinforced masonry design; reinforced masonry design; seismic behavior of masonry structures. Prereq: Introduction to Structural Design.

580 Risk Analysis in Civil and Environmental Engineering (3) Applications of probability theory and statistical analysis in civil engineering disciplines: geotechnology, water resources, transportation, and environmental engineering. Prereq: Calculus II or consent of instructor.

590 Special Problems in Civil Engineering (1-6) Problems and topics related to current developments in field. May be repeated. Maximum 6 hrs. S/NC only.

595 Special Topics (1-4) Problems and topics related to current developments in field. May be repeated. Maximum 4 hrs. S/NC only.

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

651 Analysis Techniques for Transportation Systems I (3) Analysis of trip generation, trip distribution, and modal split and traffic assignment, employing mathematical, statistical, and computer science techniques. State of the art and new modeling techniques. Prereq: 545 or 558.

652 Analysis Techniques for Transportation Systems II (3) Advanced topics of application of mathematical, statistical, and computer science techniques in modeling and analysis of transportation systems. Prereq: 651.

671 Behavior of Steel Bridges and Buildings (3) Behavior, analysis and design of plate girders, columns, and composite members subjected to static and dynamic loading. Prereq: 571.

674 Behavior of Reinforced Concrete Beams and Slabs (3) Strength and behavior of statically indeterminate reinforced concrete beams and frames; limit analysis; behavior, analysis, and design of reinforced concrete slabs: yield-line theory, finite element solutions, and ACI Code Method. Prereq: 574.

680 Reliability of Constructed Systems (3) Development of safety factors and probability based design codes, Monte Carlo methods, reliability evaluation of existing infrastructures. Prereq: 580, introduction to Structural Design or consent of instructor.

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

Environmental Engineering

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

568 Seminar (1) 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 balance in natural ecosystems. Prereq: Consent of instructor.

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

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 local laws; floodplain hydrology and hydraulics, HEC-1, HEC-2: floodway encroachment, flood hazard zone and mitigation potential and cost benefit studies. Prereq: Hydraulics or consent of instructor for non-majors.

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


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 changes on rainfall 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: hydrodynamics, dispersion, anisotropy, layered soils, unsaturated flow and groundwater contaminant transport phenomena. Analytical and numerical solution of flow and transport equations. Prereq: Hydraulics and Hydrology or Civil Engineering 485 for geology majors. (Same as Geological Sciences 535.)

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 Physiocochemical 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-
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.

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

556 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.

557 Hazardous Waste Site Remediation (3) Advanced study of processes for hazardous waste site remediation; soil vapor extraction, soil washing, chemical destruction, thermal destruction, bioremediation. Prereq: 556 or consent of instructor.

570 Air Quality Management/Pollution Control (3) Introductory course on concepts of air pollution, analysis of relationships among sources, meteorology, effects, control sampling, emission control systems. Prereq: Consent of instructor.

571 Design of Air Pollution Control Systems (3) Design and evaluation of systems used to control emission of gaseous and particle 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 Saint 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: 552, 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.
speech communication. Both thesis and non-
thesis options are available.

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

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

Degree Requirements

The M.S. program emphasizes communi-
cations management and industry in the
areas of advertising, broadcasting, journal-
ism (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 two semesters of the student's program, except with written approval of the Associate Dean for Graduate Studies for the College.

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

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

4. Six hours of thesis work (Communications 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 prerequi-
site.

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

Students interested in subsequent entry into a doctoral program are advised to pursue the thesis option and to take additional courses in communications theory and research, subject to advisor's approval. After completion of the formal program of coursework and research for the thesis option, the student must pass an oral examination conducted by his/her graduate committee. The non-thesis option requires a written comprehensive examination and an oral defense of the project.

THE DOCTORAL PROGRAM

The Ph.D. with a major in Communications is intended to prepare scholars for teaching, research, administration, and service in the field of mass communications.

The program is interdisciplinary, consist-
ing 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 communica-
tions. 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 concentra-
tion (advertising, broadcasting, information sciences, journalism, public relations, or speech communication) supplementing the core. Courses may be taken in one or more of the Departments of Advertising, Broad-
casting, Speech Communication, and/or the Schools of Information Sciences and Journalism.

3. Twelve hours in a secondary concentra-
tion (outside the College of Communica-
tions).


5. Twenty-four hours of dissertation. All courses require the approval of the student's advising committee.

Admission to candidacy must be attained at least two semesters prior to graduation and requires successful completion of a written comprehensive examination.

Each doctoral student's progress will be reviewed annually by the Doctoral Committee of the College of Communications. Results will be reported to the student by his/her program advisor, who will convey the committee's recommendation concerning the student's remaining in the program (non-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 the preceding November. 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 Communi-
fication.

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 Communications is available to residents of Arkansas or Kentucky. The Ph.D. program is available to residents of the states of Alabama, Arkans-
as, Louisiana, Virginia, or West Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Student Services.

ACADEMIC STANDARDS

A student in the College of Communica-
tions 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 recommenda-
tion of the student's faculty committee.

GRADUATE COURSES

400 Mass Communications Law and Ethics (3) Legal issues directly affecting the mass media: libel, pri-
vacy, free press-fair trial, judicial controls, govern-
mental regulations. Ethical standards and practices of mass media in America. Prerequisite: Consent of instructor. (Same as Legal Studies 400.) E

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. SNC only. E

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

521 Tutorial in Communications Teaching (1) Ex-
perience as teacher under guidance of faculty mem-
er. Prerequisite: Consent of instructor. SNC only. P

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

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

551 Seminar in Science, Society, and the Mass Media (3) An investigation of the interplay between scientific community and mass media. How scientific information reaches public and impact of journalism on scien-
tific practice. Prerequisite: Consent of instructor.
Comparative and Experimental Medicine

(Office of the Provost)

MAJOR

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

L. N. D. Potgieter, Director

Joint Graduate Coordinating Committee:

Karstad, M.D., Ph.D., Anesthesiology
Lawler, J. E., Ph.D., Psychology
Lozio, C., M.D., Medical Biology
Potgieter, L. N. D. (Liaison), M.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 joint-administration 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 pathology, 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 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://cem.vet.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 coursework in chemistry through organic. May be repeated. Prereq: 622, 632, 642 or 652 or consent of instructor.

Ph.D. Program

Applicants must have a postgraduate degree in one of the biomedical 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.

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 accepted 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. 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- 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. 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--Veterinary 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

503 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, S, A

611 Advanced Topics in Medical Science (1-3) New developments in scientific 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, S, A

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, S, A

Comparative and Experimental Medicine--Graduate School of Medicine

GRADED COURSES

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

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

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

502 Registration for Use of Facilities (3-15) Required for the student 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 Predictive Toxicology (3) Principles and techniques of predictive toxicity: structure-activity relationships, expert systems, neural nets and molecular similarity. Sp, A

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

505E Experimental Animal Surgery (3) Competence in performing humane surgical modifications of experimental animals. Techniques of anesthesia. Drug administration and postoperative care. Prereq: Embryology, parasitology, physiology and/or consent of instructor. 1 hr and 2 labs. F

520 Wildlife Diseases (2) (Same as Wildlife and Fisheries Science 530.) F, A

551 Mammalian Organology (3) (Same as Animal Science 551.) F

552 Anatomy of Domestic Carnivores (4) (Same as Animal Science 552.) F

561 Pharmacology (4) Principles of pharmacokinetics and pharmacodynamics properties of drugs: mode of action, pharmacologic effects, chemical and physical properties, metabolism, toxicology, important idiosyncrasies and clinical applications. Prereq: Consent of instructor. F

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

602 Surgical Pathology (1-2) Examination of biopsy specimens and interpretation of observations. Preparation of specimens for sectioning. Prereq: Consent of instructor. May be repeated. Maximum 3 hrs. E

603 Correlative Post-Mortem Pathology (1-3) Gross and microscopic post-mortem examination of animals. Correlative interpretation of clinical diseases and lesions. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

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

605 Pathobiology Seminar (1) Subjects of current interest in biomedical science. 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. 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. 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

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 (1-3) Specialized in-depth experience in various disciplines. Current and future research methods. Recent advances in instrumentation in analytical techniques for comparative medicine. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. E

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.
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 departmental office.

Problems in Lieu of Thesis Option

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

Master's Minor in Computer Science

The graduate minor consists of any two of the three core courses (530, 560, 580) plus an additional 3 hours of graded computer science graduate-level courses at or above the 400 level.

THE DOCTORAL PROGRAM

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

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

2. The student is expected to have taken the GRE verbal and quantitative general test within the past three years and to have received at least a Bachelor's degree. The student should satisfy the same background requirements as for the master's program. See the departmental brochure for details.

3. Original research reported in a dissertation of high quality is emphasized. The minimum hour requirement 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, 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.

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

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

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when 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

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 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; comparison 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, runtime storage administration. Software system design issues; description, structured design and design review; software structures. 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 large sparse linear systems: graph models, reordering techniques, symbolic factorizations, data structures, numerical algorithms, complex systems, 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-
namic programming, efficient approximation algo-
rithms. Prereq: 580.

593 Independent Study (1-15) May be repeated.

594 Special Topics in Computer Science (1-3) May be repeated.

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

620 Advanced Topics in Intelligent Systems (1-6)
Prereq: Consent of instructor. May be repeated with consent of department.

650 Advanced Topics in Pattern/Image Analysis (1-6)
Prereq: Consent of instructor. May be repeated with consent of department.

660 Advanced Topics in Software Systems (1-6)
Prereq: Consent of instructor. May be repeated with consent of department.

670 Advanced Topics in Scientific Computing (1-6)
Prereq: Consent of instructor. May be repeated with consent of department.

680 Advanced Topics in Theory and Foundations (1-6)
Prereq: Consent of instructor. May be repeated with consent of department.

690 Advanced Topics in Computer Science (1-6)
Prereq: Consent of instructor. May be repeated with consent of department.

Consumer and Industry Services Management
(College of Human Ecology)

MAJORS

DEGREES

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

Nancy B. Fair, Head

Professors:
Breese, Randall R. (Liasion), Ph.D. ..................................................Florida State
Collier, Billie J., Ph.D. ..........................................Tennessee
Duckett, Kermit E., Ph.D. ........................................Tennessee
Fair, Nancy B., Ph.D. ........................................NC State
Hayes, Gene A. (Liasion), Ph.D. .............................................North Texas State
Wadsworth, Larry C., Ph.D. ........................................NC State

Associate Professors:
Bhat, Gajanan, Ph.D. ........................................Georgia Tech
Biant, Mary Dale, Re.D. ........................................Indiana
Costello, Carol, Ph.D. ........................................Tennessee
Fairhurst, Ann E. (Liasion), Ph.D. ........................................Ohio State
Krick, Ken L., Re.D. ........................................Indiana
Noriega, Pender, DBA ........................................NOVA

Assistant Professors:
Chen, Rachel, Ph.D. ........................................North Carolina
Lin, Li-Chun, Ph.D. ........................................Kansas State
Paige, Rosalind, Ph.D. ........................................Iowa State
Pfaffenberg, Carl, Ph.D. ........................................Tennessee
Young, Allison, Ph.D. ........................................Minnesota

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

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

Interested students should contact the department head for more information.

ADMISSION REQUIREMENTS

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

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

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

THE MASTER'S PROGRAM

The requirements for the major in Textiles, Retailing and Consumer Sciences are listed below.

Retail and Consumer Sciences (Thesis)

| Major (Required RCS courses): 510, 511, 541, 550, 562 | 16 |
| Cognate Area | 6 |
| Statistics | 6 |
| Total | 34 |

Textile Science (Thesis Option)

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

*Must include RCS 562 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, 526, 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); statistics (3 hours); Research Methods (3 hours); Internship (3 hours)

Thesis Option (6 hours): 500;
Non-Thesis Option (9 hours): 535;
Hotel and Restaurant Administration/Nutrition elective (3 hours); elective (3 hours).

For a description of courses in the hospitality management concentration, see Nutrition.

Recreation Administration

All students (27 hours): 415 or 440, 510, 515, 540, 541; Safety Education 443; Sport Management 512; social studies (3 hours); research methods (3 hours);
Thesis Option (6 hours): 500;
Non-Thesis Option (9 hours): 590 (6 hours); elective (3 hours).

Therapeutic Recreation

All students (24 hours): 420 or 425, 510, 515, 520, 521, 522; statistics (3 hours); research methods (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 548 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: 12-15
Cognate Area
Human Ecology 630
Electives
Dissertation
Total
83-89

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 one 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 (500-600 level)
Research Methods*
Electives
Dissertation
Total
82

*Must include 6 hours of laboratory techniques in materials analysis and characterization.

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 is available from the Office of 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 and financial analysis. 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. Prereq: Microcomputer Applications or consent of instructor. F, A
534 Special Topics in Foodservice and Lodging Administration (1-3) Lecture/discussion format. Contemporary developments and trends in industry. Prereq: Consent of instructor. May be repeated. 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 to hotel and lodging management of hotel organizations. 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) Study and measurement of food products applicable to foodservice industry. Market research, sensory evaluation, production techniques, and microbiological evaluation of food. Prereq: Quantity Food Procurement. Prereq: Consent of instructor. F, A
555 Foodservice and Lodging Law (3) Management organization and policy as imposed or governed by law. Prereq: Research Methods.* Prereq: Consent of instructor. F, A
600 Doctoral Research and Dissertation (3-15) P/NP only. E

Recruitment 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 private enterprises and operating selected profit centers in various 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) Symbiotic relationship between tourism and various sectors of leisure industry. Use of resources, both natural and developed, and economic impacts of ventures. Socio-cultural impacts on venue as well as 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

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. Prereq: Consent of instructor. 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. Sp, A
555 Foodservice and Lodging Law (3) Management organization and policy as imposed or governed by law. Prereq: Research Methods.* Prereq: Consent of instructor. F, A
600 Doctoral Research and Dissertation (3-15) P/NP only. E

Recruitment 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 private enterprises and operating selected profit centers in various 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) Symbiotic relationship between tourism and various sectors of leisure industry. Use of resources, both natural and developed, and economic impacts of ventures. Socio-cultural impacts on venue as well as 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 DEGREES

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
- Peterson, Marla P., Ph.D. ................. Ohio State
- Popen, William A. (Liaison), Ph.D. ............... Ohio State
- Thompson, Charles L., Ph.D. .......... Ohio State
- Walsh, Olga, Ed.D. ............................ Tennessee
- Woodside, M. R., Ed.D. ................. Mississippi
- VPI

Associate Professors:

- Ashmore, D. H., 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
- Diambra, 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
- 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 Rehabilitation 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 practices 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. SINC only. E

503 Problems in Lieu of Thesis (2-3) May be repeated. Maximum 6 hrs. SINC only. E

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

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

520 Statistics and Research Design: Conceptual (3) Consumer-oriented, conceptual treatment of statistics, research design, and quantitative basis of testing. E

525 Formal Measurement in Education and Counseling (3) Principles of test construction and item analysis. Survey of standardized tests of intelligence, achievement, aptitudes, 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. F,Su

550 Introduction to Pupil Personnel Programs (3) History, philosophy, professional standards, counselor role in relation to school staff and mental health professionals, and ethics of profession. F

551 Theory and Practice of Counseling (3) Philosophical bases of helping relationships; development of counselor 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: 652 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: Permission to program, 651 or consent of instructor. May be repeated. Maximum 15 hrs. E

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

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

559 Internship in Community Agency Counseling (1-6) Supervised postgraduate 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 formulation, 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 (2) Theory 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. Emphasis on use of psychological testing, interpretation for Wechsler, adults and adolescents. 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 only. E

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

602 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

604 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.)

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 12 hrs. S/NC only. 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 (1-4) Supervised employment in academic unit approved internship site in counselor education. May be repeated. Maximum 12 hrs. S/NC only. E

661 Education Implications of Neuropsychology (3) Theories and assessment. Common syndromes and their behavioral and cognitive manifestations. Prereq: 516 and 541 or equivalent individual assessment course, or consent of instructor. Sp, A


670 Foundations of Counseling Psychology (3) History, theory, research and practice of counseling psychology. Prereq: Admission to counseling psychology doctoral program. May be repeated. Maximum 8 hrs. F, Sp

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: 625 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. Sp

678 Theory and Practice of Counseling Supervision (3) Theory and practice of supervision in counseling. Prereq: 655, 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

Rehabilitation and Deafness

GRADUATE COURSES

415 Language Development of Deaf/Hard of Hearing I (3) Language problems of hearing impaired contrasted with those 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. Comparison 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 oral habilitation. Practicum experiences.

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

425 Introduction to the Psychology and Education of Deaf/Hard of Hearing I (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 and verbal communication. Visits to programs.

431-32 American Sign Language III, IV (3.3) Fluency of expressive and receptive sign communication skills. Use of language in context. Grammatical structures of ASL and cultural implications of deaf community. Must be taken in sequence. Prereq: 426; 431 for 432, 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 before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E


504 Clinical Experience in Teaching an Supervision of Exceptional Children (3-9) (Same as Special Education 504.)

509 Vocational Guidance and Career Planning: With Hearing Impaired (3) Utilization of psychological, educational, social and vocational, diagnostic materials and resources appropriate for hearing impaired to provide information and career decisions and individualized rehabilitation plan.

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

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


529 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 and programs which assist in integrating hearing impaired students in regular reading curricula and materials. Prereq: 415.

530 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.

532 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.

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

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

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

538 Disability Management (3) Return-to-work issues in disability management programs: early intervention, quality of life, and job design, standards and procedures for rehabilitation counselors/case managers in private sector rehabilitation.
Ecology and Evolutionary Biology

(College of Arts and Sciences)

MAJOR DEGREES

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., 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
Ethier, D. A., Ph.D. ........................ Minnesota
Greenberg, N. B., Ph.D. ................... Rutgers
Gross, L. F., Ph.D. .......................... Cornell
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
Sayler, G. S., Ph.D. ........................ Idaho
Schultz, T. W., Ph.D. ........................ Tennessee
Simonoff, D. (Gore Hunger Chair of Excellence), Ph.D. ................ Harvard
Stacey, G., Ph.D. ............................. Texas
Vaughan, G. L. (Emeritus), Ph.D., 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:
Greimler, M. J., 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) Advanced topics in ecology and evolution, 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, tropical, 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) 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

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/N only. E

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

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 Colloquium in Ethology (1) (Same as Psychology 516.)

520 Ecology for Planners and Engineers (3) Ecological principles and effects that human-caused changes have on living organisms. Lectures and field trips. Appropriate for students in Planning and 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. Terrestrial vegetation. Prereq: Undergraduate courses in animal physiology and ecology, Biochemistry and Cellular and Molecular Biology 440 and General Ecology or equivalent.

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. E

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 fresh water invertebrates exclusive of insects. Prereq: Comparative Invertebrate Biology or equivalent and consent of instructor. 3 hrs lab and field study.

545 Advanced Animal Behavior (3) Second-level course in ethology, stressing evolution, genetics, physiology, ecology and human behavior. Prereq: 450 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.)

554 Environmental Planning (3) (Same as Planning 555.)

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 yrs. Prereq: Consent of instructor. (Same as Geological Sciences 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.) F

575 Ecological Genetics (3) Genetics of natural populations, using both single-locus and quantitative genetic approaches. Prereq: 573 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/N 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 DEGREES
Economics ........................................ M.A., Ph.D.

Matthew N. Murray, Head

Professors:
Bohm, Robert A., Ph.D. .................. Washington (St. Louis)
Bowby, Roger L. (Emeritus), Ph.D. .... Texas
Carroll, Sidney L., Ph.D. ............... Harvard
Chang, Hui 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
Moore, John R. (Distinguished Prof.) (Emeritus), Ph.D. .... Cornell
Murray, M., N., Ph.D. ................ Syracuse
Neale, Walter C. (Emeritus), Ph.D. .... London
Russell, Milton (Emeritus), Ph.D. ....... Oklahoma
Spiva, George A. (Emeritus), Ph.D. .... Texas

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

Assistant Professors:
Bruce, Donald, Ph.D. ................... Syracuse
Fallaschetti, Dino, Ph.D. ............. Washington (St. Louis)
Santore, Rudy, Ph.D. .................. Ohio State
Stango, Victor O., Ph.D. .......... California (Davis)
Stewart, Steven W., Ph.D. .......... New Mexico

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 are 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 and 513, 514, and the remaining 6 hours must be in one field of economics. Of the 30 hours, a maximum of 9 hours in courses approved by the department may be taken in fields other than economics. Students electing the non-thesis option are required to pass a final comprehensive examination.

The thesis option requires 30 hours of coursework at the 400 level or above, including at least 24 hours at the 500 level or above, 6 hours of which may be thesis hours. Of the remaining 18 hours at the 500 level or above, at least 15 hours must be in economics and must include 511, 512, 513, and 514. A maximum of 6 hours may be in an area other than economics.

THE DOCTORAL PROGRAM
Admission to the Ph.D. program is based on promise of outstanding scholarship as demonstrated by previous academic performance, by scores achieved on the general portion of the GRE, and by recommendations. The program requires a minimum of 46 hours of coursework beyond the bachelor's degree or 24 hours beyond the master's degree, at least 24 hours of 600 level coursework and dissertation, and successful completion of the following:

1. Students are required to complete the following core requirements:
   a. Economic Theory: Microeconomic theory and macroeconomic theory by a qualifying exam taken not later than the beginning of the fourth quarter of study.
   b. History of Economics: Completion of 515 or 615 with a grade of B or better, or by qualifying examination.
   c. Quantitative Methods: Completion of 581, 582 and 583 with grades of B or better, or by qualifying examination.

2. Students failing a qualifying examination must retake the examination the next time offered. A qualifying examination may be taken a third time only with approval of the department. Failing a qualifying examination for a third time will result in dismissal from the doctoral program.

3. Students are required to demonstrate competence by comprehensive examination in at least two fields of specialization in economics. Students failing a comprehensive examination must retake the examination the next time offered. A comprehensive examination in a specific field may be taken a third time only with approval of the department.

4. Students are required to complete a doctoral dissertation to defend it successfully before the faculty.

MINOR IN ENVIRONMENTAL POLICY
The program is designed to give master's and doctoral level graduate students an opportunity to develop an interdisciplinary specialization in environmental policy. While administered through the Economics Department, the program is coordinated by a committee of representatives from the following participating departments and programs: Agricultural Economics and Rural Sociology, Botany, Civil and Environmental Engineering, Ecology and Evolutionary Biology, Economics, Forestry, Wildlife and Fisheries, Geography, Management, Planning, Political Science, and Sociology.

Students may request admission to the minor following admission to a graduate program in one of the participating departments. Students in good standing in one of these programs may apply for admission to the minor in environmental policy. The coordinating committee will consider the admission of interested students. Applicants should have a background in both natural and social sciences evidenced by prior coursework or experience. One course in environmental studies from the student's major discipline and one course in quantitative 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 573, 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 macroeconomic 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 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 under degree requirements may be repeated. S/N only.

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 distribution, market structures, derived demand and factor pricing, introduction to welfare economics, market failure and theory of second best, pure exchange.

515-14 Macroeconomic Theory (3,3) Determination of national income, prices, and employment. Results using Keynesian, non-market-clearing, monetarist, and rational expectations paradigms.

515 History of Economics (3) Purpose and methods of history of economic thought, the major economic issues, origins, concerns, methods, development and conclusions of classical political economy: From Adam Smith through J.S. Mill and K. Marx. Antecedents of neoclassicism: C.J. Dupuit and H.H. Gossen.

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 relations.

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.


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 (1-15) P/NP only. E

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


621 International Economics (3) Comparative advantage, trade migration, commodity production, trade, protectionism, protectionist arguments, trade liberalization, U.S. trade policy, exchange rate determination, balance of payments adjustment, multilateral 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.


642 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.

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

660 Advanced Macroeconomic Theory (3) Modern macroeconomic theory, post-Keynesian, and post-Keynesian theories of business cycles and monetary theory.


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

781 Public Policy: Environmental Policy and Natural Resource Economics (3) Analysis of public and private policies on the environment. Prereq: Consent of instructor.

782 Environmental and Natural Resource Economics (3) Environmental and Natural Resource Economics (3) Environmental economics, environmental policy, and natural resource economics. Analysis of issues related to market failure and differences between renewable and nonrenewable resources.

783 Economics of Environmental Policy (3) Topics in environmental economics. Emphasis on application of alternative policy instruments, defining policy objectives and role of risk in decision-making process.

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

THE MASTER'S PROGRAMS

The College of Education offers the Master of Science, Educational Specialist, Doctor of Philosophy, and Doctor of Education 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
The College of Education 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, 37996-3430, tel. (865) 974-0906, www.utk.edu/advising/advising.html.
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 one of the above fields. 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

The thesis option requires the completion of 30 hours, including 6 hours of Thesis 500 (36 hours for instructional technology concentration). The non-thesis option requires the completion of 33 hours of coursework (36 hours for special education and instructional technology concentrations). 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 teaching
- Modified and comprehensive special education
- Secondary teaching

Special education: early childhood

The thesis option requires completion of 36 hours, plus 6 hours of Thesis 500 for a total of 42 hours. The non-thesis option requires 36 hours, including 24 hours of prescribed licensure coursework and 12 hours in the academic discipline as approved by the student's committee.

For both tracks, a comprehensive written examination is required. An oral exam is given over the thesis.

**Educational 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 course 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
- 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, including practicum and internship experiences. The school psychology concentration requires the completion of a minimum of 66 semester hours beyond the baccalaureate. Refer to Degree Requirements under The Graduate School for complete program requirements.

**THE DOCTOR OF EDUCATION PROGRAM**

The Ed.D. program with a major in Education is available in the following concentrations 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 service) (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:

<table>
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<tr>
<th>Requirements</th>
<th>Minimum Hours</th>
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<tbody>
<tr>
<td><strong>Research Area</strong></td>
<td>15</td>
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<tr>
<td><strong>Core Requirements</strong></td>
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<tr>
<td>- Seminar in primary concentration</td>
<td>3</td>
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<tr>
<td>- Philosophy of science or history of 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>
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<tr>
<td>- Theoretical foundations and/or applications (select one)</td>
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<tr>
<td>- Learning and curriculum theory (Educational Psychology 609, 515, or Psychology 560)</td>
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<td>- Administrative/leadership theory (Educational Administration and Supervision 513, 680 or Educational Administration and Policy Studies 514)</td>
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<td>- Group dynamics (Counselor Education and Counseling Psychology 554)</td>
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<td>- Instructional technology (Instructional Technology, Curriculum and Evaluation Education 573 or 575)</td>
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<tr>
<td>- Trans-college seminar: two consecutive semesters (Education 601)</td>
<td>2</td>
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<tr>
<td><strong>Concentration</strong></td>
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<tr>
<td>- A minimum of 15 hours selected from one concentration</td>
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<tr>
<td>- A minimum of 9 hours selected from a specialization</td>
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<tr>
<td><strong>Cognate</strong></td>
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<tr>
<td>- A minimum of 6 hours selected from outside the college in addition to the designated research courses</td>
<td>6</td>
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<tr>
<td><strong>Dissertation</strong></td>
<td>24</td>
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The program requirements consist of three consecutive semesters of full-time enrollment. Additional details are available through the College's Graduate Center, Claxton Complex A332, (865) 974-8070, 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 ldmorgan@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 Alabama, 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 other 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. E

562 Direction and Supervision of Student Teaching (3) Roles and responsibilities of cooperating teachers and student teacher; objectives and policies of student teaching program; elements of clinical supervision; overview of research. F, Su

568 Teacher-Parent-Community Relations (3) Techniques for effective relations between parents and teachers; examination of roles and expectations; parental involvement; volunteer 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 effective teaching and consult with other professionals in personal development. May be repeated. Maximum 12 hrs. S/N only.

575 Professional Internship in Teaching (1-5) Intensive teaching and teaching-related experiences in professional settings in public schools. Enrollment limited to postbaccalaureate 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. E

589 Field Experience (1-3) Application of curricular and instructional principles, methods, and materials in schools. Prereq: Program prerequisites and consent of instructor. May be repeated. Maximum 9 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 academic 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
Educational Administration and Cultural Studies

MAJORS: DEGREES

College Student Personnel ........ M.S. ........ M.S.Ed., Ph.D........ Fisher, Leslee, Ph.D........ California

Education ......................... M.S., Ed.S., Ed.D., Ph.D........ Wright, Handel K., Ph.D........ Toronto

Educational Administration and Policy Studies .................................. M.S. .. Thayer-Bacon, Barbara, Ph.D........ Indiana

Human Performance and Sport Studies ............................................. M.S. .. Aper, Jeffery P. (Liaison), Ph.D........ VPI

Wrisberg, C.A., Ph.D........ Michigan .. Wisniewski, Richard (Emeritus), Ph.D........ Minnesota

Joy T. DeSensi, Head

Professors:

Allison, C. B. (Emeritus), Ph.D........ Oklahoma .. Ubben, Gerald C., Ph.D........ Minnesota

Bogue, Grady (Liaison), Ed.D........ Memphis State .. Phillips, Madge M. (Emeritus), Ph.D........ Iowa

DeSensi, J. T. ............ North Carolina (Greensboro) .. Phillips, Madge M. (Emeritus), Ph.D........ Minnesota

Howard, Robert (Emeritus), Ph.D........ Ohio State .. Ubben, Gerald C., Ph.D........ Minnesota

Malki, Anand (Emeritus), Ed.D........ Columbia .. Wrisberg, C.A., Ph.D........ Minnesota

McNinis, Malcolm, Ph.D........ Florida State .. Paul, Joan (Emeritus), Ed.D........ Alabama

Mead, B. J. (Emeritus), Ph.D........ Purdue .. Phillips, Madge M. (Emeritus), Ph.D........ Iowa


Morgan, W. J. (Liaison), Ph.D........ Minnesota .. Rubenstein, Berta M., Ed.D........ Minnesota

Paul, Joan (Emeritus), Ed.D........ Alabama .. Ubben, Gerald C., Ph.D........ Minnesota

Phillips, Madge M. (Emeritus), Ph.D........ Iowa .. Wisniewski, Richard (Emeritus), Ph.D........ Michigan

Ubben, Gerald C., Ph.D........ Minnesota .. Wrisberg, C. A., Ph.D........ Michigan

Associate Professors:

Aper, Jeffery P. (Liaison), Ph.D........ VPI .. Wrisberg, C. A., Ph.D........ Michigan

Norris, Cynthia, Ed.D........ Tennessee .. Wrisberg, C. A., Ph.D........ Michigan

Thayer-Bacon, Barbara, Ph.D........ Indiana .. Wrisberg, C. A., Ph.D........ Michigan

Wright, Handel K., Ph.D........ Toronto .. Wrisberg, C. A., Ph.D........ Michigan

Assistant Professors:

Fisher, Leslie, Ph.D........ California .. Mangione, Terry, Ph.D........ Buffalo

Gagne, Madeline, Ph.D........ California .. Mangione, Terry, Ph.D........ Buffalo

Joy T. DeSensi, Head

The Department of Educational Administration and Cultural Studies participates in graduate programs leading to degrees, majors, and concentrations in:

Master of Science

College Student Personnel

Education

Social foundations

Educational Administration and Policy Studies

Educational administration and supervision

Human Performance and Sport Studies

Sport studies

Specialist in Education

Education

Educational administration and supervision

Doctor of Education

Education

Educational administration and policy studies

Doctor of Philosophy

Education

Cultural studies in education

Educational administration and policy studies

Socio-cultural foundations of sport and education

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 ethnography, 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 values, beliefs, 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

500 Thesis (1-15) P/NP 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


505 History of Olympics: Ancient and Modern (3) Examination of various aspects of ancient and modern Games. Ancient Olympics 776 BC to 393 AD: Panhellenic Games. Modern Olympics, 1896 to date: political, social, class, gender, and economic issues that influence Games.


514 Advanced Philosophy of Sport (3) Major philosophical theories of sport. Various conceptual, moral, aesthetic, and social-political issues.

515 Social Theories of Sport (3) Liberal, democratic, and Marxist social theories of sport.

526 Philosophy of Education (3) Description, interpretation, and critique of philosophical/theoretical arguments: truths, knowledge and values in relation to education.

532 Professional Practice Issues in Sport Psychology (3) Study and critique of professional practice in sport psychology.

533 Psychology of Sport (3) Social psychological factors influencing human behavior in sport context: discussion of contemporary theory, research, and methodology. Prereq: General psychology course or consent of instructor.

534 Motor Behavior and Skill Acquisition (3) Topical explanation and application of principles of human movement behavior to acquisition and performance of skills; discussion of current research and methodology.

535 Health and Exercise Psychology (3) Study and cultural critique of various aspects of exercise psychology.

537 Sport Psychology Seminar (1) Issues and problems in applied sport psychology. Analysis and synthesis of research literature and discussion of sport psychology consultation practices and other topics. May be repeated. Maximum 3 hrs. S/NC only.

539 Development of Education Thought (3) Historic and philosophic approaches to the lives and writing of influential educators: Plato, Quintillian, Comenius, Rousseau, Pestalozzi, Froebel, Dewey. Prereq: Graduate status and consent of instructor. Su, Su

540 Foundations of Educational Policy (3) Relationship between theory, policy, and practice; educational policies that arise from philosophical and practical considerations relative to human nature, to educational purpose, content of curriculum and to methods and techniques for conducting educational enterprise. F, Su

541 Special Topics (1-3) Advanced study in selected disciplinary or professional areas of physical education and sport. May be repeated. F, Su

542 Sociological Aspects of Sport (3) Social and cultural factors influencing sport and physical education. Pertinent issues and research applications. Prereq: Consent of instructor.

544 Survey of Contemporary Philosophies In Education (3) Current debates within various philosophical fields of studies related to education.

545 Educational Sociology (3) Sociological analysis of American education system. Controversial social issues that affect educational system and potential solutions offered by various programs. Open to Juniors, Seniors, and graduate students. F

546 Topics in History of Education (3) May be repeated. F, Su

547 Topics in Philosophy of Education (3) May be repeated. F, Su

549 Topics in International Education (3) Historical, philosophical, and sociological foundations: selected nations and their cultures. May be repeated. E

560 Introduction to Qualitative Research in Education (3) Fundamentals of qualitative research methods
Educational Administration and Supervision

GRADUATE COURSES

513 Administrative and Organizational Theory in Education (3) Introduction to theoretical administrative and organizational foundations of management and supervision of educational programs and institutions. F, Su

515 Human Relations and Communication in Administration (3) Development and use of effective interpersonal communication skills and channels, intergroup relations, supportive work climates, personnel management and appraisal, motivation, leadership, role of values, attitudes, and expectations in administration. F, Su

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

521 Administration of Special Services (3) Legal, 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 evaluation frameworks. Inclusion and full service delivery. Sp, Su

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

535 Administrative Applications of Microcomputers (3) DOS, word processing, data base management, spread sheets, and computer communications. Review and development of specific administrative applications: scheduling, attendance, student record systems, and accounting. F, Su

544 School Finance and Business Management (3) For prospective building level administrators. Financial and logical management tasks and procedures in individual school setting. Prereq: M.S. Introductory core or consent of instructor. F, Su

547 Educational Facility Planning (3) Concepts and skills for development, evaluation, construction, renovation, maintenance, finance, 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: building and maintaining employee information, supervisory and personnel supervision, counseling techniques, interviewing, personnel planning, collecting and maintaining employee information. Supervision of instructional and non-instructional personnel, 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 qualitative and quantitative 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) Legal responsibilities of educational supervisors and administrators: problems concerning law and public education. Prereq: M.S. Introductory core or consent of instructor. Sp, Su

580 Internship in Educational Administration (3) Field experience in a school setting working directly with administrator. At end of planned course of study. Placement by department assignment. Prereq: 21 hours 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. Prereq: M.S. Core or consent of instructor. F, Su

590 Special Topics (1-3) May be repeated. E

592 Field Problems in Educational Administration and Supervision (3) Topic to be assigned. May be repeated. S/NC or letter grade. E

595 Seminar in School Leadership, K-12 (3) On-site study of quality school processes throughout region. Prerequisites: makes organizations "benchmarks of the twenty-first century". Prereq: Consent of instructor. May be repeated. S/NC or letter grade. F, Sp

605 Advanced Seminar in Administrative Theory (3) Interdisciplinary seminar. Readings selected by faculty for research and scholarly value from current classic theoretical studies and current periodical literature in administrative and organizational theory.
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) Theoretical and methodological approaches to quality in higher education and examination of contemporary policy issues related to quality assurance in colleges and universities.

537 Student Assessment in Higher Education (3) Outcome assessment in American higher education: origins of assessment policies, rationales for assessment policy and practice, constructs and outcomes typically assessed, methods for conducting assessment, and uses of assessment data. Philosophies, priorities, and values, recent assessment efforts in higher education.

542 The College Student and the Court (3) Legal precedent affecting student personnel services in public higher education. Student discipline, housing, dress, organizations, activities fees, tuition and related federal regulations.

543 American Higher Education in Transition (3) History, philosophy, purposes, functions, organizations and programs in American higher education.

570 Student Affairs Administration in Higher Education: Theory & Practice (3) Historical, philosophical and organizational perspectives. Functional areas comprising field and major issues.

574 The College Student (3) Today's college student beginning with transition into college, through critical first year and beyond, culminating in senior year and another period of transition.

599 Internship in College Student Personnel (1-4) Prereq: Consent of instructor. May be repeated. S/NC only.

619 Administration and Governance of Higher Education (3) Trends, structure and process of administration. Development of administrative theory and practice in higher education. Prereq: 543 or consent of instructor.

630 Special Topics (1-3) May be repeated. E

640 Policy Issues in College and University Law (3) Legal precedent affecting organizations, administration, and finance of higher education. Academic freedom, faculty tenure, religious liberty, administrative law, academic due process and affirmative action in employment.

645 Curriculum & Instruction in Higher Education (3) Content and organization of institutional strategies and curriculum structures in higher education.

650 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.

670 Values and Ethics in Educational Leadership (3) (Same as Educational Administration and Supervision 670.)

698 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 institutional improvements in higher education at state, regional, and federal levels.

The Department of Educational Psychology offers graduate programs leading to degrees, majors, and concentrations in: Master of Science

Educational Psychology

Adult education
individual and collaborative learning

Educational Specialist

Education
School psychology

Doctor of Education

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/~edpsych.

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/~appedpsy.

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.