Fields of Instruction

Accounting and Business Law  
(College of Business Administration)

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

Keith G. Stanga, Head

Professors:
Anderson, Kenneth E., CPA, Ph.D.................................................. Indiana
Dittrich, Norman E. (Emeritus), CPA, Ph.D............................................. Ohio State
Herring, Hartwell C., III, CPA, Ph.D. ...... Alabama
Kiger, Jack E. (Warren L. Slagle Prof. of Acct.), CPA, Ph.D. ...... Missouri
Reeve, James M. (Distinguished Prof.), CPA, Ph.D................................. Oklahoma State
Roth, Harold P., CPA, Ph.D. ................. VPI
Stanga, Keith G. (Arthur Andersen Prof.), CPA, Ph.D................ Louisiana State
Williams, Jan R. (Ernst & Young Prof.), CPA, Ph.D................................ Arkansas

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

Assistant Professors:
Ayers, Susan, CPA, Ph.D. .......... Arizona State
Bein, Bruce K., CPA, Ph.D. ............. Arizona State
Carcello, Joseph V., CPA, Ph.D. .......... Georgia State
Hethcox, Kathleen B., Ph.D. .......... Oklahoma

THE MASTER OF ACCOUNTANCY PROGRAM

The objective of the M.Acc. program is to provide persons who have a high level of

ability and motivation with the depth and understanding of accounting that will enhance

their probability of success in a career in professional accounting. Moreover, the

student's educational experience should develop perspectives toward the discipline of

accounting in a manner that will enable the student to spearhead innovation and change in

response to needs in public accounting, industry, and government.

UTK's accounting undergraduate and graduate programs are accredited by the

American Assembly of Collegiate Schools of Business and are among the initial programs in

the nation to receive this accreditation.

Admission Requirements

Application deadlines for international students are: Fall and Summer, January 15.

Application deadlines for U.S. citizens and permanent residents are: Fall and Summer,

March 1. The program is designed both for students who have completed an accredited

baccalaureate degree program with a major in Accounting and others. Those without

standing undergraduate records in areas other than accounting may earn the M.Acc. degree by

completing prerequisites in accounting and by including courses in other business and related

disciplines to supplement the applicant's undergraduate background. Students entering

the program should be computer literate and are expected to have completed coursework in

calculus, principles of accounting, and

introductory economics.

In addition to the general admission requirements for The Graduate School, M.Acc.

applicants are required to take the Graduate Management Admission Test (GMAT) and submit

information on forms provided by the College of Business Administration. Applicants

whose native language is not English must submit results of the Test of English as a

Foreign Language (TOEFL).

Course Requirements

A student's program encompasses a minimum of 30 semester hours of graduate coursework. Specifically, the student must complete courses in accounting and other

areas as indicated below. Each course is 3 semester hours of graduate credit.

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

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

Business Core (9 hours): Business Administration 502-03; Business Law 511.

Accounting Core (6 hours): 506-07.

Accounting Concentration (9 hours): Three concentrations are available:


3. Taxation: 531, 532, 533, 534, 539.

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

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

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

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

Business Core (12 hours): Business Administration 502-03; Business Law 511; and a

non-accounting business elective to be approved by advisor.

Accounting Core (9 hours): 506-07, 521.

Accounting Concentration (9 hours): Three concentrations are available:


3. Taxation: 531, 532, 533, 534, 539.

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

Transfer Credits

A maximum of six semester hours taken at other AACSB accredited institutions that

otherwise conform to the transfer policy of The Graduate School may be credited toward

M.Acc. degree requirements.
Other Requirements

To qualify for the degree, a student must maintain a B average (3.0) or above in the program. The student must satisfactorily demonstrate his/her ability to recognize, analyze, and solve accounting policy problems and integrate concepts from the various areas of accounting by passing a comprehensive written examination. This examination is included in the capstone course in each concentration as follows: 519, Seminar in Accounting and Auditing Policy; 531, Tax Policy; and 549, Systems Issues and Policies.

BUSINESS ADMINISTRATION CONCENTRATION

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

Ph.D. Concentration: Accounting.

This degree provides a research-oriented terminal qualification for those seeking entry-level faculty positions in accounting. Students take approximately three years of coursework beyond the bachelor's degree, including a doctoral sequence designed to expose students to various areas of accounting research. Courses in accounting and other areas are selected to supplement the student's individual background and to prepare the student in an area of accounting specialization (financial, managerial, auditing, tax or systems). The final year is normally spent completing the dissertation research.

Minimum course requirements are 12 hours including 611, 612, 613, and one other accounting course to be approved by Ph.D. accounting program advisor.

ACADEMIC STANDARDS

A graduate student in the College of Business Administration whose grade-point average fails to maintain a B average (3.0) or higher at the end of the probationary period. The probationary period is defined as the next semester's coursework as established by the graduate program for full-time students and the next two semester's coursework as established by the degree program for part-time students.

ACADEMIC COMMON MARKET

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

Accounting

GRADUATE COURSES

415 Governmental and Nonprofit Accounting (3) Contemporary issues in theory and practice of governmental accounting principles; environment of state and local government; governmental accounting principles; fund accounting; accounting for non-governmental nonprofit entities. Prereq: 414 or consent of instructor.

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

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

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

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

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


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

531 Tax Research, Methods, and Procedures (3) Development of expertise in tax research using authoritative sources through available technologies. Advanced study of tax accounting methods, periods, procedures, and review of fundamental tax concepts to provide foundation for tax practice. Prereq: 431 and admission to M.Acc. program.

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

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

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


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

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

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

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

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

594 Graduate Seminar in Accounting (3) Topics vary. Prereq: Admission to M.Acc. program or consent of instructor.

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

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

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

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

Business Law

GRADUATE COURSES

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

Advertising

(College of Communications)

MAJOR

DEGREES

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

Ronald E. Taylor, Head

Professors:

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

Taylor, Ronald E., Ph.D............................. Illinois

Associate Professors:

Haley, Eric, Ph.D.................................. Georgia

Hoy, Marias, Ph.D................................. Oklahoma State

Assistant Professors:

Morris, Margaret, Ph.D............................. Georgia

Raman, Niranjani, Ph.D............................ Ohio State

Texas

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

GRADUATE COURSES

490 Special Topics (3) Topics vary: advanced media strategy, advanced creative strategy, direct marketing, and advertising and social issues.
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 36 hours of graduate credit in courses approved by the student's advisory committee.
2. A minimum of 24 hours of graduate credit in courses numbered at or above the 500 level.
3. A minimum of 12 hours of graduate credit in courses appropriate to the area of concentration taught in the department and a minimum of 6 hours taught from outside the department.
4. A minimum of 3 hours of graduate credit in coursework in either research methodology or statistics.
5. A 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.
4. A minimum of 3 hours of graduate credit in coursework in either research methodology or statistics.
5. A creative component designed by the student and approved by the student's advisory committee for 3 hours of graduate credit.
6. A written and oral comprehensive examination.

GRADUATE COURSES

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

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

502 Registration for Use of Facilities (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

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

522 Extension Teaching Methods (2) Teaching/learning methods and techniques applicable to extension work, interpersonal relations and effective performance. Result of demonstrations, meetings, tours, audio-visual aids. Prereq: 411 or consent of instructor. Sp

523 Extension Program Evaluation (2) Principles, instruments and techniques of identifying, gathering, analyzing, and using data to appraise planning and teaching and to determine progress of clientele. Prereq: 411, 521, or consent of instructor. Sp

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

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

526 Agricultural Education for First-Year Teachers (2) Developing competencies needed by first-year teachers for planning, organizing and conducting programs of instructional agricultural education. Prereq: 411 or 436 or consent of instructor.

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

531 Extension History, Philosophy and Objectives (2) Historical and philosophical foundation of adult education in American agriculture; major issues, legislation, movement, farmer organizations and programs. Cooperative Extension Service, origin, legislation and growth, and nature of present-day objectives and programs. Prereq: 411 or consent of instructor. Sp

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

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
Associate Professors:

Buschermohle, Michael J., Ph.D. ..........Clemson
Freeland, R. S., Ph.D. ...............Tennessee
Grandle, G. F., Ph.D. .................Tennessee
Hart, W. E., Ph.D. .................Purdue
Wilkerson, J. B., Ph.D. ...............Purdue
Yoder, D. C., Ph.D. .................Purdue
Yoder, R. E., PE, Ph.D. ..........Colorado State

Assistant Professors:

Burns, R. T., PE, Ph.D. ............Tennessee
Hubert, G. J., PE, Ph.D. ..........Illinois
Ramam, R. R., Ph.D. ............Cornell
Womac, A. R., PE, Ph.D. ..........Tennessee

Graduate programs leading to the Master of Science and Doctor of Philosophy with a major in Biosystems Engineering are available to graduates of a recognized curriculum in engineering, mathematics, or one of the physical or biological sciences. A graduate program leading to the Master of Science in Biosystems Engineering Technology is available to graduates in a recognized curriculum in agriculture or other related fields.

A completed departmental data sheet and three completed Graduate School Rating Forms are required in addition to The Graduate School application.

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

THE MASTER'S PROGRAMS

Biosystems Engineering

Applicants who have not previously earned a degree from an ABET-accredited engineering program must submit scores from the GRE general and engineering subject examinations. Applicants accepted into the program must complete at least 30 semester hours to earn a degree. Of these 30 hours, 20 must be in courses numbered 500 or greater (6 hours of thesis plus 14 hours of other courses). Other specific requirements for the 30 hours are:

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

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

Biosystems Engineering Technology

Thesis Option: Applicants who have not previously earned a degree from a professionally accredited program within the U.S. must submit scores from the GRE general examination. Applicants accepted into the program must complete at least 30 semester hours to earn a degree. Of these 30 hours, 20 must be in courses numbered 500 or greater (6 hours of thesis plus 14 hours of other courses). Other specific requirements for the 30 hours are:

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

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

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

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

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

THE DOCTORAL PROGRAM

Departmental Requirements

Students applying for admission into the doctoral program must submit evidence of ability to perform and report independent research to the satisfaction of the faculty of the department. An approved master's thesis will usually be acceptable for this purpose. Scores on the GRE general and engineering subject examinations also are required for applicants who have not received a degree from an ABET-accredited engineering program. To earn a degree, each doctoral student must complete at least 75 hours of approved graduate credit (beyond the baccalaureate degree) in Biosystems Engineering and supporting areas (engineering, computational methods, agricultural and biological sciences, and other related areas). Of the 75 hours, 48 must be in courses numbered greater than 500 (including 24 hours of course 600) and 6 hours of courses at UTK numbered greater than 600. Other specific requirements for the minimum 75 hours are:

Major subject courses 18 hours
Coursework in computational methods (mathematics, computer science, statistics, or any course containing appropriate computational components that may be approved by the department) 9 hours
Program electives 21 hours
Seminar (504, 505 or equivalent courses) 3 hours
600 Dissertation 24 hours

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

Biosystems Engineering

GRADUATE COURSES

403 Machine and Component Design (3) Nature of design; functional analysis; creativity; geometric and kinematic requirements; plane mechanisms, force, stress, deflection, and time analyses. Prerequisites: 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 waste management systems with consideration given to flows, pipe characteristics, climate, water quality, system characteristics, and impact on crop yield and water quality. Prerequisites: Soil and Water Conservation and Engineering Lab. 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. Prerequisites: 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 biological materials. Mass and energy balances, product and waste characterization, equipment specifications, economic analysis, safety, and human factors. Design content: 3 hrs. Prerequisites: Process Design and Biological Materials. 1 hr and 2 labs. F

451 Electronic Systems (4) Basic electronics with biological applications. Analog and digital electronics; sensing and controlling physical and environmental parameters; sensor selection and interfacing; signal conditioning; process control. Laboratory experiments and design projects. Prerequisites: Circuits and Electronic Mechatronics. 3 hrs and 1 lab. Sp

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

502 Registration for Use of Facilities (3-16) 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, G/NC only. E


**Biosystems Engineering Technology**

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 systems, and materials handling. Prereq: Introductory Physics, Basic Calculus. 2 hrs and 1 lab. F

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

424 Agricultural Waste Management and Pollution Control (3)
Waste renovation fundamentals, characteristics of animal manure, techniques for collection, transporting, storing, and utilizing livestock waste. Prereq: Basic 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: Introductory Physics 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; sand considerations; materials handling and disposal methods. Prereq: Physics 121 or consent of instructor. 2 hrs and 1 lab. Sp

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

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. Maximum 6 hrs. E

504 Professional Development Seminar (1) (Same as Biosystems Engineering 504). S/N only. F

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

542 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

546 Automation Devices and Applications (3)
Basic electronics as applied to simple automation systems, programmable controllers, data acquisition, digital logic and transducers. Prereq: 506 or consent of instructor. 2ologic and transducers. Prereq: 506 or consent of instructor. 2

562 Selected Topics in Biosystems Engineering Technology (1-3) Lectures/group discussion on specialized topics. May be repeated. Maximum 6 hrs. E

**Agricultural Economics and Rural Sociology**

(College of Agricultural Sciences and Natural Resources)

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<tr>
<th>MAJOR</th>
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<tr>
<td>Agricultural Economics</td>
<td>M.S., Ph.D.</td>
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</table>

Dan McLemore, Acting Head

Professors:
- Badenhop, M. B. (Emeritus), Ph.D. (Purdue)
- Brooker, J. R. (Liaison), Ph.D. (Florida)
- Cleland, C. L. (Emeritus), Ph.D. (Wisconsin)
- Eastwood, D. B., Ph.D. (Tufts)
- English, B. C., Ph.D. (Iowa State)
- Jakus, Paul M., Ph.D. (Ohio State)
- Keller, L. H. (Emeritus), Ph.D. (Kentucky)
- Klintd, T. H., Ph.D. (Kentucky)
- Knoop, W. M., Ph.D. (Virginia Tech)
- Klindt, T. H., Ph.D. (Kentucky)
- Leuthold, F. O., Ph.D. (Wisconsin)
- McLenon, D. P., Ph.D. (Clemson)
- McMahan, R. T. (Emeritus), Ph.D. (Purdue)
- Martin, J. A. (Emeritus), Ph.D. (Minnesota)
- Mundy, S. D., Ph.D. (Tennessee)
- Orr, R. H., Ph.D. (Virginia Tech)
- Park, W. M., Ph.D. (Iowa State)
- Pentecost, B. H. (Emeritus), J.D. (Tennessee)
- Ray, Daryl E. (Bernard Blasingame Chair of Excellence), Ph.D. (Iowa State)
- Riley, John B., Ph.D. (Oklahoma State)
- Roberts, R. K., Ph.D. (Iowa State)
- Sappington, C. B. (Emeritus), Ph.D. (Illinois)
- Whatley, T. J., Ph.D. (Missouri)
- Williamson, H. Ph.D. (Missouri)

Associate Professors:
- Jensen, K. L., Ph.D. (Oklahoma State)
- Pompei, G. K., Ph.D. (California (Davis))

Assistant Professors:
- Jakus, Paul M., Ph.D. (NC State)
- Larson, J. A., Ph.D. (Oklahoma State)

The Department of Agricultural Economics and Rural Sociology offers programs of graduate study leading to the Ph.D. and M.S. The doctoral program includes concentrations in agricultural marketing and price analysis, agricultural policy, farm management and production economics, natural resources, and rural development. The M.S. program may be completed under a thesis option with concentrations in agricultural economics or rural sociology. A non-thesis program on-site wastewater renovation systems. Prereq: 506. 2 hrs and 1 lab. F,A
THE MASTER’S PROGRAM

Thesis Option

A candidate for the master's degree must complete a minimum of 33 hours of graduate credit in courses approved by the student's master's committee. Six hours of thesis may be counted toward this requirement. At least 27 hours of graduate credit must be earned in courses numbered at or above the 500 level. In the agricultural economics concentration, 15 hours of agricultural economics, 6 hours of economic theory and 6 hours of quantitative methods are required. In the rural sociology concentration, 12 hours in the department (9 hours rural sociology), 6 hours of sociological theory, 3 hours of research methods and 3 hours of statistics are required. Each student must successfully complete a final oral examination.

Non-Thesis Option

A minimum of 36 hours of graduate coursework is required. At least 30 hours must be in courses numbered at or above the 500 level. The program must include a minimum of 21 hours in agricultural economics and 6 hours of quantitative methods. In the agricultural economics concentration, 6 hours of internship are required. In the agricultural economics concentration, 6 hours of economic theory are required. Each student must successfully complete both written and oral comprehensive exams.

Minor

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

THE DOCTORAL PROGRAM

A minimum of 78 hours of graduate credit beyond the B.S. degree, including 24 hours of dissertation research, but excluding any master's research credit, is required. A minimum of 27 hours of coursework in agricultural economics, 15 hours of economic theory, and 9 hours of quantitative methods are required. The program must include a minimum of 9 hours in courses numbered at or above the 500 level (excluding dissertation credits). Qualifying exams are required in macroeconomics and microeconomics theory. Comprehensive exams include three written exams and one oral exam. The written exams are in general agricultural economics, quantitative methods, and the area of concentration.

Minor

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

MINOR IN ENVIRONMENTAL POLICY

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

Agricultural Economics

GRADUATE COURSES

412 Agricultural Finance (3) Micro-finance, financial objectives, acquisition of debt and equity funds, capital investments, capital allocation, capital budgeting, capital structure, and managerial decision making. Prereq: Microeconomics or equivalent. F

420 International Agriculture Trade and Marketing (3) Real and monetary aspects of international trade and effect on agricultural commodity flows; partial equilibrium analysis of international trade and market structures. Prereq: Intermediate Microeconomics. F

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

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

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

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

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

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

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

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

525 Agribusiness Operations Research Methods (3) Applications of operations research methods and concepts for agribusiness. Theoretical background and applications of operational methods to solve problems in agribusiness. Prereq: Basic Calculus and 524. Sp

530 Agricultural Policy Analysis (3) Evaluation of public policy as related to agriculture 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 issues; decision theory with application to agricultural firms; impact of firm decisions on industry. Prereq: 505 or equivalent. Sp

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

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

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

595 Professional Internship (6) Supervised internship experience with appropriate agribusiness firm.

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

620 Advanced Quantitative Methods (3) Discussion and evaluation of advanced statistical and mathematical techniques in current agricultural economics research. Prereq: 522, 524, and Economics 581-82, or consent of instructor. Sp, A

640 Agricultural Supply Analysis (3) Critical evaluation of both theoretical bases and empirical procedures used for estimating agricultural supply relationships using regression techniques; production functions, mathematical programming, firm growth models, and simulation in supply analysis. Prereq: 540 or consent of instructor. F

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

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

Rural Sociology

GRADUATE COURSES

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

580 Advanced Rural Sociology (3) Application of sociological concepts and theory to analyze changing structure and function of rural life in U.S. and developing countries. Demographic changes, rural social and community indicators, and rural development processes. Prereq: 380 or equivalent. (Same as Sociology 580.) Sp

593 Special Topics in Rural Sociology (1-3) Current sociological issues involving sociological theory. Prereq: 380 or consent of instructor. May be repeated. Maximum 6 hrs. (Same as Sociology 593.) E

Agriculture

(Graduate Department of Agricultural Sciences and Natural Resources)

GRADUATE COURSES

507 Professional Development Seminar (1) Planning and execution of graduate research programs; ethics and professionalism; graduate program procedures and resources. (Same as Biosystems Engineering 507, Biosystems Engineering Technology 507, Animal Science 507, Ornamental Horticulture and Landscape De-
Animal Science

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

MAJOR

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
Bletner, K. J., Emeritus, Ph.D., Ohio State
Chamberlain, C. C., Emeritus, Ph.D., Iowa State
Eiler, D. V., M.D., Ph.D., Illinois
Erickson, B. H., Emeritus, Ph.D., Kansas State
Godkin, J. D., Liaison, Ph.D., Massachusetts
Hall, O. G., Emeritus, Ph.D., Iowa State
Hansard, S. L., Emeritus, Ph.D., Illinois
Henry, R. W., Emeritus, Ph.D., Virginia Tech
Hansard, S. L., Emeritus, Ph.D., Florida
Hall, O. G., Emeritus, Ph.D., Iowa State
Godkin, J. D., Liaison, Ph.D., Massachusetts
Oliver, S. P., Emeritus, Ph.D., Ohio State
Richardson, D. O., Emeritus, Ph.D., Ohio State
Robbins, K. R., Emeritus, Ph.D., Illinois
Saxton, A., Emeritus, M.D., NC State
Shirley, H. V., Emeritus, Ph.D., Illinois
Schultz, T. W., Emeritus, Ph.D., Tennessee
Ryan, J. R., Emeritus, Ph.D., Auburn
Tugwell, R. L., Emeritus, Ph.D., Kansas State

Associate Professors:
Backus, W. R., Emeritus, Ph.D., Tennessee
Bell, R. B., Emeritus, Ph.D., NC State
Grizzle, J., Emeritus, Ph.D., Florida
Heitmann, R. N., Emeritus, Ph.D., Maine
Katesh, H. G., Emeritus, VPI
Mendis-Handagama, L. C., D.V.M., Emeritus, VPI
Mensik, Emeritus, M.D., M.O., Emeritus, VPI
Smith, M.O., Emeritus, Ph.D., Oklahoma State
Waller, J. C., Emeritus, Nebraska

Assistant Professors:
Mathew, A. G., Emeritus, Ph.D., Purdue
Schrick, F. N., Emeritus, Ph.D., Clemson
Smalling, J. D., Emeritus, Ph.D., Texas A&M

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. If the department is also a part of the College of Veterinary Medicine, the areas of anatomy, systemic physiology (blood, cardiology, and neural), and histology are also available. 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.

All-first year graduate students are required to enroll in 507 and 509. All first- and second-year students are required to enroll in 596 each fall and each spring term.

THE MASTER'S PROGRAM

For admission to the M.S. program, a student must have obtained a 3.0 grade-point average on a 4.0 scale (or a 2.0 each term during the junior and senior years) in a completed undergraduate degree program in one of the animal sciences or in a related area. The student must submit evidence (letters of recommendation, personal interview, etc.) that indicates ability to complete requirements for the M.S. Prerequisite coursework must be completed if the student has insufficient undergraduate background. If the student has an unsatisfactory grade-point average, acceptance may be on a probationary (non-degree) basis and a minimum of 9 hours of graduate coursework must be completed the first term with a minimum grade-point average of 3.0 for admission to the M.S. program.

The program requires the writing of a thesis based on original research; the completion of a minimum of 24 hours of graduate coursework, of which at least 14 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 the Animal Science Department. The advisory committee approves the student's coursework and research and problems in the final oral examination 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. The 48 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 concentration management must complete Animal Science 581 and 9 hours at the 500 or 600 level in two non-management concentration for a total of 12 hours (including 581).
3. A minimum of 1 hour of Agriculture 512 in addition to that required at the M.S. level.
4. A minimum of 6 hours in 400-, 500-, or 600-level statistics courses approved for the ICGSP.

A minimum of five faculty members will constitute the student's advisory committee, of which at least one must be outside Animal Science. The major professor will be the chairperson. The student and the major professor select a program of study depending on the student's area of concentration and professional goal. The advisory committee approves the coursework and the dissertation research proposal and determines if there is to be a foreign language requirement. The advisory committee conducts the comprehensive written and oral examination and the final dissertation defense examination.

GRADUATE COURSES

420 Advanced Reproduction (3) Collection, evaluation, and preservation of ova, spermatozoa and embryos; application of methods of natural breeding and techniques of artificial insemination and embryo transfer. 3 hrs.
430 Advanced Ration Formulation (2) Computer simulation of beef and dairy cattle, sheep, horses, swine, poultry, laboratory, zoo, and companion animals. Materials and energy content and computer assisted formulating complex ration with constraints. Prereq: 330 or equivalent and introductory computer science course. 2 labs. 2 hrs.
440 Advanced Animal Breeding (2) Computer simulation of genetic improvement for multiple traits in swine, beef, and dairy cattle; evaluation of alternative breeding strategies; industrial programs in swine, poultry, beef, and dairy cattle; breed development, improvement, and utilization. Prereq: 340 or equivalent. 1 hr and 1 lab. 2 hrs.
481 Beef Cattle Production and Management (3) Integration of principles of nutrition, breeding, physiology, and marketing into complete production programs. Structure of industry, enterprise establishment, systems of production, production practices, and management programs. Management evaluated in terms of production responses and economic returns. Prereq: Completion of 300 level core courses or equivalent or consent of instructor. 2 hrs and 1 lab. 2 hrs.
482 Dairy Cattle Production and Management (3) Integration of principles of nutrition, breeding, physiology, and marketing into complete production and management programs. Structure of industry, enterprise establishment, systems of production, production practices, and improvement programs. Management evaluated in terms of production responses and economic returns. Prereq: Completion of 300 level core courses or equivalent or consent of instructor. 2 hrs and 1 lab. 2 hrs.
483 Pork Production and Management (3) Integration of principles of nutrition, breeding, physiology, and marketing into complete production and management programs. Structure of industry, enterprise establishment, systems of production, production practices, and improvement programs. Management evaluated in terms of production responses and economic returns. Prereq: Completion of 300 level core courses or equivalent or consent of instructor. 2 hrs and 1 lab. 2 hrs.
484 Poultry Production and Management (3) Integration of principles of nutrition, breeding, physiology, and marketing into complete production and management programs. Structure of industry, enterprise establishment, systems of production, production practices, and improvement programs. Management evaluated in terms of production responses and economic returns. Prereq: Completion of 300 level core courses or equivalent or consent of instructor. 2 hrs and 1 lab. 2 hrs.
of production responses and economic returns. PreReq: Completion of 500-level course or equivalent or consent of instructor. 2 hrs and 1 lab. F

486 Lamb and Wool Production and Management (3) Integration of principles of nutrition, breeding, physiology, and marketing into complete lamb and wool production enterprises. Structure of industry, enterprise establishment, systems of production, production responses and economic returns. Alternatives evaluated: production responses and economic returns. PreReq: Animal Science sophomore and junior core courses or consent of instructor. 2 hrs and 1 lab. Sp,A

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

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

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

509 Scientific Communication (1) (Same as Agriculture 509, Ornamental Horticulture and Landscape Design 509, and Plant and Soil Sciences 509.) S/NC only. F

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


523 Advanced Mammalian Reproduction (3) Current topics and "new frontiers" in reproductive biology. PreReq: 522, Sp,A

530 Animal Nutrition and Metabolism (4) Comparative digestive physiology, digestion, absorption and metabolism of nutrients in ruminant and nonruminant species. Concepts and methodologies of animal growth and nutrient requirements; relationships, availability and deficiencies of nutrients. PreReq: Animal Nutrition, Prez and Pratton Formulation or consent of instructor. F

531 Analytical Techniques in Animal Science (3) Principles, concepts and methods applied to characterization and mechanistic study of cells, organ systems and biologically active molecules. Demonstration of methodologies: nutrient analyses, histology and ultrastructural morphology, immunology, competitive binding assays, protein biochemistry and molecular biology. PreReq: Organic Chemistry I and Lab equivalent: 1 hr and 2 labs. S/NC only. Sp,A

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

538 Nutritional Aspects of Companion Animal Health (2) Nutritional concepts applied to veterinary management of normal and disease states for pets including dogs, cats, horses and exotic species. (Same as Comparative and Experimental Medicine--Veterinary Medicine 538.) Sp,A

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

552 Anatomy of Domestic Carnivores (4) Gross dissection by systems and regions of dogs with comparison to cat. PreReq: Consent of instructor. 1 hr and 3 labs. (Same as Comparative and Experimental Medicine--Veterinary Medicine 552.) F

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

571 Design and Analysis of Biological Research (3) Experimental design and procedures, selection of experimental units; analysis and interpretation of data; statistical models and contrasts, analyses of variance; covariances, treatment arrangements. PreReq: Management, economics, computer science, statistics. 2 hrs and 1 lab. Sp,A

572 Least Squares Analysis (3) Least squares estimation and hypothesis testing procedures for linear models; mixed model methodology: full rank and non-full rank situations; covariance structures; estimation of variance components. PreReq: 571 or equivalent. 2 hrs and 1 lab. F

581 Advanced Livestock Management (3) Objective functions to evaluate alternative livestock production management policies. Systems approach to analysis and integration of reproductive management programs, genetic improvement policies, alternative feeding systems, and herd health programs. Consideration of time risk, and uncertainty in livestock production. Tools, linear programming, as in decision-making and resource allocation. PreReq: Management, economics, computer science, statistics. 2 hrs and 1 lab. Sp

596 Seminar (1) Advanced topics in animal science. Prereq: Consent of instructor and department head. May be repeated. Maximum 4 hrs. F,S,Sp

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

621 Advanced Topics in Animal Physiology (1-4) Recent advances and concepts, research techniques, current problems. May be repeated. Maximum 6 hrs. E

631 Advanced Topics in Animal Nutrition (1-4) Recent advances and concepts, research techniques, current problems. May be repeated. Maximum 6 hrs. E

633 Advanced Mineral-Vitamin Nutrition (4) Chemical forms, digestion, absorption, intermediary metabolism, deficiencies, excesses and interaction of minerals and vitamins. PreReq: 533 or 534, and Biochemistry and Cellular Molecular Biology 410 or Nutrition 511 or consent of instructor. Sp,A

651 Advanced Topics in Animal Anatomy (1-4) Current anatomy, experimental methods and future research methodology, laboratory situation, recent advances in quantitative techniques for gross and microscopic anatomy. PreReq: Consent of instructor. May be repeated. Maximum 6 hrs. (Same as Comparative and Experimental Medicine--Veterinary Medicine 651.) E

652 Disorders of the Endocrine System (2) Pathological physiology and experimental methods of the endocrine glands of various animal species. PreReq: 521 or consent of instructor. (Same as Comparative and Experimental Medicine--Veterinary Medicine 652.) Sp,A

653 Principles of Normal and Disease States (4) Physiology, biochemistry and molecular biology of domestic animals. Prereqs: 521 or consent of instructor. Prereq: Management, economics, computer science, statistics. 2 hrs and 1 lab. (Same as Comparative and Experimental Medicine--Veterinary Medicine 653.) E

Simek, Jan F., Ph.D. ................................ SUNY Binghamton
Wheeler, Margaret C. (Emeritus), Ph.D. ............. Yale

Associate Professors:
Harrison, Iris E., Ph.D. ................................ Syracuse
Howell, Benita J., Ph.D. ............................. Kentucky
Kongisberg, Lyle, Ph.D. ............................. Northwestern
Kramer, Andrew (Liaison), Ph.D. .................. Michigan
Schroedl, Gerald F., Ph.D. ........................ Washington State

Assistant Professor:
Marks, Murray K., Ph.D. ............................ Tennessee
Research Associate Professor:
Chapman, J., Ph.D. ................................ North Carolina

The Department of Anthropology offers the Master's Program in Anthropology. Students wishing to enter the Master's Program must make formal application to The University of Tennessee, Knoxville Graduate School. Copies of the application form, transcripts, and GRE scores that are sent to The Graduate School should also be sent directly to the Department of Anthropology at the same time. In addition, the department requires a letter of intent from the applicant indicating career goals and reasons for selecting The University of Tennessee, three letters of recommendation, and one sample of the prospective student's written work (a class paper or research report); these materials should be sent directly to the Graduate Department, Department of Anthropology, SSH 250, University of Tennessee, Knoxville, Tennessee 37996-1720.

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

Animal Science - Veterinary Medicine

See College of Veterinary Medicine and Comparative and Experimental Medicine

Anthropology

(College of Arts and Sciences)

DEGREES

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

Major: Anthropology, 36 credits

Jan F. Simek, Head

Professors:
Bass, William M. (Emeritus), Ph.D. ................................ Pennsylvania
Faukner, Charles H., Ph.D. .............................. Indiana
Jantz, Richard L., Ph.D. ............................... Kansas
Kippel, Walter E., Ph.D. ............................... Missouri
Logan, Michael H., Ph.D. ............................. Penn State
Parmalee, Paul W. (Emeritus), Ph.D. .......... Texas A&M
acceptance into the Ph.D. program can enroll as doctoral students the semester following conferral of the M.A. degree. Students holding Master's degrees from other institutions must apply by January 15 for admission the following Fall and must begin their studies in the Fall semester.

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

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

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

Language: Students must demonstrate knowledge of one foreign language. This language should normally be French, German, Russian or Spanish, but another language may be substituted at the committee's discretion. This requirement may be met by either:

1. Successful performance on a language examination administered by the appropriate language department. A student electing this alternative should consult with the advisor; or
2. Completion of the second semester of specialized reading courses for graduate students with a grade of B or better.

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

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

1. Comprehensive Written Examination: When the Ph.D. aspirant has completed all of the following 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 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 examination, which is ordinarily held as a colloquium in which the candidate will expound on the nature and significance of his/her contribution to anthropological knowledge as set forth in the dissertation.

ACADEMIC COMMON MARKET
An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.A. program in Anthropology is available to residents of states of Louisiana (concentration in zooarchaeology only), Virginia (concentration in zooarchaeology or cultural anthropology), or West Virginia. The Ph.D. program is available to residents of Alabama, Louisiana, Mississippi, or West Virginia.

Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE COURSES
410 Principles of Cultural Anthropology (3) Exploration and illustration of major concepts, theories, and methods in cultural anthropology, with application to analysis of specific ethnographies. Prereq: 130.

411 Linguistic Anthropology (3) Basic linguistic concepts applied to research in cultural anthropology; investigation of relationships between language and culture. Prereq: 130 or Linguistics 200. (Same as Linguistics 411.)
412 Folklore in Anthropology (3) Introduction to anthropological study of folklore, using folklore and folklife material from various tribal, peasant, and complex societies. Prereq: 430 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 diverse cultural traditions. Prereq: 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. Relationship between actors (individuals) and structures. Encapsulation of traditional political forms and systems within modern states. Prereq: Consent of instructor.

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

501 Graduate Research (1-15) Independent investigation of special problems in anthropology. May be repeated. Maximum 15 hrs.

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

510 Method and Theory in Cultural Anthropology (3) Development of primary theoretical orientations by cultural anthropologists; formulation of research problems and methods of interpreting and utilizing data. Prereq: Consent of instructor.

511 Special Topics in Cultural Anthropology (3) Seminars for advanced students on topics of special interest: ethnogenesis, psychological anthropology, contemporary 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 anthropological research. Prereq: Cultural Anthropology or consent of instructor.

513 Rural Studies in Anthropology (3) Theory, method, and ethnographic research on seceded problems and aspects of traditional agrarian cultures in U.S. and peasant societies. Prereq: Cultural Anthropology or consent of instructor.

514 Anthropology of Development (3) Application of anthropological theory, methods, and findings to community and national development programs. Analysis of anthropologists' roles, values, and ethical issues in selected case studies. Prereqs: 120, 130, 410, or consent of instructor.

515 Medical Anthropology (3) Cultural impact on disease patterning, theories of disease causation, and models of therapy. Theoretical and applied aspects of the anthropological study of health and disease. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

517 Forms of Social Inequality (3) Anthropological perspectives on societies stratified along lines of race, caste, race, ethnicity, and class. Inequalities engendered by tax and labor structure. Construction of social distinctions before and after rise and consolidation of modern world systems. Interactions of race and ethnicity with class and gender. May be repeated. Maximum 8 hrs.

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

521 Laboratory Studies in Zooarchaeology (4) Examination and comparison of skeletal elements of major vertebrate species, shells of terrestrial and aquatic mollusks, in relation to animal remains from prehistoric contexts. Basic osteology and shell characteristics of species encountered in archaeological sites; use of comparative collections. May be repeated. Maximum 6 hrs.


530 Fieldwork in Archaeology (3-6) Practicum in surveying, excavating, processing, and analysis of archaeological data. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

560 Theory in Cultural Anthropology (3) Detailed consideration of theory in contemporary archaeology: models of scientific explanation, research design, archaeological formation processes, and methods of analysis and interpretation. May be repeated. Maximum 6 hrs.

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

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

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

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 hominids to appearance of anatomically modern humans. Functional morphology and phylogenetic relationships of fossil humans. Prereq: 480.

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

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

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

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

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

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

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

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

601 Advanced Graduate Research (1-4) Independent investigation of special problems in anthropology by advanced graduate students. May be repeated. Maximum 12 hrs. Only 3 hrs may count toward 600-level requirement.

611 Theory in Cultural Anthropology (3) Critical evaluation of current issues in theory and data interpretation, primarily for doctoral students in cultural anthropology. May be repeated. Maximum 6 hrs.

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

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

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

695 Gross Human Anatomy (9) Skeletal, musculoskeletal, cardiovascular system. Dissection of cadavers. Prereqs: 480 or Human Biology. 5 hrs and 5 labs.

Architecture

(College of Architecture and Planning)

MAJOR

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

Marleen K. Davis, Dean
William J. Lauer, Associate Dean
Jon P. Coddington, Graduate Program Head

Professors:
Anderson, G. L., M.Arch. ........................................ Illinois
Conley, G. (Emeritus), B.Arch. ....................... Harvard
Davis, Marleen, M.Arch. .................................. Harvard
The School of Architecture offers two tracks leading to the Master of Architecture degree. Track 1 is for students seeking the first-professional degree who already hold a Bachelor's degree in another field. Track 2 is for students with an accredited first-professional degree who seek to develop an area of specialization.

Admission Requirements

In addition to meeting The Graduate School's minimum requirements, the following specific admission requirements to the Master of Architecture program must be met.

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

For Track 2 applicants, a Bachelor of Architecture degree from an NAAB accredited program, or foreign equivalent. Candidates with a GPA less than 3.0 may be considered for conditional admission when evidence of
504 Issues in Preservation (3) Architectural issues: preservation, restoration and conservation of historic structures. Prereq: Consent of instructor.

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

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

512 Technological Traditions (3) Technological aspects influencing building form. Role of technical aspects of structural, environmental and building infrastructure as integrated systems supporting access use and expression of building.

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

514 Ethical Imperatives (3) Social, cultural, philosophical and moral issues which impact professional responsibilities. Attitudes, values, and ideas that address formation of profession's ethos.

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

525 Special Topics in Architecture (1-3) Student or instructor-initiated course. May be repeated. Maximum 8 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.

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

553 Advanced Topics in Architectural Technology (3) In-depth investigations and analyses: architectural technology lighting, 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 management functions within professional firms; legal and ethical concerns facing practitioners today; and introduction to special obligations and privileges of design professionals.


573 Architectural Design Studio/Seminar III: Cultural Aesthetics (3) Role of cultural influences on architectural form. Investigations into relationships between place and culture and impact on architectural character. Analysis and design with urban context. Readings and discussions: process of formal synthesis in design studio. Prereq: 572. 1 hr and 5 labs.


591 Foreign Study (1-9)

592 Off-Campus Study (1-9)

593 Independent Study (1-9)

Art
(College of Arts and Sciences)

MAJOR

ART

DEGREE

M.F.A.

Norman Magden, Head

Professors:
Blair, Sandra J., M.F.A. .................. Wisconsin

Braake, P. M., M.F.A. .................. Yale

Clarke, R. A. (Emeritus), M.S. ................. Wisconsin

Cleaver, Dale G. (Emeritus), Ph.D. ......... Chicago

Daehnert, R. H. (Emeritus), M.F.A. .......... Wisconsin

Darrow, J. F., Ed.D. .................. Illinois State

Falsani, Joseph S. (Emeritus), M.S. ......... Ohio State

Goldenstein, M. B., M.F.A. ............ Nebraska

Kenedy, William C., M.F.A. .......... Wisconsin

Lee, B., M.F.A. .................. Yale

Leland, W. E., M.F.A. .................. Tennessee

Livingston, P. R., M.F.A. ............... Wisconsin

Lyons, B. (Laison), M.F.A. ........... Arizona State

Magden, Norman, Ph.D. Case Western Reserve

Martinson, Fred, Ph.D. .................. Chicago

Metcalf, N. S., M.F.A. .................. Michigan State

Moffatt, F., Ph.D. .................. Chicago

Peacock, D., M.F.A. .................. Iowa

Riesing, T. J., M.F.A. .................. Nebraska

Stewart, F.C., M.F.A. .................. Claremont

Yates, S., M.F.A. ............ North Carolina (Greensboro)

Associate Professors:
Habel, Dorothy, Ph.D. .................. Michigan

Hiles, Timothy, Ph.D. .................. Penn State

LeFevre, Richard (Emeritus), M.F.A. ...... Rochester IT

Longobardi, Paul, M.F.A. ........ ......... Pennsylvania

Neff, A., Ph.D. .................. Ohio State

Staples, Carolyn, M.F.A. ............. Michigan State

Wilson, D., M.F.A. .................. California (San Diego)

Assistant Professor:
Brogden, Sally B., M.F.A. .... NY State College of Ceramics (Alfred)

Eversen, Kevin, M.F.A. ............... Ohio State

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

THE MASTER'S PROGRAM

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

1. A detailed letter of intent including statement requesting assistantship, if desired.

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

3. An Undergraduate major in art or evidence of equivalent proficiency.

4. A portfolio to be evaluated by the faculty.

Further information is available by writing to the Department of Art.

M.F.A. Requirements
A minimum of 60 hours is required:

1. Successful completion of 20 hours of studio in a concentration area. An inter-area program must be approved by the graduate faculty only after the second semester in residence. Ten hours of concentration must be in second year courses (512, 514, etc.)

2. A minimum of 9 hours of art history for graduate credit.

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.

5. A student with the permission of the area faculty can petition to take 3 hours of outside work as a substitute for 3 hours of art history or 3 hours of concentration area. The petition is to be presented to the graduate committee for final approval and must directly address the need and relevance of this substitution to the student's concentration.

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

The candidate's committee will consist of a minimum of three members and a maximum of six members and will be appointed prior to registration for 599. The committee must consist of one faculty member from the candidate's concentration area (if 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 required courses and 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
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 implementation. Exhibition design and installation techniques. Publicity, production, matting and framing, shipping and storage. Prereq: 481 or consent of instructor. (Same as Anthropology 482.)

484 Museology III: Field Projects (1-12) Special field projects: restoration, preservation, registration, and other related research on off or off campus. Prereq: 481 and 482. May be repeated. Maximum 12 hrs. (Same as Anthropology 484.)

499 Special Topics (3) Student- or instructor-initiated course offered at the convenience of department. Prereq: Determined by department. May be repeated. Maximum 10 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.

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

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

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

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

Art Drawing

Graduate Courses

411 Drawing IV (6) Individualized pursuit of personal drawing techniques and concepts; supplemented by individual and group critiques; weekly life drawing sessions. Prereq: 311. May be repeated. Maximum 12 hrs.

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

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

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

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

Art Design/Graphic

Graduate Courses


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.


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 arrangement with department. Prereq: Senior standing and consent of instructor. May be repeated. Maximum 12 hrs.

599 Special Topics in Graphic Design (3) Student- or instructor-initiated course offered at the convenience of department. Prereq: Determined by department. May be repeated. Maximum 6 hrs.

551 Graphic Design II (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.

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

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

Art History

Graduate Courses

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

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


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

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

441 Northern European Painting, 1350-1500 (3) From county art of late Middle Ages to Northern Renaissance. Jan van Eyck, Roger van der Weyden, and Dürer; 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.

Art

Art Painting

GRADUATE COURSES

413 Painting IV (6) Individual concepts and personal expression with varied media. Prereq: 313. May be repeated. Maximum 12 hrs.


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

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

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

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

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

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

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

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

Art Printmaking

GRADUATE COURSES

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

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

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

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

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

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

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

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

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

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

Audiology and Speech Pathology (College of Arts and Sciences)

MAJORS

DEGREES

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

Associate Professors:
Burchfield, Samuel B., Ph.D. .......... Michigan State
Ferrell, Charles J., M.A. ................. Tennessee
Gordon, Pearl A., Ph.D. ................. Texas
Krishnan, Ravi A., Ph.D. ................. Texas
Thelin, J. W., Ph.D. ....................... Iowa

Assistant Professor:
Erickson, Mary E., Ph.D. ................. Southern Cal
Hedrick, Mark, Ph.D. ...................... Vanderbilt
McCallough, Gary ....................... Vanderbilt
Ruark, Jacki L., Ph.D. ................. Pittsburgh
Swanson, Lori A., Ph.D. ............... Purdue

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 general intent of each major program is to provide the student with a scholarly and professional educational experience necessary for functioning as an independent professional clinician in any clinical environment.

Students majoring in either of the two areas must meet the academic and practicum requirements for clinical certification of the American Speech-Language-Hearing Association and for Tennessee licensure as an audiologist or speech-language pathologist. An exception to this rule may be approved by the appropriate departmental committee. Enrollment in clinical practicum courses is required for all clinical practice experiences. If the undergraduate preparation does not include sufficient coursework in speech pathology, audiology, psychology, and related fields, the student may be required to make up such deficiencies.

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

THE DOCTORAL PROGRAM

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

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

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

The total program is a minimum of 60 semester hours, including a minimum of:
1. 24 semester hours in dissertation 500.
2. 6 semester hours in a research tool.
3. 6 semester hours in a cognate area outside the department.
4. 24 semester hours in 600-level coursework within the department of which:
   a. A minimum of 6 semester hours in the topic of major interest;
   b. A minimum of 6 semester hours in topic(s) of related interest;
   c. 3 semester hours in 611; and
   d. 3 semester hours 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 Knoxville on an in-state tuition basis. The M.A. program in Audiology is available to residents of the state of South Carolina. The Ph.D. program in Speech and Hearing Science is available to residents of the states of Alabama, Arkansas, Kentucky, or West Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE COURSES

431 Stuttering (3) Nature, appraisal and treatment. Prereq: 304 or consent of instructor.
433 Observation of Clinical Practice (3) Prereq: Speech and Language Development, Articulation Disorders, or consent of instructor.
434 Clinical Practice in Speech-Language Pathology II (1-4) Prereq: 433 and consent of instructor. Enrollment for fewer than 2 hrs must have prior departmental approval.
455 Problems in Speech Pathology (1-3) Prereq: Consent of instructor.
461 Introduction to Language Pathology in Children (3) Nature, etiology, and treatment of language retardation in children; observations of language therapy. Prereq: 320 or consent of instructor.
473 Audiology II (3) Basic principles of clinical audiology; pure tone, speech, masking and overview of special auditory tests. Prereq: 371.
The thesis program involves satisfactory completion of the following requirements:

**THESIS OPTION**

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

**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 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:

1. Twelve hours of 500-level courses in the major field of aviation systems.
2. Six hours in industrial engineering (engineering management).
3. Twelve hours of electives from 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.

**Graduate Courses**

- **500 Thesis (1-15) P/NP only. E**
- **501 Aviation Systems: An Overview (3)**
- **502 Registration for Use of Facilities (3-15)**
- **503 Air Vehicles (3)**
- **504 Airports and the Community (3)**
- **505 Governmental Policies for Aviation (3)**
- **506 Aircraft Design (3)**
- **521-22 Experimental Flight Mechanics (3.3)**
- **531 Air Traffic Control Systems (3)**
- **550 Project in Aviation Systems (3)**

**Academic Common Market**

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

MAJOR DEGREES
Biochemistry and Cellular and Molecular Biology .................. M.S., Ph.D.
John W. Koontz, Head

Professors:
Bagby, R. M., Ph.D. ................. Illinois
Carlson, J. G. (Emeritus) (Distinguished Prof.), Ph.D. ................. Pennsylvania
Chen, T. T., Ph.D. .................... Florida
Churchich, Jorge E., Ph.D. ............. Sheffield
Handel, Mary Ann (Distinguished Prof.), Ph.D. ....................... Kansas State
Hochman, Ben (Emeritus), Ph.D. .......... California
Koontz, John W., Head
Lee, J. W. (Emeritus), Ph.D. ........... Ohio State
MacCabe, J.A., Ph.D. ................. California (Davis)
Monty, Kenneth J., Ph.D. .......... Rochester
Nolen, J. G. (Emeritus), Ph.D. .......... Iowa
Serpersu, Engin H., Ph.D. ............ Hateceppe
Roberts, Daniel M., Ph.D. ............ California (Davis)
Shivers, C. A., Ph.D. ................. Michigan State
Welch, H. G. (Emeritus), Ph.D. ........ Pennsylvania
Whiston, G. L. (Emeritus), Ph.D. ........ Florida
Wicks, Wesley D., Ph.D. ............. Harvard

Associate Professors:
Ganguly, R., Ph.D. .................... Nebraska
Hall, J. C., Ph.D. ..................... Illinois
Howell, Elizabeth E., Ph.D. ............ Lehigh
Koontz, John W. (Liaison), Ph.D. ....... Kentucky
McKee, B. D., Ph.D. ................. Michigan State
Peterson, Cynthia B., Ph.D. ............. LSU
Roberts, Daniel M., Ph.D. ............ California (Davis)
Serpersu, Engin H., Ph.D. ............. Hatecepe

Assistant Professors:
Bruce, Barry, Ph.D. .................. California (Berkeley)
Prosser, R. A., Ph.D. .................. Illinois

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

1. One year of general biology or the equivalent;
2. A minimum of 8 semester hours of approved biology courses beyond the introductory level and including the subject areas of genetics, cell biology and physiology;
3. Two years of chemistry including one year of general chemistry and one year of introductory organic chemistry with laboratory;
4. At least one semester of biochemistry;
5. One year of calculus;
6. One year of physics;
7. Graduate Record Examination scores; and
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, 515-16, and 517.
2. Completion of course requirements as determined by the candidate's faculty committee.
3. Achievement of a 3.0 or better GPA in all courses taken for graduate credit.
4. Participation in 601 and 603 during the entire period of residence. Participation in at least one journal club chosen from among 605-608 for 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, 515-16 and 517.
2. At least two approved graduate courses each 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.
4. Participation in 601 and 603 during the entire period of residence. Participation in at least one journal club chosen from among 605-608 for six semesters.
5. Comprehensive examination, taken before the end of the third year of study.
6. A dissertation reporting the results of original and significant research carried out during the term of candidacy.
7. A final oral examination which will be concerned primarily with the student's dissertation.

Petitioning for Master's Degree
Students who have passed the comprehensive examination in the Ph.D. program and have completed at least 30 hours of approved coursework for graduate credit, at least two thirds of which must be at or above the 500 level, may petition the department for award of a master's degree. The additional requirements for such a degree are:
1. The preparation of a research manuscript suitable for submission for publication in a major scientific journal and oral defense of that manuscript before an examining committee of three faculty members appointed by the head of the department, at least two of whom shall be members of the department; or
2. Publication of at least one full-length paper in a major scientific journal as senior author.

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

GRADUATE COURSES
403 Advanced Genetics Laboratory (2) Experiments illustrating and methods in modern genetics: techniques in classical, cyto-, molecular and developmental genetics. Models, organisms, Droshophila and mouse. Prereq: General Genetics and Organic Chemistry.
410 Cellular and Comparative Biochemistry (4) Electrons and reaction. Biochemicals in cells. Study of enzymes; subcellular structure and function; nucleic acids; polypeptide synthesis; protein synthesis; and biochemical genetics; control of metabolism. Prereq: Organizational Physiology and General Biology. 3 hrs and 1 discussion. F.Sp
419 Cellular and Comparative Biochemistry Lab (2) Lab experiments with enzymes, nucleic acids and membranes and organelles. Chromatography; kinetics; hybridization; sequencing; and immunological methods. Prereq or coreq: 410. F.Sp
421 Cell and Tissue Structure and Function (4) Study of animal cells and tissues at light and electron microscope levels. Prereq: Cell Biology. 2 hrs and 2 labs.
449 Laboratory in Physiology (2) Prereq or coreq: 440 or 445.
465 Human Genetics (3) Genetic and molecular principles and problems of human inheritance. Prereq: General Genetics.
471-61 Biophysical Chemistry (3,3) Physical-chemical principles with applications to biological systems. 471-61 Thermodynamics; chemical equilibria; solution chemistry; transport; electrochemistry; kinetics; enzyme catalysis; macromolecules; 461-62 Elementary quantum chemistry: interactions of light with biological molecules; optical and magnetic spectroscopy; light scattering; case studies of selected macromolecules. Prereq: Calculus, Organic Chemistry, General Biology or consent of instructor. (Same as Chemistry 471-61.) F.Sp
500 Physiology of Exercise (3) (Same as Exercise Science 480.)
500 Thesis (1-15) Pr/F only. E
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
511 Advanced Protein Chemistry and Cellular Biology (3) Cell structure and function at molecular and supramolecular level in progression; protein structure and function; membrane structure and function; bioenergetics and membrane proteins. Prereq: Prior knowledge of cell biology and biochemistry and/or consent of instructor.
512 Advanced Molecular Biology (3) Regulation of nucleic acid expression and protein activity. Nucleic acid structure and function; replication and repair of nucleic acids; gene expression; protein synthesis; post-translational protein modification; mitosis and meiosis; cell cycle and cell growth. Prereq: 511 or consent of instructor. (Same as Life Sciences 512.)
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 supramolecular structures: cytoskeleton and cell junctions and adhesions. Prereq 511, Sp.
515 Experimental Techniques I (3) Modern experimental methodology and instrumentation. Lab. cell growth; spectrophotometry; microscopy; nucleic acid purification; analysis; protein assay; enzyme purification; electrophysiology; computer analysis of nucleic acid and protein sequences. Lecture on theory of laboratory to accompany two lab periods per week. Prereq: Department graduate students. Coreq: Chem Dept. Prereq 511, Sp.
516 Experimental Techniques II (3) Laboratory rotations. Students work in laboratory of faculty member on
604 Current Topics in Environmental Toxicology (1)
(Same as Ecology and Evolutionary Biology 504.)
S/N C only. F,Sp

605 Journal Club in Neurophysiology/Physiology
(1) Readings and discussion based on current literature.
May be repeated. Maximum 12 hrs. S/N C only.

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

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

608 Journal Club in Genetics/Developmental Biology
(1) Readings and discussion based on current literature.
May be repeated. Maximum 12 hrs. S/N C only.

610 Current Topics in Biochemistry, Cellular, and
Molecular Biology (1-2) Critical review of research
problems and methods in biochemistry, cellular biology and/
or molecular biology. Oral presentations, written reports,
computer simulations by faculty and students.
Prereq: Consent of instructor. May be repeated. Maximum 4 hrs.

524 Environmental Toxicology (1) (Same as Ecology and Evolutionary Biology 561.)

562 Introduction to Electron Microscopy - Transmission
Electron Microscope (4) Practical application to techniques for preparation of biological samples for viewing in transmission electron microscopy. Use of microscope and ancillary equipment, darkroom techniques, preparation of materials for publication and special project. Admission limited to departmentally approved graduate students. (Same as Botany 516.) 2-3 hrs. Lab. Sp

564 Introduction to Electron Microscopy-Scanning
Electron Microscopy (3) 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. Admission limited to departmentally approved graduate students. (Same as Botany 516.) 2-3 hrs. Lab. Sp

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

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

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

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

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

600 Doctoral Research and Dissertation (3-15) P/N P only. E
601 Departmental Seminar (1) Invited speakers. Topics posted in advance. Required every semester in residence. S/N C only. F,Sp

603 Graduate Research Colloquium (1) Seminars and lectures dealing with current advances in fields of biochemical and biomedical research. Admission limited to departmentally approved graduate students. Specific subject area to be announced. Required every semester in residence. S/N C only. F, Sp

604 Current Topics in Environmental Toxicology (1)
(Same as Ecology and Evolutionary Biology 504.) F,Sp

605 Journal Club in Neurophysiology/Physiology
(1) Readings and discussion based on current literature.
May be repeated. Maximum 12 hrs. S/N C only.

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

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

608 Journal Club in Genetics/Developmental Biology
(1) Readings and discussion based on current literature.
May be repeated. Maximum 12 hrs. S/N C only.

610 Current Topics in Biochemistry, Cellular, and
Molecular Biology (1-2) Critical review of research
problems and methods in biochemistry, cellular biology and/
or molecular biology. Oral presentations, written reports,
computer simulations by faculty and students.
Prereq: Consent of instructor. May be repeated. Maximum 4 hrs.

511 Advanced Topics in Medical Science
(Same as Comparative and Experimental Medicine - Graduate School of Medicine 611.)

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

Biomedical Sciences
(Office of the Vice Chancellor for Academic Affairs)

MAJOR DEGREES

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

Raymond A. Popp, Director

Professor:
Olns, Donald E., Ph.D. ....................... Rockefeller
Popp, Raymond A., Ph.D. .................... Michigan

Research Professor:
Olns, Ada L., Ph.D. ......................... New York

Assistant Research Professor:
Hauser, Loren, Ph.D. ....................... California (Irvine)

Shared faculty are drawn from the Oak Ridge National Laboratory.

The University of Tennessee-Oak Ridge Advanced Research Facilities

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

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

ADMISSION REQUIREMENTS

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

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

THE DOCTORAL PROGRAM

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

2. These courses are sequential, as well as the areas of the student's interests. The number and nature of the required advanced courses will vary depending upon the student's background and area of specialization.

5. Passing both written and oral comprehensive examinations.

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

7. A final oral examination on the dissertation.

8. A formal seminar presentation of the dissertation research.

GRADUATE COURSES

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

511 Biochemistry (3) Chemistry of carbohydrates, lipids, proteins, and nucleic acids; enzyme kinetics; intermediary metabolism and photosynthesis; biosynthesis of amino acids, lipids, and carbohydrates.
515 Genetics (3) Mendelian genetics, mitosis and meiotic recombination, chromosome structure and replication, principles of microscopes. Prereq: 511.

516 Genetics (3) Molecular genetics, mapping and linkage, genetics of organelles, mutant genes, molecular conceptions, inter- and intramolecular forces; principles of microscopes. Prereq: 511.

525 Computing for the Life Sciences (3) Interactive computing, mini- and micro-computing environments, Basic, Fortran, and/or Pascal languages; application of statistics, graphics, text manipulation, and computer communications.

530 Survey of Statistical Methods I (3) (Same as Statistics 531.) Approaches and technologies in various areas of modern biology. Prereq: 515.

651-52 Advanced Topics in Biomedical Sciences (3, 3, 3) Either tutorials or formal lectures. Potential topics: X-ray diffraction and crystallography, nucleotide sequences of phage, bacteria and eucaryotes; mapping, linkage, mutagenesis, intronic inheritance. May be repeated.

660 Doctoral Research and Dissertation (3-15) P/NP only. Can be repeated.

Botany (College of Arts and Sciences)

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

Edward E. Schilling, Head

Professors:
Caponetti, J. D., Ph.D. ................. Harvard University
Clebsch, E. C. (Emeritus), Ph.D. ....... Duke University
DeSelm, H. R., Ph.D. ................. Ohio State University
Evans, A. M. (Emeritus), Ph.D. ...... Michigan State University
Hendrix, W. R. (Emeritus), Ph.D. ..... Vanderbilt University
Hickok, L. G., Ph.D. ................. Massachusetts Institute of Technology
Holton, R. W., Ph.D. ................. University of Michigan
Hughes, K. W., Ph.D. ................. Utah State University
Mullin, B. C., Ph.D. ................. North Carolina State University
Petersen, R. H. (Distinguished Professor), Ph.D. ....................... Duke University
Schilling, E. E. (Liaison), Ph.D. .......... Indiana University
Schwarz, O. J., Ph.D. ................. North Carolina State University
Walne, P. L. (Benwood Distinguished Professor), Ph.D. ........... Texas A&M University

Associate Professors:
Amundsen, C. C., Ph.D. ................. Colorado State University
Smith, D. K., Ph.D. ................. University of Tennessee
Wolford, B. E. (Curator), Ph.D. ........ University of Tennessee

Assistant Professors:
Pignocchi, M., Ph.D. ................. Connecticut College
von Amm, A. G., Ph.D. ........... University of East Anglia (UK)

Lecturer:
McFarland, K. D., Ph.D. ............... University of Tennessee

The Botany Department offers the Master of Science and Doctor of Philosophy degrees with concentrations in anatomy, physiology, genetics, ecology, evolution, plant growth, reproduction, and taxonomy.

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

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

ADMISSION REQUIREMENTS

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

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

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

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

4. Physical sciences: general inorganic chemistry: 8 semester hours; general physics: 8 semester hours.

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

Evidence of a broad undergraduate background, an ability to do work of graduate quality, and an interest in the study of plant science are considered to be much more important than the particular courses taken as an undergraduate.

Applicants lacking specific prerequisite courses but otherwise qualified may be admitted to graduate studies in botany. In such cases, the deficiencies should be made up as soon as possible, typically during the first year of the student's graduate program. The determination of deficiencies and the manner in which they will be removed will be decided upon by the student's committee during the first meeting with the student.

THE MASTER'S PROGRAM

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

Thesis Option

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

1. Satisfactory preparation of a written proposal 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 600 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 600 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 coursework 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 proposal by means of a written proposal and an oral defense to the student's committee. This must be completed before enrollment in Botany 600.

2. Satisfactory performance on a written comprehensive examination.


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

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


7. Presentation of a departmental seminar near the end of the doctoral program.

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

MINOR IN ENVIRONMENTAL POLICY

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

GRADUATE COURSES

401-02 Field Studies in Botany (1-3, 1-3) Field experience and taxonomy of special plant groups. Topics vary: taxonomy, lichenology, phytogeography, agrostology, mycology, botany of aquatic vascular plants, systematics, woody plants, and botanical parks. May be repeated under different topics. Maximum 9 hrs.

403 Plant Evolution (3) Evolutionary biology from a plant perspective. Speciation, hybridization, polyploidy, evolution of mating systems, phenotypic plasticity; comparison of characteristic traits in animal and plant systems. Lectures; paper discussions on primary literature; current research in evolutionary ecology and genetics. Prereq: General Botany. 2 hrs and 1 lab. F, A, S, P

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

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

431 Plant Ecology (4) Interactions between individuals, species, communities and their environments. Circulation of energy and matter in ecosystems. Weekly field trips or laboratory periods. 2 to 3 credits. Maximum 7 hrs. Prereq: Field Botany or equivalent. (Same as Ecology and Evolutionary Biology 431.) Sp

451 Plant Tissue Culture (3) Methods for culture of cells, tissues, and organs: media preparation and maintenance. Prereq: General Botany or Biodiversity; Organization and Function of the Cell or equivalent and General Chemistry or equivalent. Recommended prereq: Botany 412: Plants: Evolutionary Survey; Introduction to Plant Physiology. 2 hrs and 1 lab. F, A

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

501 Mycology (4) Intensive survey of fungi; all major classes. Lecture, laboratory, and field information. Occasional field trips. Prereq: 310. 3 hrs and 1 lab. Su, A

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

503 Non-Thesis Research (2) Library, field, or laboratory research under supervision of staff member. Not for thesis candidates. May be repeated. Maximum 4 hrs. E

506 Mycology (4) Comparative study of major algal phyla, both freshwater and marine: morphological, developmental, ecological, taxonomic and phylogenetic aspects. Field and laboratory. 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 (B&W and Color) photomicroscopy and photomicrography, drawing, graphics and video for recording and presentation for research and publication of data in pictorial and graphic form.

510 Introduction to Electron Microscopy - Transmission Electron Microscopy (4) (Same as Biochemistry and Cellular and Molecular Biology 562.)

521-22 Advanced Plant Physiology I, II (3, 3) 521—Plant biochemistry and metabolism: respiration, carbon dioxide, carbon, photosynthesis, and biosynthesis of specialized plant products: terpenoids, alkaloids, phanatics, and plant growth regulators. 522—Studies of differentiation and development of plants at molecular, cellular, and organismic levels. Hormonal regulation of development; macromolecular architecture of differentiation, development, and growth; flowering and senescence. Prereq: Introduction to Biochemistry or Biochemistry and Cellular and Molecular Biology 410 and 1 semester of Introductory Plant Physiology or Cell Biology.

530 Advanced Taxonomy of Flowering Plants (3) Evolution and classification of families of angiosperms, local flora. Prereq: 330 or equivalent. 2 hrs and 1 lab. F, A

531-32 Special Problems in Botany (1-4, 1-4) May be repeated. Maximum 12 hrs.

544 Seminar in Botany (1) Readings and discussions of current literature and/or selected topics in botanical research. May be repeated. Maximum 8 hrs. S/N only.

580 Bryophytes and Pteridophytes (4) Taxonomy, phytology, ecology and developmental morphology; field studies and current research. Prereq: 310-20 or consent of instructor. 2 hrs and 2 labs. F, A

582 Methods and Instrumentation in Laboratory Investigation (4) Project experience and theoretical background in various research methods, ion exchange resins, adsorption spectrometry, disc electrophoresis, polargraphy, fluorescence correlation, gas chromatography, automatic analyzers, microscopy, culture methods, use and detection of radiotopes. Prereq: Chemistry 350, 360, Physics 121, 122. May be repeated. Maximum 5 hrs. S/N only.

583 Methods and Instrumentation in Field Investigation (1) Appropriate methods and instrumentation. Topics vary, may be repeated with consent of instructor. Maximum 5 hrs. S/N only.

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

606-07 Advanced Topics in Botanical Sciences (1-3, 1-3) Experimental botanical science: nomenclature, morphology and systematics of vascular plants, cryptogamic botany, cytology and cell biology, genetics, plant physiology, phytology and ecology. May be repeated. Maximum 12 hrs.

635 Environmental Assessment and Sustainable Development in Third World Countries (3) (Same as Ecology and Evolutionary Biology 635 and Planning 565.)

662 Seminar in the History of Botany (2) History of botanical exploration and advances from early civilization to modern period. May be repeated. Maximum 4 hrs.

Assistant Professor: Wilkinson, Jeffrey, Ph.D. Georgia

Broadcasting

(College of Communications)

MAJOR DEGREES

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

Barbara Moore, Head

Professors:

Holt, Darrel W. (Emeritus), Ph.D., Northwestern University

Howard, Herbert H., Ph.D., Ohio State University

Moore, Barbara A., Ph.D., Ohio State University

Swan, Norman R., Ph.D., University of Missouri

Ziegler, Dyanha, Ph.D., Southern Illinois University

Associate Professor:

Bates, Benjamin J., Ph.D., Michigan State University

The Department of Broadcasting offers a concentration area for the major'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, educational, and industrial uses of video. Management, budgeting, planning, producing and evaluating projects. Prereq: 430 or consent of instructor.


460 Broadcast News Operations (3) Production of news programs for broadcast on television stations. Electronic news gathering, editing and writing news packages and studio production. Prereq: 410 or consent of instructor.

470 Cable Television and Emerging Technologies (3) History and structure of cable television industry. Cable regulations and programming. Entry of telephone companies in distribution video. Analysis of all relevant technological and legal issues. Prereq: Introduction to Radio and Television or consent of instructor.


560 Radio & Television Law and Regulations (3) Legal problems faced by broadcast managers. Philosophy of regulatory policy formation. Efforts at self-regulation. Social, economic and political pressures on stations, networks, cable and new technologies. Unique situation of broadcasting among media in terms of regulations. Prereq: Consent of instructor or admission to program. F

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) Issues in broadcast communications, topics vary. International broadcasting, cable television, new technologies, corporate television, educational and public broadcasting, broadcasting and society. Prereq: Consent of instructor or admission to program. May be repeated. Maximum 6 hrs. (Same as Information Sciences 581.) F

590 Advanced Radio & Television Management (3) Financial management of broadcast operations: budgeting, financial planning, accounting, and related techniques. Broad perspectives in broadcast management, organization and management of commercial and non-commercial operations from the perspective of a general manager. Prereq: 490. Sp

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

598 Internship (3-45) 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.
The MBA program consists of a common first-year core and a wide selection of second year concentration/elective courses. The first-year core develops a general management foundation upon which specialization is developed in the second year electives. The objective of the program is to develop leaders able to enhance the success of their organizations.

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

## Admission Requirements

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

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

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

For admission to the MBA program, consideration is given to (1) the applicant's academic record with particular attention to the last two years of undergraduate work and previous graduate studies, (2) scores on the GMAT and the Test of English as a Foreign Language (TOEFL) for those whose native language is not English, (3) work experience and other activities that demonstrate potential for leadership, and (4) recommendations from professors and work supervisors. The admission decision is based on all factors which make up the total application; therefore, there is no automatic cut-off for either grade point averages or GMAT scores. However, admission preference will be given to applicants with full-time work experience after obtaining the undergraduate degree.

### Prerequisites

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

### MBA Core

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

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

### Concentration and Electives

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

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

- Economics
- Environmental Management
- Finance
- Forest Industries Management
- Global Business
- Logistics and Transportation
- Management
- Manufacturing Management
- Marketing
- New Venture Analysis and Entrepreneurship
- Statistics

The remaining elective courses must be in fields outside the concentration area, normally selected from MBA courses offered in other departments of the college. Courses outside the College of Business Administration as well as courses listed in the Graduate Catalog numbered below 500 may be included in this block only with written prior permission via formal petition to the Office of Graduate Business Programs.

### Transfer Credits

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

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

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

### Other Requirements

The Application for Admission to Candidacy must be approved by two faculty members and
Business Administration

Within their first three years, students fulfill all general education requirements for the BA degree, both upper and lower division along with a minor offered by one of the Arts and Sciences departments. They may use one Economics course only to fulfill distribution requirements, and they are required to take a year of calculus as the only prerequisite to the MBA.

Admission requirements are higher than those normally expected of MBA applicants. Desired qualifications include a minimum 3.4 GPA and a GMAT score of 600 or higher.

Students interested in the program are counseled initially in the Arts and Sciences Advising Center regarding admission standards and Arts and Sciences requirements. At the end of their second year, they have a conference with the Director of Graduate Business Programs and are advised of their prospects for formal admission. Students who are likely candidates are advised to take the Graduate Management Admission Test in October of the third year, and to submit an application to the MBA program. The admission decision is made by January of the third year.

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

DUAL J.D.-MBA PROGRAM

The College of Business Administration and the College of Law offer a coordinated dual program leading to the conferral of both the Doctor of Jurisprudence and the Master of Business Administration. The dual program saves the student approximately 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 studies be started prior to entry into the last 28 semester hours of J.D. coursework and prior to entry into the second year of the MBA program. Students interested in entering the dual degree program should submit a letter of application to the Dual Program Committee.

Upon receipt of the application, the Dual Program Committee will determine eligibility and assign students to advisors who will be responsible for course approval and supervision of 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 9 semester hours of credit toward the MBA for acceptable performance in approved courses offered in the College of Law. The approval of courses is the responsibility of the Dual Program Committee and the student's assigned advisor.

Students may begin their studies in either the J.D. or 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. For any term in which students take MBA courses, even though they are also taking law courses, they must register through The Graduate School. The Graduate School registration form must be approved by the Director of Graduate Business Programs.

Awards of Grades

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

Approved Dual Credit

MBA courses to be counted toward the J.D. program must include 9 semester hours approved by the College of Law. Law courses
DUAL M.S.-MBA PROGRAM

The College of Business Administration and the College of Engineering offer a coordinated program leading to the concurrent Master of Business Administration degree (concentration in manufacturing management) and the Master of Science degree with a major in Industrial Engineering (concentration in manufacturing systems engineering). The dual program saves the student one or two semesters over the time that would be required to earn both degrees independently.

The establishment of the dual program addresses the critical need for personnel trained in both engineering and management who can integrate this increasingly complex body of knowledge in achieving the efficient operation of manufacturing and production firms. The program is designed to accommodate the interests of students who desire a career leading to a leadership position in a manufacturing organization.

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 Industrial Engineering, and by the Dual Program Committee.

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

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

Curriculum

The curriculum in the first academic year of the dual M.S.-MBA program is the two-semester core of the MBA program (two 15-hour courses, one per semester). A 1-hour seminar course each semester in manufacturing will also be taken concurrently during the first two semesters (not for graduate credit). A 3-hour design or industrial problem project will be accomplished in the summer term of the first year. This will be a summer internship in industry, and the project will be academically supervised by a faculty member associated with the dual program.

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

The dual degree candidate must satisfy the curriculum and graduation requirements of the Department of Industrial Engineering and the College of Business Administration. Dual degree students withdrawing from the dual program before completion of both degrees will not receive credit toward graduation in either degree program for courses 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.

Approved Dual Credit

A maximum of 6 semester hours of approved graduate-level courses completed in the College of Business Administration may be counted toward the M.S. degree program with a major in Industrial Engineering. A maximum of 15 semester hours of approved graduate-level courses completed in the Department of Industrial Engineering may be counted toward the MBA degree program. The approval of courses is the responsibility of the Dual Program Committee and the student's assigned advisor.

PROFESSIONAL MBA PROGRAM

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

The professional program is three consecutive semesters completed in 16 months. Classes meet all day on Saturdays and occasionally on Friday evening and/or Sunday afternoon. It offers an integrated core curriculum with an applied project in each semester. The program begins in the fall semester with an intensive week of classes, then continues with weekend classes throughout the following calendar year. The final fall semester also includes an intensive week of courses in addition to weekend classes.

Admission Requirements

Applications are accepted for fall semester only. The application deadline is April 15. For admission to the program, consideration is given to (1) the applicant's academic record with particular attention to the last two years of undergraduate work and previous graduate study, (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 supervisors. The admission decision is based on all factors which make up the total application; therefore, there is no automatic cut-off for either grade-point averages or GMAT scores.

Prerequisites

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

Transfer Credits

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

Other Requirements

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

EXECUTIVE MBA PROGRAM

The executive MBA is designed for professionals holding middle and upper level positions in organizations that wish to support their attainment of an MBA degree. The objective of the program is to provide advanced management skills to individuals who play key roles in leading their organizations. The executive track of the MBA is three consecutive terms completed in one year. Each term requires two residence periods on campus, alternating with a continuous program of reading, study and on-the-job applications to their positions off campus. The off-campus work requires substantial and regular contact with program faculty and other participants and includes scheduled assignments to be carried out.

The program consists of three 12-hour core courses and a 6-hour sequence which is a project of diagnosis and analysis of a significant strategic issue in the sponsoring organization.

Admission Requirements

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

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

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

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

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

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

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

Transfer Credits

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

Executive MBA in Taiwan

The executive MBA taught in Taipei, Taiwan is designed for professionals residing in Taiwan and or working within its target audience and objectives are the same as those on the Knoxville campus, except that the sequence of material has been changed to accommodate the schedules of faculty teams traveling to Taiwan. The executive track of the MBA in Taiwan results in the same Master of Business Administration degree as the full-time MBA and executive MBA on the Knoxville campus.

The Taiwan executive MBA is three semesters of 15 credit hours each, including the same core and project courses described for the Knoxville program. Between each semester, there is a term when students are not enrolled. The program begins in the summer term, continues in Spring semester of the following calendar year and is completed in the Fall semester of that same year. All participants begin and complete the program together.

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

Admissions Requirements for the Executive MBA in Taiwan

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

Each international participant who has not taken the Test of English as a Foreign Language (TOEFL) within the previous two years must take and pass it with a score of 550 or higher. This test may be taken after enrolling in the program but must be successfully completed prior to the international study period in the U.S. To allow for registration, delivery of scores and receipt of the I-20, participants should arrange to take the TOEFL at least 5 months before the international study period.

Executive MBA for Physicians

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

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

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

Admission Requirements for the Executive MBA for Physicians

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

THE DOCTORAL PROGRAM

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

Admission Requirements

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

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

Program of Study

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

Since the program focuses on the development of competent scholars, heavy emphasis is placed on both teaching and research skills. As part of the doctoral program, each student is required to serve as a teaching assistant to an undergraduate business class or as a research assistant to a senior faculty member. 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
- Marketing
- Management Information Systems

Program of Study

The Ph.D. in Business Administration is a unique program that offers the opportunity to pursue a career in academia at the highest level of research and teaching excellence. The program is designed to provide students with a strong foundation in theoretical and practical knowledge in their chosen field of study, as well as the skills necessary to conduct independent research and contribute to the academic community. The program is structured to allow for flexibility, with opportunities for students to specialize in areas of interest while ensuring a broad understanding of the field.

Admission Requirements

Students applying for admission to the Ph.D. program must meet the following requirements:

1. A baccalaureate degree from an accredited institution.
2. A minimum grade point average of 3.0 on a 4.0 scale.
3. Two letters of recommendation from academic or professional references.
4. A statement of purpose outlining career goals and interest in the field.
5. A current resume or CV.

Program of Study

The Ph.D. program typically requires at least four years of full-time study, although the exact duration may vary depending on the student's progress and the specific requirements of the program.

The program is divided into three main phases:

1. Coursework: Students are required to complete a minimum of 36 credit hours of coursework, which includes both required and elective courses. The coursework is designed to provide a solid foundation in the student's chosen field of study, as well as to develop skills in research methodology and critical thinking.

2. Comprehensive Examinations: The comprehensive examinations are designed to assess students' knowledge and understanding of the core concepts in their field of study. The examinations are typically divided into written and oral components.

3. Dissertation: The dissertation phase is the culmination of the Ph.D. program. Students are required to conduct original research in their chosen field and submit a dissertation. The dissertation is typically the result of several years of independent research and writing, and it is a significant contribution to the field of study.

Conclusion

The Ph.D. in Business Administration is a highly competitive program that requires a strong commitment to academic excellence and research. Students who complete the program are well-prepared for careers in academia, research, and industry, with opportunities to contribute to the advancement of knowledge in their chosen field.
Degree Requirements

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

1. Students must complete at least three years of full-time coursework beyond the baccalaureate degree, with two years of residence on the Knoxville campus.
2. Students are required to have a sound and broad base on which to build their Ph.D. coursework. The departmental doctoral advisor will work with the student to determine what, if any, courses need to be completed. All such work is subject to approval by the temporary doctoral advisory committee and the Director of Graduate Business Programs. Specific concentrations may have prerequisites.
3. Research Tools: A minimum of 9 semester hours of graduate research methods must be completed. At least 6 semester hours in statistics courses beyond Statistics 531 are required. The remaining 3 semester hours may be completed in additional statistics courses (not to include Statistics 531) or in other areas such as research methodology, management science, computer science, econometrics, and psychometrics.
4. Concentrations: The concentration is the focal point of the Ph.D. program. Students are expected to master the literature and research techniques in the concentration area and to do quality research as evidenced by the preparation of an acceptable dissertation. A minimum of 12 semester hours of coursework is required, including at least 9 hours of doctoral seminars. Graduate work taken in the concentration at other institutions is considered by the temporary doctoral advisory committee in approving the specific coursework required. Available concentrations are: accounting, finance, logistics/transportation, management (operations management and strategic management), marketing, and statistics. See the appropriate fields of instruction for specific course requirements.
5. A minimum of 9 semester hours of graduate coursework is required in an area outside, but complementary to, the concentration. The student may choose the cognate from one of the following: one of the six 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 qualify 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 13 months.

Doctoral Committee

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

Admission to Candidacy

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

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

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

Dissertation

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

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

GRADUATE COURSES

502-03 Business Core for Master of Accountancy I, II (3,3) Development of role and responsibility of accountant as business advisor. Assessment and delivery of customer value, continuous system improvement, statistical process control, human resource management, role of quality management systems, performance measurement, and oversite of overall corporate strategy. Prereq: Admission to M.Acc. program. Coreq: 553

504 Core 1 (15) Development of roles and responsibilities of business manager. Functional fundamentals (accounting, finance, management, human resource management) through year-long case in which knowledge is applied to solution of simulated real-world enterprise. Continuous systems improvement and delivery of customer value: role of firm in society (with attention to stakeholder value, economics, and the ethical and legal environment of firm). Personal leadership skills: teamwork in written and oral communication, and assessment of students' leadership abilities. Prereq: Admission to MBA program or consent of Director of Graduate Business Programs.

505 Core II (15) Continuation of 504. Functional fundamentals through year-long case in organizational reality, global competition, managing technology, ethics and social responsibility, and strategic planning. Capstone integrated business simulation. Prereq: 504 or consent of Director of Graduate Business Programs.

506 Information Engineering and Management (3) Design and management of information necessary to accomplish organizational objectives: activity blueprints, entity-relationship diagrams, data base design principles, view diagrams and CASE (Computer-Aided Software Engineering) tools.

510 Management of Responsible Service Organizations (3) Management of service organizations that respond to customer requests rather than to produce inventory: non-product economics, relationship building and management methods built on enabling, empowering, monitoring and mentoring employees as they diagnose and respond to individual customer needs.


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


593 Directed Independent Study (3) Cross-disciplinary topic of mutual interest to student and faculty. Available only by arrangement with faculty member. May require approval of Director of Graduate Business Programs. May be repeated. Maximum 6 hrs. S/N or letter grade.
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 covering the review paper and oral examination covering the review paper and related areas.

THE DOCTORAL PROGRAM

Graduate students apply for entrance into the doctoral program to submit evidence of ability to perform and report independent research to the satisfaction of the department. The master's thesis may be offered as evidence of such ability.

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 courses.
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 and economic problems; unconstrained and constrained optimizations, linear programming, dynamic programming, and geometric programming. Prereq: Mathematics 240.


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: CHE 541, Process Dynamics and Control and consent of instructor.

500 Thesis (1-15) Open only to E

501 Graduate Seminar (1) Prereq: Admission to graduate program. May be repeated. S/NC only. F, Sp

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


507 Application of Numerical Linear Algebra in Systems and Control Engineering (3) Fundamental concepts of linear algebra to problems in systems and control areas. Geometric and physical interpretations of vector concepts; least square problems, LU, QR, and SVD decompositions of matrix, eigenvalue problems and similarity transformations; and applications in solving difference and differential equations. Numerical aspects of various algorithms. Prereq: CHE 241 and CHE 340.

531 Advanced Chemical Engineering Thermodynamics (3) Phase equilibrium in ideal and nonideal solutions; composition-relationship between phases, solution behavior and application to macromolecules; introduction to microeconomic approach to thermodynamics.


541 Fluid Mechanics and Polymer Processing (3) (Same as Materials Science and Engineering 541.)

542 Diffusive and Stagnewise Mass Transfer Operations (3) Analysis of mass transfer phenomena, coupled mass transfer and reaction, mass transfer operations in packed towers and agitated vessels, membrane separations, mass transfer in fluidized beds, transfer of substances at different stages of the process. Prereq: CHE 241.

547 Introduction to Transport Phenomena (3) Unified treatment of mass, momentum, and heat transfer. Applications to chemical engineering problems. Prereq: CHE 241.

551 Chemical Reactor Analysis (3) Rate models for heterogeneous reactions, properties of porous catalysts, catalysis deactivation, fluid-fluid and fluid-solid reactions.

575 Applied Microbiology and Bioengineering (3) Cross-disciplinary course combining basic concepts in microbiology, biochemistry, reaction kinetics, and bio- and environmental engineering. Commercial processes, biochemical reactions, wastewater treatment, analysis of basic metabolic processes, and the development of environmental engineering methods. Fundamentals of laboratory techniques as they relate to the Environmental Engineering 575, Agricultural Engineering 575, and Microbiology 575.


581 Industrial Pollution Prevention (3) Principles and practical aspects of industrial waste minimization. Regulatory area, waste minimization strategies, economic analysis, process safety, case study; analysis of alternative waste minimization/mangement technologies. Prereq: Graduate standing in engineering or consent of instructor. (Same as Environmental Engineering 575, Agricultural Engineering 575, and Mechanical Engineering 581 and Environmental Science and Chemistry 585.)

585 Process System Reliability and Safety (3) (Same as Nuclear Engineering 585.)

590 Special Topics in Chemical Engineering (3) May be repeated. Maximum 6 hrs.

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

631 Advanced Topics in Statistical Thermodynamics and Molecular Dynamics (3) Statistical thermodynamics, molecular dynamics, Monte Carlo and molecular dynamic calculations; applications to supramolecular and macromolecular and biological systems. Prereq: 532.


642 Advanced Topics in Polymer Processing (3) (Same as Materials Science and Engineering 642.)

647 Advanced Transport Phenomena (3) Theory of mass, momentum, and energy transport in reactive and non-reactive systems. Formulation of transport models useful for application to analysis and design of separation processes, and chemical and biochemical reactors. Prereq: 505, 547.


655 Advanced Topics in Process Dynamics and Control (3) May be repeated. Maximum 6 hrs.

675 Microbial Systems Analysis (3) Identification and analysis of complex microbial systems using perturbation-response methods. Structuring of important mechanistic processes, interactions, and regulation at several systems levels (reactor or macro, ecological, cellular, physiological, and molecular). Experimental methods for data gathering, signal resolution and processing, mathematical signal analysis, model development (deterministic, stochastic, phenomenological), and utility and limitations of approach. Prereq: 575 or consent of instructor.

691 Advanced Topics in Chemical Engineering (3) May be repeated. Maximum 6 hrs.

Chemistry
(College of Arts and Sciences)

MAJOR

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

Michael Sepaniak, Head

Professors:

Adcock, J. L., Ph.D. ......... Texas
Alexandratos, S. D. (Hoechst-Celanese Prof. of Polymer Science), Ph.D. .... California
Baker, D. C. (Paul and Wilma Ziegler Prof.), Ph.D. .... Ohio State

Barrett, J. E., Ph.D. ............ Northwestern
Bloor, J. E. (Emeritus), Ph.D. .... Manchester
Bull, W. F. (Emeritus), Ph.D. .... Illinois
Chambers, J. Q., Ph.D. ....... Tennessee
Cook, K. D., Ph.D. ............. Wisconsin
Dean, J. A. (Emeritus), Ph.D. .... Michigan
Eastham, J. F. (Emeritus), Ph.D. .... California
Fletcher, W. H. (Emeritus), Ph.D. .... Minnesota
Grimm, F. A., Ph.D. ....... Cornell
Guiochon, G. (Distinguished Scientist), Ph.D. .... Ecole Polytechnique and Paris Vi
Kabalka, G. W. (Robert H. Cole Prof., Distinguished Professor), Ph.D. .... Purdue
Keinleiter, D. C., Ph.D. ....... Princeton
Kovac, J. D., Ph.D. .......... Yale
Lietzke, M. H. (Emeritus), Ph.D. .... Michigan
Magid, L. J., Ph.D. ......... Tennessee
Magid, R. M., Ph.D. ........... Yale
Pagni, R. M., Ph.D. ............. Wisconsin
Peterson, J. R., Ph.D. ....... California
Schweitzer, G. K. (Distinguished Professor), Ph.D. .... Illinois
Sepaniak, M. J., Ph.D. .... Iowa State
Smith, W. T. (Emeritus), Ph.D. .... Ohio State
VanHook, W. A. (Paul and Wilma Ziegler Prof.), Ph.D. .... Johns Hopkins
Wehry, E. L. (Emeritus), Ph.D. .... Purdue
Williams, T. F. (Distinguished Professor), Ph.D. .... London
Wunderlich, B. (Distinguished Scientist), Ph.D. .... Northwestern

Assistant Professors:

Barnes, C. E., Ph.D. ....... Stanford
Feigler, C. S., Ph.D. ........ Colorado
Schell, F. M., Ph.D. ....... Indiana
Xue, Z. B., Ph.D. .......... California

Assistant Professor:

Dadmun, M. D., Ph.D. ........... Massachusetts
Gilman, S. C., Ph.D. ....... Penn State
Hinde, Robert J., Ph.D. ....... Chicago
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 majoring in Chemistry are required to present as a prerequisite two years of chemistry including quantitative analysis.

THE MASTER'S PROGRAM

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

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

1. Research and a thesis to give 6 to 12 hours of graduate credit in Chemistry 500.

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 and above) and/or a related field to make an overall total of 30 hours, including one of the following sequences: 530-31, 550-51-52, 570-72-73, 590-94-95, or three courses from 510-11-12-20. 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, 550-51-52, 570-72-73, 590-94-95.

6. A final oral examination.

The Ph.D. program with concentration in chemical physics is conducted jointly with the Department of Physics. Requirements depend on the choice of the major department.

Chemistry departmental requirements include passing the above degree requirements in chemistry with concentration in physical chemistry plus 6 additional hours in physics at the 500 level or above. Three of the additional physics hours can be used to satisfy the 18 hours requirement in item 5.

GRADUATE COURSES

430 Advanced Inorganic Chemistry (3) Atomic and molecular structure, bondings theories, descriptive chemistry of elements, kinetics and mechanism of inorganic reactions, applications of modern techniques for characterization, coordination and organometallic chemistry. Prereq: 330. Prereg or coreq: 380 or 381. 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 473 nor for both 481 and 483. 473-83: Properties of gases; first, second, and third laws of thermodynamics; chemical equilibria; simple phase equilibria; properties of solutions; introduction to statistical thermodynamics. 483: Kinetics of chemical reaction; introduction to quantum mechanics and applications to electronic structure of atoms and molecules;
applications and interpretations in polar, radical, and synthetic processes. Prereq: 540. 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 beyond degree completion. May not be used toward degree requirements. May be repeated. S/N only. E

505 Special Problems (3) Specially assigned theoretical or experimental work on problems not covered in other courses. Prereq: Consent of department. May be repeated. Maximum 6 hrs. S/N only. E

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

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

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

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

531 Characteristics of Inorganic Compounds (3) Descriptive chemistry of elements; structure, reactions, kinetics, mechanisms, equilibria, and spectra of coordination, organometallic, and biomolecular compounds. Prereq: 530. S

532 Experimental Methods of Inorganic Chemistry (3) Electronic, infrared, Raman, microwave, NMR, ESR, nuclear quadrupole, Mossbauer, mass, and photoelectron spectroscopies for characterization of inorganic compounds. Prereq: 530. F

540 Nuclear and Radiochemistry (3) Nuclear properties, radioactivity, radioactive decay processes, nuclear structure and models, nuclear reactions, radiations and matter, radiation detection. Prereq: 1 yr of physical chemistry. F

550 Structure and Reactivity in Organic Chemistry (3) Structure and bonding in organic compounds; molecular orbital theory, chemical reactions, conformational analysis, and chemical mechanisms, substituent effects on acidity and reactivity; introduction to reaction mechanisms. Prereq: 550. F


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

553 Spectroscopic Characterization of Organic Compounds (2) Organic structure elucidation using spectroscopic methods: nuclear magnetic resonance, infrared, ultraviolet and mass spectrometry. Prereq: 360 or equivalent. F

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

570 Quantum Chemistry and Spectroscopy (3) Basic principles of quantum mechanics and their applications to molecular orbital theory, molecular structure, and spectroscopy; introduction to group theory. Prereq: 1 yr of physical chemistry. F

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. Prereq: 1 yr of physical chemistry. F

573 Chemical Kinetics and Transport (3) Time-dependent current significance. Prereq: 510-11-12 or consent of instructor. May be repeated. 1 yr of physical chemistry. Sp

590 Polymer Chemistry (3) Fundamentals of polymer synthesis and characterization through application of organic and physical chemistry. Prereq: 1 yr of each of organic and physical chemistry. F


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

600 Doctoral Research and Dissertation (3-15) Prereq: Consent of instructor. 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/N only. E

610 Selected Topics in Analytical Chemistry (3) Topics of current significance. Prereq: 510-11-12 or consent of instructor. May be repeated. Maximum 12 hrs.

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

650 Selected Topics in Organic Chemistry (3) Topics of current significance. Prereq: Two of 550-51-52 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.

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Child and Family Studies

(College of Human Ecology)

MAJORS


学位

Connie Steele, Head

Professors:


Associate Professors:

Allen, Jan, Ph.D. .......... Purdue Malia, Julia, Ph.D. .......... Iowa State Smith, Delores, Ph.D. .......... Oklahoma State Tegano, Deborah, Ph.D. .......... Virginia Tech

Assistant Professors:

Groses, Melissa, Ph.D. .......... Virginia Tech Morris, Lane, Ph.D. .......... Tennessee

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The Department of Child and Family Studies encompasses two primary concentrations: child 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 individual goals. All programs are characterized by a broad array of coursework, varied research experiences, and opportunities for experiences in applied settings.

Because the doctoral degree is a research degree, students at this level receive substantial preparation in statistics and research methodology. Interested students should contact the department head.

ADMISSION REQUIREMENTS

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

Admission to the program is contingent upon faculty evaluation of GRE scores, undergraduate/graduate GPA, rating forms, and work experience. Prerequisites for admission to the master's or doctoral program are 9 semester hours of either upper division undergraduate or graduate social science.

THE MASTER'S PROGRAM

An individual program of study may be designed by the student in collaboration with his or her major professor and committee. The program provides for a concentration in either child development or family studies. The M.S. with a concentration in child development offers two tracks. Track 1 is designed to meet the needs of professionals who work in programs encompassing a variety of early childhood programs. Specializations in Track 1 consist of early childhood education, early childhood special education, early childhood administration and child development. Thesis and non-thesis options are available for Track 1. Track 2 is designed for students seeking initial teacher licensure in early childhood education (pre-K through grade 3). This program is based on an undergraduate degree in child development or equivalent coursework. A non-thesis option only is available for Track 2.

Track 1 - All students in the child development concentration must enroll in CFS 510, 511, and 571. At least 6 hours in a cognate area outside the department must be completed.

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Child and Family Studies
Thesis students are required to take: 3 hours of 500-level research methods; 3 hours of 500-level statistics; 6 hours of CFS courses in the area of concentration; 6 hours of thesis credit; and an oral comprehensive examination. Non-thesis students are required to take 3 hours of 500-level research methods, statistical methods, or interpretation of methods and statistics; CFS 565; 9 hours of CFS courses in the area of concentration; and a written comprehensive examination.

Track 2 - All students in the early childhood education licensure program must enroll in Human Ecology 574, 575, 591, and Holistic Teaching, or 550 (or equivalent CFS course). Students are required to take: 3 hours from CFS 510, 511 or 512; three courses from CFS 511, 520, 521, 522, 530, 540, 525, 590; 3 hours of 500-level statistical methods or interpretation of statistics or research methods (requirement may be met with CFS 570); and written comprehensive examination (30 hours).

The family studies concentration consists of specializations in family life intervention and family science. Thesis and non-thesis options are available. Students should also consider an interdisciplinary minor in gerontology to provide a life span perspective to human development or family studies.

Students in the family studies concentration must enroll in CFS 550, 571, and 540 or 560. At least 6 hours in a cognate area outside the department are required. Thesis students are required to take: 3 hours of 500-level research methods; 3 hours of 500-level statistics; 6 hours of CFS courses in an area of concentration; 6 hours of thesis credit; and an oral comprehensive examination. Non-thesis students are required to take: 3 hours of 500-level research methods, statistical methods, or interpretation of methods and statistics; CFS 564, 565; 9 hours of CFS courses in the area of concentration; and a written comprehensive examination.

Students seeking the M.S. with a major in Child and Family Studies are required to file a plan of study with the department head after 15 hours of graduate credit have been completed.

**THEPH.D. CONCENTRATION**

The doctoral program in Human Ecology prepares scholars in the concentration areas of child development and of family studies. The strength of the doctoral program is based on three major components: the integration of child development and family studies within the context of human ecology and related areas, concentration in child development or family studies, and an emphasis on becoming proficient producers and consumers of research. A doctoral program that is concurrently specialized and integrative in nature reflects this complexity of the disciplinary subject matter, provides a broader context to formulate theoretical questions, and broadens the empirical literature for addressing those questions.

**Requirements include:**

1. Minimum 13-16 hours in child and family studies required foundation courses: 510, 550, 570, 571; 511 and 630 (child development area); or 634 (family studies area).
2. Minimum 12 hours in 500- and 600-level courses in child development or family studies, with at least 3 hours in 600-level courses (in addition to the required courses described in #1);
3. Minimum 6 hours in a cognate area;
4. Minimum 9 hours in graduate-level statistics; with at least 3 of these hours in a more specialized area than a sequence of survey courses;
5. Minimum 3 hours of specialized research methods;
6. Pre-doctoral research project approved by student's committee;
7. Minimum 8 hours of electives.

**ACADEMIC COMMON MARKET**

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state basis. The M.S. in Child and Family Studies (concentration in family studies only) is available to residents of Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

**GRADUATE COURSES**

500 Thesis (1-15) P/NP only. E
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student is University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N only. E
505 Development of Interpersonal and Supervision Skills (2) 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. Prereq: 9 hrs of either upper division undergraduate or graduate social science or consent of instructor. F
510 Theory in Child Development (3) Theoretical models in child development (conception through adolescence); application to research, intervention and education. Prereq: 9 hrs of either upper division undergraduate or graduate social science or consent of instructor. F
511 Survey of Research in Child Development (3) Classic and contemporary research literature in child development from conception through adolescence. Prereq: 510 or equivalent or consent of instructor. Sp
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. F
515 Children in Contemporary Society (3) Theory and research on environmental and developmental issues in contemporary family life and educational environments for children from infancy through middle childhood. Implications for programs and policy. Prereq: 510 or equivalent or consent of instructor. F
520 Curriculum and Program Development in Early Childhood Education (3) Current programming issues in early childhood education: description, analysis and evaluation of curriculum models, teaching methods, administrative style, and supervision of personnel. Experience in designing and evaluating early childhood programs for young children, special needs, infancy-age 8. Prereq or coreq: 510 or 512.
521 Organizational Management in Early Childhood Education (3) Designing, implementing, and evaluating physical and human resources in educational environments. Development of skills in environmental organization, interpersonal leadership, and supervision of staff. Prereq: 512 or equivalent or consent of instructor. E
522 Naturalistic Interventions for Parents and Teachers of Young Children (3) Common problems faced by parents and teachers; methods available to modify problem behavior. Prereq: 510 or equivalent or consent of instructor.
525 Seminar on Play (3) Comparison and contrast of theoretical framework and research methodologies on play. Developmental perspective on play.
530 Families of Handicapped Children (3) Developmental nature of families' experiences in caring for handicapped children, especially during infancy and early childhood. Prereq: 510 or consent of instructor.
540 Parent-Child Relations (3) Influence of parents on children, influence of children on parents, reciprocal interaction between parents and children, specializations of systems models, child abuse, and impact of divorce on children. Prereq: 550 or equivalent or consent of instructor. F
550 Survey of Theory and Research in Family Studies (3) Use of family conceptual frameworks and application of theoretical models in research and family life programs. F
552 Advanced Family Diversity (3) Diversity in family configurations in contemporary U.S. society. Variations of family patterns by race, ethnicity, religion, and social class; social dynamics of family formation, composition, and patterning. Prereq: 550. F
555 Children, Divorce and Remarriage (3) Children's and adolescents' adjustment to transitions involved in parental divorce, single-parenthood, and remarriage. Prereq: 550 or equivalent or consent of instructor.
560 Marital Dyad (3) Communication, power, sexuality, marital stability, and marital satisfaction. Prereq: 550 or equivalent or consent of instructor.
562 Families in Crisis (3) Family processes during times of stress. Vulnerabilities and coping mechanisms of families. Prereq: 550 or equivalent or consent of instructor.
563 Family Life Education Programs (3) Planning, implementing and evaluating programs in marital, parent, and child, and family relationships, and parenthood education. Prereq: Consent of instructor. (Same as Human Ecology 563.)
564 Practicum in Human Development or Family Studies I (3) School and community programs. Education for developmental and family living. Prereq: Consent of instructor. (Same as Human Ecology 564.)
565 Practicum in Human Development or Family Studies II (3) School and community programs concerned with education for human development and family living. Consent of instructor. (Same as Human Ecology 565.)
567 Family Violence (3) Theory and research on initiation, maintenance and cessation of violent behaviors in intimate family contexts; and assessment of responses to violent family behaviors. Prereq: 510 or equivalent or consent of instructor. F
571 Research Seminar (1) Presentation and critique of research projects. Prereq: Departmental major or consent of instructor. May be repeated. S/N only. E
580 Special Topics in Human Development or Family Studies (1-3) Research, theory and current issues in child development or family studies; divorce, handicapped children, symbolic interaction, work and family, Platypus, mainstreaming children, theory and research in human sexuality, cognition. Prereq: 6 graduate hrs in major, or consent of instructor. May be repeated with different topics. Maximum 9 hrs. E
581 Directed Study in Human Development or Family Studies (1-3) Individual learning experiences in specific topics in child 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. E
590 Assessment of Development and Learning in Young Children (3) Theory, empirical research and practices related to measurement of development and learning in young children.
600 Doctoral Research and Dissertation (3-15) P/NP only. E
Civil and Environmental Engineering

(College of Engineering)

MAJORS

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

Gregory D. Reed, Reed

Professors:

Benett, R. M., PE, Ph.D. ................................................ Illinois
Burdeotte, E. G. (Fred N. Pebbels Prof.), PE, Ph.D. ....................... Illinois
Catterjee, A., PE, Ph.D. ............................................. NG State
Davis, W. T., Ph.D. ...................................................... Tennessee
Deatherage, J. H., PE, Ph.D. ........................................... Tennessee
Drum, E.C., PE, Ph.D. .................................................. Arizona
Ghosh, M. (Goodrich Chair of Excellence), Ph.D. ......................... Illinois
Goodpasture, D. W., PE, Ph.D. ......................................... Illinois
Grecco, W. L. (Emeritus), Ph.D., Michigan State
Heathington, K. W. (Emeritus), Ph.D. ...................................... Texas A&M
Humphrey, J. B. (Emeritus), Ph.D., Texas A&M
Johnson, H. L. (Emeritus), M.S., Tennessee

Miller, W. A. (Granger Prof.), PE, Ph.D. .................. Georgia Tech
Reed, G. D. (Lasion), PE, Ph.D. .................................. Arkansas
Robinson, R. B. (Fisher Prof.), PE, Ph.D. ................................. Iowa State
Smoot, J. L., PE, Ph.D. ................................................... VPI
Tashchiyan, B. A. (Condra Prof.), PE, Ph.D. ............................... VPI

Associate Professors:

Chou, K. G., Ph.D. ................................................... Northwestern
Cox, C. D., Ph.D. ......................................................... Penn State
Han, L. D., Ph.D. ........................................................ California
Hansen, J. H. (UTSI), Ph.D. ........................................ Missouri
Mauldin, M., 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, water resources, air quality, mixed waste management, waste management, and environmental risk assessment.

THE MASTER'S PROGRAM

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

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

Civil Engineering

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

Thesis Option: A minimum of 30 seminar hours, including 6 hours of thesis, is required. A minimum of 12 semester hours, including a 3-hour special problems course is required. The special problem will culminate in a written report which must be approved by the student's major professor.

Non-Thesis Option: A minimum of 33 semester hours of approved graduate courses is required. The major shall include a minimum of 18 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 goals.

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, biology, 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. A minimum of 24 semester hours of approved graduate courses, subject to a comprehensive examination in all coursework, each student must pass a comprehensive examination.

6. After completion of the dissertation, prior to graduation, 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.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal
Civil Engineering

GRADUATE COURSES

421 Portland Cement and Asphalitic Concrete (3) Agglomerated structure, testing of Portland cement concrete mix design methods for concrete and asphalt concrete admixtures, tests of asphalt and asphalt mixes, 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; basic principles of geometric and pavement design. Prereq: 210, 251, 352.

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

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

461 Analysis of Framed Structures (3) Maximum stress due to moving loads; use of influence lines; lateral forces due to earthquake and wind; analysis of portals, building frames, and space frames; matrix methods; use of computer in structural analysis. Prereq: Structural Analysis II.

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

474 Reinforced Concrete Design (3) Reinforced concrete continuous beams and floor slabs, columns, and shear walls; test data on construction, testing and analysis. Prereq: 321. 2 hrs and 1 lab.

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

490 Water Resources Project Design (3) Coherent development of multipurpose reservoir and dam master plan; data acquisition; spillway and outlet works design; earth and gravity dam stability analysis; drainage and filling; maintenance and operation principles; site selection; environmental concepts; dam break analyses. Prereq: 390, 395.

494 Urban Drainage Engineering (3) Design and management of stormwater conveyance and control structures. Application of hydrologic and hydraulic principles to design of drainage systems for urban, agricultural, and highway development; design of inlet structures, ditches, culverts, and detention/retention basins; application of computer computer runoff models; evaluation of land-use on streamflow quantity and quality. Prereq: 390, 395.

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

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

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

510 Urban Systems: Engineering and Management (3) Various urban systems usually under responsibility of city managers and engineering boards: water, sewer, drainage, refuse collection. Personnel management, finance, planning and public relations. Prereq: Graduate standing or consent of instructor.

512 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 330.


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

532 Rock Mechanics and Rock Engineering (3) Engineering properties of rock and rock masses. Discontinuity analysis, stress and strain, key block theory. Application to rocks slopes, underground excavation, and foundation ground water flow. Prereq: Introduction to Soil Behavior or consent of instructor.

534 Geological Engineering (3) Influence of geologic history 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 problems, problems, discussions, and presentations in geotechnical engineering. Graduate standing or consent of instructor. May be repeated.

538 Finite Element Applications in Geotechnical Engineering (3) Applications of finite element method to typical problems in geotechnical engineering. Confinement and unconfined flow through porous media; stresses and strains in elastic halfspace; representation of nonlinear soil behavior with elastic and elasto-plastic models; soil structure interaction effects. Prereq: Introduction to Soil Behavior and 551.

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

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

543 Construction Estimating (3) Project costs, estimating and takeoff techniques, market cost conditions, and feasibility of design to cost. Prereq: Construction Methods and Equipment.

551 Traffic Engineering-Characteristics (3) Driver-vehicle-roadway system; traffic flow modeling; elements of transportation/highway safety. Prereq: Graduate standing.

552 Traffic Engineering-Operations (3) Signs, signals and traffic control; traffic volume and traffic flow; on-ramp and off-ramp signal timing/timing/phasing; one-way reversible flow; system operations; identification and correction of high-accident locations and system deficiencies. Prereq: 551 or 452.

553 Geometric Design and Layout of Roadways and Community Facilities (3) Functional and geometric design and rural and urban roads of all classes; subdivision layout and alignment; geometric design of urban roads of all classes; techniques for access control; highway interchange design; and street and intersection design and parking. Prereq: 451 or consent of instructor.

554 Urban Transportation Planning (3) Transportation problems in urban areas; systematic planning for identifying existing and future problems; travel surveys and demand models; evaluation of alternatives; implementation processes; special topics: urban goods movement, transportation system management. Prereq: 352 or graduate standing.

555 Public Transit Planning (3) Characteristics of transit modes: conventional and paratransit; operations design of services: route planning and scheduling; cost analysis; mode choice models; performance evaluation; transit surveys; organization and financing. Prereq: 554 or graduate standing.

556 Traffic Accident Reconstruction (3) Data collection and analysis as basis for accident prevention on control programs; roadway hardware design and crash testing. Prereq: 452 or graduate standing.

557 Transportation Planning and Operations with Micro-Computer Applications (3) Transportation system management techniques and application of micro-computers to analysis of transportation actions. Prereq: 551 and 556.

558 Planning and Transportation (3) Preparation of transportation as elements of comprehensive development. Analysis of relationships of transportation with various transportation modes and between transportation and other community uses. Use of planning process to evaluate existing travel patterns, modeling of demand, proposing alternatives and evaluation. Prereq: Graduate standing. (Same as Planning 537.)

561 Computer-Aided Structural Analysis (3) Fundamental concepts of computational methods used in structural analysis; matrix and finite element methods; practical application of structural analysis software. Prereq: Structural Analysis and Matrix Computation or equivalent.

563 Statistically Indeterminate Structures (3) Deflections of beams and trusses; force methods; moment distribution and other displacement methods; secondary stresses. Prereq: 361.

565 Structural Dynamics (3) Analysis of free and forced vibrations; transient response of structures having many degrees of freedom; estimation of structural behavior considered for structural systems; earthquake design and response of structures. Prereq: 561.

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

571 Behavior of Steel Structures (3) Behavior of structural steel members due to static and fatigue loading; relation between relaxation results and current specifications for design. Prereq: 471.

573 Prestressed Concrete (3) Properties of prestressing materials; methods of prestressing 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; combined bending and axial load; shear and flexure behavior of concrete reinforced members; moment-curvature relationships for reinforced concrete beams. Prereq: 471.

575 Repair and Retrofitting of Structures (3) Technical methods, and materials for repair and retrofitting of deteriorated or overstressed structures, foundation underpinning, retrofitting of steel fatigue failures. Prereq: 472.

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 statistics in civil engineering disciplines: structures, geotechnology, water resources, transportation, and
Environmental Engineering

GRADUATE COURSES

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

502 Registration for Use of Facilities (3-15) P/NP only. E

520 Open Channel Flow Theory and Applications (3) Open channel flow theory and applications: analysis, unsteady flow theory and analysis; dynamic routing; spatially varied flow; non-linear variation; microcomputer applications, using HEC-2 model. Prereq: Civil Engineering 300.

522 Floodplain and Urban Flood Management (3) Review of national, regional, and local flood problems; state of the art; flood damage reduction techniques; countermeasures; and procedures. Prereq: Civil Engineering 300 or consent of instructor. May be repeated. Maximum 6 hrs. S/N only.

524 Sediment Transport (3) Sediment properties and measurements; principles of dynamics of suspended and bed sediment transport in erodible channels; erosion, transportation, and deposition of sediment by flowing water; erodible channel designs; channel regime theory; common computer models. Prereq: Civil Engineering 300.

552 Soil Erosion and Sediment Yield (3) Theory of soil erosion and sediment yield from disturbed land; methods and computer models for estimating sediment yield. Erosion and sediment control theory and management principles, local and state regulations. Prereq: Civil Engineering 395. (Same as Agricultural Engineering 525.)

530 Stormwater Modeling (3) Systems approach to stormwater modeling; hydrologic components; linear and nonlinear systems integrated into mathematical models of watershed response. Review and application of computer-aided design and analysis techniques. Prereq: Civil Engineering 395.

555 Ground Water Hydrology (3) Dynamics of flow and contaminant transport in porous and fractured systems; pollution sources; field examples; pollution remedies; in situ remediation; numerical solution of flow and transport equations; numerical solution of flow and transport equations. Prereq: Civil Engineering 395.

666 Reliability of Constructed Systems (3) Development of safety factors and probability based design codes; Monte Carlo methods; construction system reliability; evaluation of existing infrastructures. Prereq: 580. Introduction to Structural Design or consent of instructor. May be repeated.

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 slabs; limit analysis; behavior, analysis, and design of reinforced concrete slabs; yield lines; finite element solutions, and ACI Code Method. Prereq: 574.

Environmental Engineering

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

Classics

Professor:

Gesell, G. C., Ph.D. ..................... North Carolina
Rutledge, H. C. (Emeritus), Ph.D. ..... Ohio State
Tandy, D. W., Ph.D. ..................... Yale

Associate Professors:

Craig, C. P., Ph.D. ..................... North Carolina
Martin, S. D., Ph.D. ..................... Michigan
Shelton, J. E., Ph.D. ..................... Vanderbilt

Assistant Professors:

Sutherland, E. H., Ph.D. ............... UC Berkeley

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


405-06 Selected Readings from Greek Literature (3.3) For advanced students in Greek, plays, historical writings, poetry of ancient Greece in original Greek. Prereq: 401-402 or consent of instructor. May be repeated. Maximum 9 hrs.

414 Cicero and Techniques of Latin Prose Composition (3) For advanced students in Latin, practice in prose composition, writings of Cicero the model. Prereq: 351-352 or consent of instructor. Maximum 9 hrs.

431-32 Selected Readings from Latin Literature (3.3) For advanced students in Latin, oratory, historical writings, poetry of ancient Rome in original Latin. Prereq: 351-352 or consent of instructor. May be repeated. Maximum 9 hrs.

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

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

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

462 Roman Law (3) Development of Roman law through examination of cases from writing of Roman jurists, world's first legal professionals. Understanding legal institutions in relationship to Roman society. Roman property and contract law.

561 Special Topics in Classical Civilization (1-3) Advanced tutorials of instructor and Roman authors in English translation; problems in cultures of Greece and Rome. May be repeated. Maximum 9 hrs.

Communications

Communications (College of Communications)

MAJOR DEGREES
Communications .................................. M.S., Ph.D.

The College of Communications offers the Master of Science and the Doctor of Philosophy degrees with a major in Communications. In addition to the full-time program, the M.S. degree program is offered on an evening basis in Knoxville and, via distance education, at Chattanooga on the University of Tennessee at Chattanooga campus and at Martin on the University of Tennessee at Martin campus.

For application forms and other information about the M.S. and Ph.D. programs in Communications, write to: Associate Dean for Graduate Studies, College of Communications, 426 Communications Building, The University of Tennessee, Knoxville, TN 37996-0347.

ADMISSION REQUIREMENTS

Applicants must meet admission requirements of The Graduate School. In addition, they must complete the Graduate Record Examination, rating forms, and application forms as required by the College of Communications. Minimum requirements for admission to full potential candidate status normally include a 3.0 (4.0 system) grade-point average in undergraduate studies and scores at or above the fiftieth percentile in verbal and quantitative aptitude on the Graduate Record Examination. All application materials are screened by an admissions committee authorized by the faculty of the College of Communications.

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

A baccalaureate degree in communications or a related field is recommended. Admission is possible with other baccalaureate degrees. However, all applicants must take prerequisite courses, unless the appropriate background is required to take up to 18 semester hours of prerequisite and corequisite courses as determined by the department in which the student is enrolled. Students must take a proficiency test on any prerequisite course, subject to review by the master's or doctoral committee of the College of Communications.

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

THE MASTER'S PROGRAM

The Master of Science with a major in Communications is intended for students who desire a career in the mass media with an emphasis on communications management and a deeper understanding of the communication process and social role of the mass media. The program follows a broad-based multi-media approach while allowing the student to concentrate in one of four fields: advertising, broadcasting, journalism, or public relations. 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 degree rather than an advanced degree.

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

Degree Requirements

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

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

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

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

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

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

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

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

THE DOCTORAL PROGRAM

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

The program is interdisciplinary, consisting of a required core curriculum and recommended courses outside the college in the related social and behavioral sciences. The program is flexible and will accommodate a wide variety of career goals in communications. New students are advised to enroll for the program at any time; however, core courses begin only in the fall semester.

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

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

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

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

3. Endorsement by at least three former teachers or professional colleagues; and

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

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

1. Twenty-eight hours of core courses—Communications 610, 612, 620, 640, 641; 6 hours of statistics; and three of the following courses: Communications 622, 632, 642, and 652.

2. Fifteen hours in a primary concentration (advertising, broadcasting, information...
issues directly affecting the mass media: libel, privacy, speech communication, and/or the Schools of Information Sciences and Journalism.

3. Twelve hours in a secondary concentration (outside the College of Communications).
4. Nine hours from a chosen concentration (non-binding) and suggestions for improvement in performance.
5. Twenty-four hours of dissertation.

All courses require the approval of the student’s advisory 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 217, Plural 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, 674-6651. See also courses listed under Advertising, Broadcasting, Information Sciences, Journalism, and Speech Communication.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S. program in Communications is available to residents of Arkansas, Kentucky, or Louisiana (with on-campus instruction only).

The Ph.D. program is available to residents of the states of Alabama, Arkansas, Louisiana, Maryland, Virginia, or West Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

ACADEMIC STANDARDS

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

GRADUATE COURSES

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

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

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

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

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

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

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

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

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

552 Seminar in Health Communications (3) Methods, problems, and issues in communication of health field. Media’s reporting of health issues. Setting of media’s “health agenda.” Strategic uses of media in social marketing efforts; public communication of complex social/medical issues. Prereq: Consent of instructor.

553 Seminar in Risk Communications (3) Interaction of scientists, journalists, and public on scientific, technological, and medical risks; analysis of methods for enhancing public understanding. Prereq: Consent of instructor.

560 Seminar in Communications Management (3) Organizational structure and functions of communication corporations: development of objectives, strategies, and tactics. Analysis of financial statements and case studies. Prereq: Consent of instructor.

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

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

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

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

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

612 Fundamentals of Communications Research (3) Universal research methods; hypotheses and problems to reporting results. Causal inference and relative strengths of various research designs. Fundamentals and specific applications of most common data-gathering and measurement techniques in communications research: experimental, survey, content analysis, historical and qualitative. Prereq: Consent of instructor or admission to program. Sp

620 Seminar in Mass Communications Education (3) Role and scope of mass communications teaching unit, historical perspectives of curricular trends. Teaching methods and instructional objectives: classroom testing and measurement; design of professional curricula, research extension and evaluation; grants and contracts in research. Prereq: Consent of instructor or admission to program. Su

622 Quantitative Research (3) Techniques for evaluation of research design and measurement. Survey, content analysis, and experimental techniques. Assessment of reliability and validity, data analysis, hypothesis testing, and inference strategies. Prereq: 612. F

632 Mass Communications History and Historiography (3) Origins and development of mass media in America. Philosophical history. Historical sources and their verifications. Synthesis and interpretation of data. Prereq: 612 or consent of instructor. Su

640 Mass Communications Theory I (3) Selected research hypotheses and theories in literature of mass communication theory. Prereq: Consent of instructor or admission to program. F

641 Mass Communications Theory II (3) Selected topics in the theory of mass communication. Critical evaluation of extant theory, derivation of hypotheses, and advanced theory construction. Prereq: 640. Sp

542 Qualitative Research (3) Theory and application of qualitative research methods to social science and communications research. Theoretical considerations underlying symbolic interactionism as translated into research strategies of participant observation, life history, interviewing, archival analysis, and case studies. Prereq: 612 or consent of instructor. Su

652 Mass Communications Law and Legal Research (2) Legal restrictions under which mass media operate. Finding, interpreting and analyzing sources of legal information. Prereq: 612 or consent of instructor. Sp

692 Advanced Topics in Communications Theory and Methodology (3) Advanced study of communication issues, theories and methods. May use qualitative, quantitative, historical or legal approaches. Prereq: 640 or consent of instructor.

Comparative and Experimental Medicine

(Office of the Vice Chancellor for Academic Affairs)

MAJOR

DEGREES

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

L. N. D. Poltjeier, Director

Joint Graduate Coordinating Committee:
Karlstad, M.D., Ph.D., Anesthesiology
Lawler, J. E., Ph.D., Psychology
Lozio, C., M.D., Medical Biology
Peterson, A. D. (Liaison), B.V.Sc., Ph.D., Veterinary Teaching Hospital
Slaud, 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-admission program designed to provide students with the necessary background to pursue research careers in the health sciences. This program emphasizes the comparative approach to the study of experimental pathobiology, infectious diseases, pharmacokinetics, epidemiology, clinical medicine, immunopathology, hematology, 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, Hemophila 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 Knoxville 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, mathematics through calculus, physics, and basic biology. More advanced study in biology such as biochemistry, mammalian anatomy, histology, cell biology, or other appropriate biomedical courses from an accredited university is recommended.

Applicants for admission to the Master of Science degree program whose background include no formal training in the biomedical field beyond the baccalaureate degree will be required to score at least 1,000 on the quantitative and verbal portions of the Graduate Record Examination.

Doctor of Philosophy Degree Program

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

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

Exceptional veterinary students at UT Knoxville 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

All students must take at least 4 credit hours in 500- or 600-level courses in basic mechanisms of disease and at least 7 credit hours of 500-level biochemistry or cell biology. See listings under Biochemistry and Cellular and Molecular Biology program for information on these courses. In addition, students must complete a minimum of 8 hours of coursework in a specified discipline, 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

All students must take at least 4 credit hours in 500- or 600-level courses in basic mechanisms of disease and at least 7 credit hours of 500-level biochemistry or cell biology. See listings under Biochemistry and Cellular and Molecular Biology program for information on these courses. In addition, students must complete a minimum of 8 hours of coursework in a specified discipline. Exceptions to accommodate students with specific interests must be approved by the joint Graduate Coordinating Committee after application, in writing, to the director.

Areas of emphasis may include hematology, oncology, comparative pathology, comparative pharmacology, toxicology, immunology, genetics, infectious diseases, or biochemistry of disease. At least 24 hours of coursework, including a minimum of 6 hours at the 600 level, and 24 hours of Dissertation 600 are required for a total of 48 hours. For students with professional degrees, a minimum of 18 hours of coursework beyond the professional degree is required for a total of 42 hours.

The doctoral committee (at least 4 members) is chosen during the first year. Three of the four members, including the chair, must be approved by the Graduate Council to direct doctoral research. At least one member must be from the College of Veterinary Medicine and at least one member from the Graduate School of Medicine.

A comprehensive examination is given at the completion of coursework. A seminar and final oral defense of the dissertation culminate the program.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The 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 Admissions and Records.

Comparative and Experimental Medicine--Graduate School of Medicine

GRADUATE COURSES

Participating departments include: Anesthesiology, Medicine, Medical Biology, Obstetrics and Gynecology, Pathology, 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/N only. E

508 Graduate Research Participation (3) Advanced research techniques while conducting individual biomedical research projects under supervision of faculty. Open to all graduate students. Prereq: Consent of Instructor. May be repeated with consent of instructor. Maximum 8 hrs. S/N 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 Metabolic Disease (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: Biology 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/N only. F,Sp

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

652 Special Topics in Pathology (1-3) Pathologic anatomy, biochemical pathology, and related areas. Primarily for doctoral candidates in Comparative and Experimental Medicine.

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

Comparative and Experimental Medicine--Veterinary Medicine

GRADUATE COURSES

Participating departments include: Animal Science, Comparative Medicine, Microbiology, Pathology, Large Animal Clinical Sciences and Small Animal Clinical Sciences. Several faculty in the Department of Microbiology hold joint appointments in the College of Veterinary Medicine. See Microbiology under Fields of Instruction for additional courses.
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 methodology, recent advances in experimental 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 581.) E

652 Disorders of the Endocrine System (2) (Same as Animal Science 582.) Sp, A.

Comparative Medicine
See College of Veterinary Medicine and Comparative and Experimental Medicine

Computer Science
(College of Arts and Sciences)

DEGREES

Major

Computer Science

M.S., Ph.D.

Robert C. Ward, Head

Professors:

Dongarra, Jack, Ph.D. New Mexico
Langston, Michael A., Ph.D. Texas A&M
Poore, J. H., Ph.D. Georgia Tech
Scherer, Gordon R. (Emeritus), Ph.D. Purdue
Thomas, Michael G., Ph.D. Duke
Tate, Robert C., Ph.D. Virginia

Associate Professors:

Berry, Michael W., Ph.D. Illinois
MacLennan, Bruce J., Ph.D. Texas A&M
Vander Zanden, Bradley, Ph.D. Cornell
Vose, Michael D., Ph.D. Texas

Assistants Professors:

Gregor, Jens, Ph.D. Aalborg (Denmark)
Hall, James S., Ph.D. Princeton
Raghavan, Padma, Ph.D. Penn State
Smith, David W., Ph.D. Texas

Instructor:

Mayo, J. Wallace (Liaison), M.S. Tennessee

THE MASTER'S PROGRAM

Two semesters of calculus plus two additional semesters of college mathematics (e.g., linear algebra, differential equations, probability) and a course in discrete structures and in systems and computer 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.

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 these scores sent to The Graduate School.

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

Original research reported in a dissertation of high quality is emphasized. The minimum hour requirements are 24 hours of coursework 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.
Pilers: lexical analysis, parsing, code generation and
Language Design and Implementation (3) Courses.
Prereq: Completion of core curriculum or consent of instructor. May be repeated. Maximum 9 hrs.
470 Advanced Topics in Scientific Computation (3) Numerical methods, supercomputers, and computer modeling and simulation of physical systems. Faculty research. Prereq: Completion of core curriculum or consent of instructor. May be repeated. Maximum 9 hrs.
471 Numerical Analysis (3) (Same as Mathematics 471.)
472 Numerical Algebra (3) (Same as Mathematics 472.)
480 Advanced Topics in Theoretical Computer Science (3) Theory of computation, complexity theory, formal languages and graph theory and its applications. Faculty research. Prereq: Completion of core curriculum or consent of instructor. May be repeated. Maximum 9 hrs.
494 Special Topics in Computer Science (1-3) May be repeated. Maximum 9 hrs.
500 Thesis (1-15) P/NP only. E
502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when student uses University facilities and faculty time before degree is completed. May not be used toward degree requirements. May be repeated. Maximum 9 hrs.
521 Artificial Intelligence (3) Heuristic search, automatic theorem proving, symbolic methods, semantic information processing, representation theory. Prereq: Discrete Structures and Problem Solving.
522 Cybernetics (3) Various functions in living systems and their actual or potential realization in computers. Prereq: Discrete Structures.
525 Software Engineering (3) Survey of key ideas in software engineering: formal methods, tools, testing, reliability, structured design and development, metrics, management and history of the field.
538 Computer Networks (3) Design and operation of networks. Hardware and software systems; communications subsystems. Prereq: System Programming and 632.
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.
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, complexity analyses, parallel algorithms. Prereq: Discrete Structures and Numerical linear algebra.
580 Foundations (3) Finite automata and regular sets, push-down automata and context-free languages, Turing Machines, recursively enumerable sets, undecidability, Cook's theorem and NP-completeness. Prereq: Discrete Structures.
581 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, dynamic programming, efficient approximation algorithms.
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.
630 Advanced Topics in Computer 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 Numerical Mathematics (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
(Phase of Individual Ecology)
MAJORS
Human Ecology ...................................... Ph.D.
Recreation, Tourism and Hospitality Management ..................................... M.S.
Textiles, Retailing and Consumer Sciences M.S.

Nancy B. Fair, Head

Professors:
Bresee, Randall R. (Liaison), Ph.D. Florida State
Duckett, Kermit E., Ph.D. .......... Tennessee
Dyer, C. L., Ph.D. ..................... North Carolina
Hayes, Gene A. (Liaison), Ph.D. .......... North Texas State
Wadsworth, Larry C., Ph.D. .............. NC State

Associate Professors:
Allam, Youssef T. Ph.D. ............... Tennessee
Bhat, Gajanan, Ph.D. ............... Georgia Tech
Blickenstaff, Mary Dale, Re.D. ....... Indiana
Costello, Carol, Ph.D. ............... Tennessee
Krick, Ken L., Re.D. ............. Indiana
Fair, Nancy B., Ph.D. .......... North Carolina
Fairhurst, Ann E. (Liaison), Ph.D. ...... Oklahoma State

Assistant Professors:
Hendrick, Francis, T. Ph.D. ............. Oregon
Lee, Jinkook, Ph.D. ................. Ohio State
McGrath, M., Ed.D. ............. Tennessee
Young, Katherine A., J.D. ........... California Western School of Law

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 Examination (GRE) scores for the general section, and three Graduate School Rating Forms completed by individuals who can attest to the potential for graduate education. Forms may be obtained from the Dean's Office, College of Human Ecology.

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

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

THE MASTER'S PROGRAM

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

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

Retail and Consumer Sciences (Non-Thesis)
Major (Required RCS courses): 510, 511, 541, 550, 562
Cognate Area
Statistics
6
501 (Professional Paper/Project)
3
Electives
9
Total
36

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

Textile Science (Non-Thesis Option)
Nonwovens Core
(Required TS courses: 510, 521, 526, 585)
15
Related Courses
9
Statistics
3
Professional Project, TS 501
3-6
Total
30-33

The major in Recreation, Tourism and Hospitality Management requires 33-38 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 STAT 500 (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 elective (12 hours); related area (6 hours); statistics (3 hours);

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

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

**RECREATION ADMINISTRATION**

All students (27 hours): 415 or 440, 510, 515, 540, 541; Safety Education 443; Sport Management 512; statistics (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 (6 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:

Major (RCS Required Courses): 614, 615, 625, 641, 651
Research Methods: 590, 616
Statistics
12-15
Cognate Area
9
Human Ecology 630
3
Electives
21
Dissertation
24
Total
83-89

Note: (1) Statistics hours must include Statistics 537, 538, 579. (2) Cognate hours must include at least 6 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.

1. RCS 552 (3 hours);
2. Research Methods which must include 6 hours of laboratory techniques in materials analysis and characterization;
3. TS 590 (2 hours). Attendance at seminar is required for all full-time students;
4. Six hours in statistics at the 500-600 level;
5. Eighteen hours in textile science courses;
6. Nine hours in a cognate area;
7. Fourteen hours of other courses which may include up to 8 hours of dissertation; and

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 UTK.

**ACADEMIC STANDARDS**

1. Evaluation of student progress will normally occur prior to enrollment for thesis hours (or the non-thesis option) and during the second semester of full time enrollment in the program. The review of the student will be undertaken by the faculty with consideration given to factors such as: GPA (minimum 3.0), portfolio evaluation, and demonstrated research 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 Knoxville on an in-state tuition basis. The M.S. program in Textiles, Retailing and Consumer Sciences is available to residents of the state of Mississippi. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records. For the Ph.D., see Human Ecology.

**Hotel and Restaurant Administration**

**GRADUATE COURSES**

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

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities; and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated: S/N 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, room management, and sales planning and analysis. Prereq: Quantity Food Procurement, Production, and Service, Microcomputer Applications or consent of instructor. F,A

531 Advanced Financial Management (3) Financial planning, operations and evaluation techniques used in foodservice and lodging management: developing budgets, accounting systems and financial reports. Prereq: Food and Lodging Cost Control or consent of instructor. F,A

532 Advanced Human Resource Management (3) Identifying labor needs; development and maintenance of work force. Prereq: Food and Lodging Personnel Development or consent of instructor. F,A

533 Advanced Food Production and Delivery System Management (3) Analysis of food production and delivery systems; application of quantitative methods and models to optimize decisions. Prereq: Quantity Food Procurement, Production and Service or consent of instructor. F

534 Special Topics in Foodservice and Lodging Administration (1-3) Lecture/discussion format. Contemporary developments and trends in industry. Prereq: Consent of instructor. May be repeated. E

536 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
Recreation and Tourism Management

GRADUATE COURSES

415 Development and Maintenance of Leisure, Sport, Tourism Services (3) Principles of planning, designing, outfitting and operating leisure/sport related facilities such as aquatic centers, tennis complexes, activity centers. Prereq: Leisure and Tourism 410. F

420 Foodservice and Lodging Law (3) Management organization and policy as imposed or granted by law. Legal research to determine legal principles at state and federal levels which impact industry. Prereq: Hospitality Law or equivalent, or consent of instructor. Sp, A

440 Organization and Administration of Leisure and Tourism Services (3) Principles of administration applied to leisure activities, developing businesses in public and/or commercial enterprises. Organizational structures, personnel management, evaluation, legal authority, introduction of computer analysis to fiscal procedures. Prereq: 310 or consent of instructor. F

450 Specialized Study in Leisure Education (1-6) May be repeated. Maximum 6 hrs.

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 venues as well as venues impact on local population. Prereq: 500 Thesis (1-15) P/NP only, 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. SNC only, E

510 Retail Strategy and Decision Making (3) Strategic, management and strategic process in retail sector. Analytical decision-making skills in retailing. Retail industry structure, international dimensions in retail systems. Prereq: Retail Management or equivalent. Sp

511 International Trade and Retail Analysis (3) International trade and marketing concepts with implications for retail, services, and consumer. Theoretical and applied analysis. International retailing. Current issues. P/NP.

510 Perspectives and Trends in Leisure Services (3) Basic role of leisure delivery systems in today's society, scope of leisure services, determinants of leisure behavior, developmental features of leisure and recreation. Current trends, problems, laws, and issues affected by and/or affecting delivery of leisure services. Sp

515 Philosophical and Conceptual Foundations of Leisure (3) Philosophical, historical, social, and psychological concepts of leisure, recreation, play, work, and other factors, history of field, and relationship of ideas to contemporary society and to professional practice. F

520 Program Design and Evaluation in Therapeutic Recreation (3) Role of therapeutic recreation in clinical and non-clinical settings; application of life-style planning, self-awareness, values clarification and assertiveness training in therapeutic recreation, relationship of leisure education to therapeutic recreation. Prereq: Consent of Instructor. F

521 Facilitation Techniques in Therapeutic Recreation (3) Role of therapeutic recreation in clinical and non-clinical settings; application of life-style planning, self-awareness, values clarification and assertiveness training in therapeutic recreation, relationship of leisure education to therapeutic recreation. Prereq: Consent of Instructor. Su

522 Clinical Aspects in Therapeutic Recreation (3) Concepts and techniques utilized by experienced and advanced therapeutic recreation specialist: clinical issues, comprehensive program concerns, administrative funding and trends in operation of therapeutic recreation services. Prereq: 220. Sp

540 Fiscal Policies for Recreation and Sports Related Organizations and Facilities (3) Application of fiscal policies and procedures to operation of recreation and sports related organizations and facilities. Finance, revenue generating strategies, cash and inventory control, commercial/public cooperative ventures and microcomputer applications. Prereq: 430 or consent of instructor. Sp

541 Management and Operation of Recreation and Sport Related Facilities (3) Research for making program and management decision, process of cost analysis, and basic design, development and operation of recreation and sport related facilities. Prereq: Consent of Instructor, Su

590 Graduate Internship (3-6) Required of all graduate students. Minimum 50 clock hrs for each hour credit. Work experience, evaluation by agency and university and written paper required. E

591 Directed Study in Leisure & Recreation (1-6) Directed study of theme, issue, or concern. Designed to meet needs of individual students. May be repeated. Maximum 6 hrs. E

592 Special Topics in Recreation & Leisure Studies (1-6) May be repeated. Maximum 6 hrs. E

Retail and Consumer Sciences

GRADUATE COURSES

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

501 Professional Project (3-6) Application-oriented, capstone project to enhance student's mastery of major academic area. Enrollment limited to retail and consumer sciences students in non-thesis program. Prereq: Consent of Instructor. May be repeated. Maximum 6 hrs. SNC only.

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

510 Retail Strategy and Decision Making (3) Strategic, management and strategic process in retail sector. Analytical decision-making skills in retailing. Retail industry structure, international dimensions in retail systems. Prereq: Retail Management or equivalent. Sp


541 Retail Consumer Analysis (3) How consumers make decisions and how retailers attempt to influence decisions by offering environment, image and selection options that satisfy customers' needs.


552 Economics of Textile Complex (3) Economics concerning apparel and textile products. Emphasis on competitive approaches to industry structure, production, marketing, distribution and institutions within both global and domestic settings. Current and future international issues and implications. Prereq: Calculus III or equivalent, microeconomics, F, A

560 Elderly and the Marketplace (3) Characteristics of elderly consumers in U.S., labor supply and demand, consumer behavior. Prereq: Economics 560 or equivalent, F, A

568 Research Seminar (1) Research topics in retail and consumer sciences. Prereq. May be repeated. Maximum 9 hrs.

590 Special Topics in Retail and Consumer Sciences (1-3) Lecture, group discussion on specialized topics: retail industry structure, international trade, international retailing, consumer affairs, entrepreneurship, small business management, issues in retail management, issues in retailing, quality perception by consumers, product and service value, retailing to children, retailing and special populations, special research methods. Prereq: 9 hrs graduate coursework. May be repeated. Maximum 9 hrs.

595 Special Topics in Retail and Consumer Sciences (1-3) Lecture, group discussion on specialized topics: retail industry structure, international trade, international retailing, consumer affairs, entrepreneurship, small business management, issues in retail management, issues in retailing, quality perception by consumers, product and service value, retailing to children, retailing and special populations, special research methods. Prereq: 9 hrs graduate coursework. May be repeated. Maximum 9 hrs.

600 Dissertation (3-15) P/NP only, E


615 Retail and Consumer Sciences Literature and Thought (3) Evaluation of retail and consumer sciences literature. Emphasis upon research and development of scholarly thought, and identification of potential areas of further study. Prereq: 562, Marketing 501, Economics 561, F, A

616 Research Methods, Models and Measurement in Retail and Consumer Sciences (3) Quantitative methods and analytical concepts in research process. Mathematical and statistical formulation of retail and consumer sciences phenomenon, utilizing models, model building and measurement constructs. Prereq: 562, Statistics 536, Sp, A

625 Strategic Managerial Retailing (3) Decision-making orientation that integrates strategic framework components with preparation and analysis of specific retail case situations. Prereq: 510.

641 Retail Consumer Behavior (3) Theories and concepts from social science in relation to consumer behavior. Prereq: 6 hrs of sociology and/or psychology or consent of instructor.

651 The Consumer and Public Policy (3) Public policy issues within consumer environments. Analysis of past and present policies within economic, social, legal and business frameworks. Implications of consumer issues and public policy alternatives. Prereq: 550 or consent of instructor.

695 Advanced Topics in Retail and Consumer Sciences (3) Lecture, group discussion, individual research on specialized topics and research areas of current significance to retail and consumer sciences. Prereq: 9 graduate hours in consumer sciences. May be repeated. Maximum 9 hrs.
**Textile Science**

**GRADUATE COURSES**

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

501 Professional Project (3-6) Application-oriented, capstone project to show competence in major academic area. Enrollment limited to textile science students in nonthesis program. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. S/NC only.

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

510 Fiber Science (3) Physical properties, mechanical properties and microstructure of polymers, fibers; relation to end-use properties. Prereq: Organic Chemistry and Thermal Physics or equivalent.

520 Optical Microscopy (4) Basic compound and polarizing microscopy for imaging. Other methods of optical microscopy. Prereq: Fundamentals of Physics: Wave Motion, Optics and Modern Physics or equivalent. 3 hrs and 2 labs.

521 Nonwovens Science and Technology I (3) Nonwoven fabric technology; different web forming processes; and relationships among the chemical, morphological and mechanical properties of fibers and orientation in webs to final performance properties of bonded structures. Prereq: Organic chemistry or consent of instructor.

526 Nonwovens Science and Technology II (3) Interrelations between mechanisms of production and mechanical properties of nonwoven fabrics; characterization of fiber morphology and web structure; chemistry of nonwoven binders and finishes; and engineering of specific fabric properties. Prereq: 521 or equivalent.

528 Laboratory Methods in Nonwovens Processing and Characterization (3) Laboratory experience in nonwoven fabrication processes and characterization techniques. Effect of processing conditions on structure development and properties of different types of webs. Prereq: 510 and 521.


590 Research Seminar (1) Research topics in textile science. May be repeated. S/NC only. F,Sp

593 Directed Study (1-3) Individual problems in textile science. Prereq: 9 hrs textbooks graduate coursework. May be repeated. Maximum 9 hrs.

595 Advanced Topics in Textile Science (1-3) Lecture, group discussion, individual research on advanced topics and research areas of current significance: future direction, professional issues, theoretical approaches. Prereq: Doctoral student and 9 hrs textbooks graduate coursework. May be repeated. Maximum 9 hrs.

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

625 Physical Chemistry of Fibers (3) Physical chemistry of fibers and fiber forming polymers: surface chemistry and thermal properties. Prereq: 510.


695 Advanced Topics in Textile Science (3) Lecture, group discussion, individual research on advanced topics and research areas of current significance: future direction, professional issues, theoretical approaches. Prereq: Doctoral student and 9 hrs textbooks graduate coursework. May be repeated. Maximum 9 hrs.

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**Counselor Education and Counseling Psychology**

*(College of Education)*

**MAJORS**

**DEGREES**

| Counseling | Education |
|----------------|
| Community counseling | M.S. Education |
| School counseling | Ed.S. |
| Educational Specialist | Ph.D. |

**MAJOR**

| M. A. Hector, Leader |

**Professors:**

- Davis, Kathleen L., Ed.D.
- DeRidder, Lawrence M. (Emeritus), Ed.D.
- D'olivo, Siegfried C. (Emeritus), Ed.D.
- Hector, Mark A., Ed.D., Ph.D., Michigan State
- Huck, Schuyler W., Ph.D.
- McClain, Ed W. (Emeritus), Ph.D., Texas
- Peterson, Marta P., Ph.D., Ohio State
- Thompson, Charles L., Ph.D., Ohio State

**Associate Professor:**

- Hutchens, Teresa A., Ph.D., Georgia

The Counselor Education and Counseling Psychology unit participates in graduate programs leading to degrees, majors, and concentrations in:

**Master of Science in Counseling**

- Community counseling
- School counseling

**Educational Specialist in Counseling**

- Doctor of Philosophy
- Counseling psychology

**Education**

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

The M.S. and Ed.S. degree programs with their respective concentrations are accredited by the Council for Accreditation of Counseling and Related Educational Programs. In addition, the counseling psychology concentration under the college-wide Ph.D. program is accredited by the American Psychological Association, and the specialization in counselor education within the counseling psychology concentration is accredited by the Council for Accreditation of Counseling and Related Educational Programs.

The Counselor Education and Counseling Psychology unit emphasizes research-based practices that address the growth and development of the whole person throughout the lifespan. In its counseling programs, the unit concentrates on maximizing development and adjustment of individuals through prevention and treatment models in schools, colleges, community agencies, businesses, and private practice settings.

**ADMISSION REQUIREMENTS**

Admission requirements include update-to-date scores from the GRE, the GRE application form and letters of recommendation. For the doctoral programs, a writing sample is also required.

**GRADUATE COURSES**

410 Sex Role Development: Implications for Education and Counseling (3) Theories and research concerning development of person's sex role and its relevance in educational and counseling settings. E

431 Personality and Mental Health (3) Various perspectives of mental health with application to education and social service settings. E

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

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


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

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

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

525 Formal Measurement in Education and Counseling (3) Principles of test construction and item analysis. Survey of standardized tests of intelligence, achievement, aptitude, vocational interest, attitudes and personality. Prereq: 520 or equivalent. F,Su

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

530 Introduction to Pupil Personnel Programs (3) Major types of counseling and related fields: education, research, standards of practice, credentialing, and policy. Prereq: 520 or equivalent. F,Su

550 Counseling and Dependent College Students (3) Major types of counseling in dependent college students: education, research, standards of practice, credentialing, and policy. Prereq: 520 or equivalent. F,Su

551 Theory and Practice of Counseling (3) Theories and research concerning the counseling relationship and its impact on counseling process. Prereq: 520 or equivalent. F,Su

552 Career Development: Vocational Theory, Research, and Practice (3) Theories and research concerning the counseling relationship and its impact on counseling process. Prereq: 520 or equivalent. F,Su

553 Career and Educational Information Systems and Resources (3) Use of print and non-print materials: computer-based systems, for career and educational planning. Prereq: 552 or consent of instructor and Internet access account.

564 Group Dynamics and Methods (3) Theory and types of groups, descriptions of group processes, methods, dynamics, and facilitative skills, supervision of leadership skills. E

555 Practicum in Counseling (3) Supervised practice and application of counseling skills with individual clients. Prereq: Admission to program. E

556 Seminar in Community Agency Counseling (1) Orientation to professional organizations, code of ethics, certification requirements, and role identity of community agency counselors. May be repeated. Maximum 24 hrs. S/NC only. E

558 Internship in School Counseling (1-8) Supervised practicum employment at academic unit approved site. Prereq: 550 and consent of instructor. May be repeated. Maximum 12 hrs. S/NC only. E
673 Advanced Theory and Practice in Group Counseling (3) Theories and supervised practice, Prereq: 554, 555, and consent of instructor. E

674 Practicum in Counseling Psychology (3) Supervised practice of individual counseling. Minimum 135 clock hrs. Prereq: Admission to counseling psychology doctoral program and consent of instructor. May be repeated. Maximum 5 hrs. E

678 Theory and Practice of Counseling Supervision (3) Theory and practice of supervision in counseling. Prereq: 665, or 674, or consent of Instructor; S/NC only. Sp

679 Internship in Counseling Psychology (1-6) Supervised employment in an 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

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

602 Directed Research (1-3) Instructor - student-initiated/individual project. May be repeated. Maximum 12 hrs. S/NC only. E

604 Special Topics (3-12) Instructor-initiated course offered at availability 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: 655 or equivalent. F

626 Ethical, Legal, and Professional Issues in Psychology (3) Same as Psychology 635 and Psychocultural Studies 635. Sp

655 Seminar in Counseling Education (1) Professional issues related to the profession and function of counselor educator. Prereq: Admission to doctoral program in counselor education. May be repeated. Maximum 2 hrs. S/NC only. F

656 Practicum in Counseling 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 Counseling Education (1-6) Supervised employment in academic unit approved internship sites in counselor education. May be repeated. Maximum 12 hrs. S/NC only. E

661 Education Implications of Neuropsychology (3) Theory and assessment. Common syndromes and their behavioral and cognitive manifestations. Prereq: 516 and 541 or equivalent individual assessment course or consent of instructor. 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: 525 and course in abnormal psychology, or consent of instructor. A

Cultural Studies in Education (College of Education)

MAJORS

DEGREES

Education .................................................. M.S., Ph.D.
Human Performance and Sport Studies .... M.S.
J. T. DeSensi, Leader

Professors:
Allison, C. B., Ph.D. .......................... Oklahoma
DeSensi, J. T. (Liaison) ....................... North Carolina (Greensboro)
Ed.D. .......................... Howard, Robert (Emeritus), Ph.D. ..... Ohio State
Malik, Anand, Ed.D. ......................... Columbia
Mead, B. J., Ph.D. .......................... Purdue
Morgan, W. J., Ph.D. .......................... Minnesota
Paul, Joan, Ed.D. .......................... Wayne State
Weisberg, C. A., Ph.D. ....................... Michigan

Associate Professor:
Fleming, Cynthia, Ph.D. ..................... Duke

Assistant Professor:
Wright, Handel K., Ph.D. .................... Toronto

The Cultural Studies in Education unit participates in graduate programs leading to degrees, majors, and concentrations in:

Master of Science Education Social foundations Human Performance and Sport Studies Sport studies Doctor of Philosophy Education Cultural studies in education

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

The unit derives its 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.

As a unit founded upon and devoted to interdisciplinary inquiry, Cultural Studies in Education seeks to bring its disciplines to the service of students and faculty throughout the college as aids to understanding diverse cultural contexts that shape beliefs, values and practices. The main charge of the unit is to examine critically the social practices, institutions, "helping" agencies, and other social sites where disenfranchised and marginalized groups struggle for greater control over their futures.

GRADUATE COURSES

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

501 Special Project (3) Cullminating experience for non-thesis major. Research study suitable for publication, or practicum requiring special written work. Prereq: 532. E

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


505 History of Olympics: Ancient and Modern (3) Examination of various aspects of ancient and modern Games. Ancient Olympics 776 B.C. to 393 A.D. Modern Olympics, 1896 to date: political, social, historical, gender, and economic issues that influence Games.

507 History of Sport in America: Educational and Business Enterprise (3) Rise of sport in U.S. in educational curricula, business enterprise, and social-political issues.


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. (Same as Sociology 594.) E

526 Philosophy of Education (3) Truth, knowledge, and valuation in relation to work of schools. F,Su

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. E

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. F,Su

539 Development of Education Thought (3) Historic and philosophic approach to theories and writings of influential educators: Plato, Quintilian, Comenius, Dewey, Pestalozzi, Froebel, Dewey. Prereq: Graduate status and consent of instructor. S,Sp

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 purposes, to 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/or sport. May be repeated. E

542 Sociological Aspects of Sport (3) Social and cultural factors influencing sport and physical education. Pertinents that shape beliefs, values and practices. Prereq: Consent of instructor. (Same as Sociology 542.) E

545 Educational Sociology (3) Sociological analysis of American education system. Controversial social issues that affect educational system and potential solutions by various programs. Open to juniors, seniors, and graduate students. F
Ecology and Evolutionary Biology (College of Arts and Sciences)

MAJOR

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

A.C. Echternacht, Head
W.O. Smith, Associate Head

Professors:
Bunting, D. L., Ph.D. .......... Oklahoma State
Burghardt, G. M., Ph.D. .......... Chicago
Delcourt, P. A., Ph.D. .......... Minnesota
Echternacht, A. C., Ph.D. .......... Kansas
Elton, D. A., Ph.D. .......... Minnesota
Gavrilovs, S., Ph.D. .......... Moscow State
Greenberg, N. B., Ph.D. .......... Rutgers
Harris, W. F., Ph.D. .......... Tennessee
Holl, J. L., Ph.D. .......... Cornell
Hallam, T. G., Ph.D. .......... Missouri
Kot, M., Ph.D. .......... Arizona
McComick, J. F., Ph.D. .......... Emory
McCracken, G. F., Ph.D. .......... Cornell
Pan, M. L., Ph.D. .......... Pennsylvania
Pimm, S. L., Ph.D. .......... New Mexico State
Riechert, L. E., Ph.D. .......... Wisconsin
Sayler, G. S., Ph.D. .......... Idaho
Schultz, T. W., Ph.D. .......... Tennessee
Simberloff, D. (Gore Hunger Chair of Excellence), Ph.D. .......... Harvard
Smith, W. O., Ph.D. .......... Duke
Stacey, G., Ph.D. .......... Texas
Vaughan, G. L. (Emeritus), Ph.D. .......... Duke

Associate Professors:
Amundsen, C. C., Ph.D. .......... Colorado
Boake, C. R. B., Ph.D. .......... Cornell
Delcourt, H. Ph.D. .......... Minnesota
Drake, J. A., Ph.D. .......... Purdue
Fox, D. J., Ph.D. .......... Johns Hopkins
Gilliam, J. L., Ph.D. .......... Sussex (UK)

Research Assistant Professor:
Cruzen, M. B. C., Ph.D. .......... SUNY (Syracuse)
Pigliucci, M., Ph.D. .......... Connecticut

REQUIREMENTS FOR ADMISSION

Applications are accepted once a year. The deadline for receipt of all application materials is 15 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 general, mathematical and analytical sections of the GRE of at least 1650. Submission of scores on appropriate (e.g., biology, mathematics) advanced GRE examinations are recommended but not required. Applicants are also expected to have an overall grade-point average of at least 3.0, and 2.7 or above for all science and mathematics courses, on a 4.0 scale (successful applicants will usually have grade-point averages well above these minima).

Application must be made to both The Graduate School and the department. The 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 a minor in a field of 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 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
MINOR IN ENVIRONMENTAL POLICY

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

GRADUATE COURSES

403 Plant Evolution (3) (Same as Botany 403.)

411-412 Minicourse in Ecology and Evolutionary Biology (2) Selected advanced topics in ecology, behavior, and evolutionary biology, concentrated in time and subject matter. Consult department 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, gyres, coral reefs, estuaries, and coastal regions. Field trip to coast required. Prereq: General Biology and General Chemistry. General Ecology recommended.

450 Comparative Animal Behavior (3) Principles and methods of ethology, ecological, developmental, physiological and evolutionary aspects. (Same as Psychology 450.)

459 Comparative Animal Behavior Laboratory (3) Introduction to observational and experimental research in ethology. Coreq: 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 physiological 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. Open to departmental majors encouraged. Required of all first- and second-year graduate students. May be repeated. Maximum 4 hrs. S/N only.

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


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/N only.

509 Foundations: Readings in Ecology (1-2) Readings and discussion of classic papers in field. Prereq: 508 or consent of instructor. Coreq: 450 or consent of instructor. Sp

510 Foundations: Readings in Evolutionary Biology (1-2) Readings and discussion of classic papers in field. Prereq: 508 or consent of instructor. Coreq: 450 or consent of instructor. Sp

513 Foundations: Readings in Behavior (1-2) Readings and discussion of classic papers in field. Prereq: 508 or consent of instructor. Coreq: 450 or consent of instructor. Sp

515 Foundations: Readings in Environmental Toxicology (1-2) Readings and discussion of classic papers in field. Prereq: 508 or consent of instructor. Coreq: 450 or consent of instructor. Sp

520 Ecology for Planners and Engineers (3) Ecological principles and effects of human-caused changes have on living organisms. Lectures and field trips. Appropriate for students in Planning and Environmental Engineering. Not bounded for graduate students in Ecology and Evolutionary Biology.


535 Ecology and Development in the Amazon (3) Natural history, ecosystem diversity and function, and opportunities for sustainable economic development in the Amazon Basin. Includes field trip of 7-10 days to Manaus, Brazil.

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 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 major classes of invertebrates. 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.)

555 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 Geological Sciences 556.)

560 Biometry (3) Statistical applications in biological research. Prereq: Statistics course or consent of instructor.

561 Environmental Toxicology (3) Basic concepts in toxicology, molecular toxicology and detoxification; 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.)

562 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.)

565 Ecological Genetics (3) Genetics of natural populations, using both single-locus and quantitative genetic approaches. Prereq: 573 and statistics course.

572 Landscape Ecology (3) Ecological structure, function, and change through time of landscape mosaics: quantitative measures of landscape heterogeneity; response of organisms to landscape configuration. 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.

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

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

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

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

601 Advanced Topics (1-3) Readings and discussion of recent advances. Consult the department listing for offerings. May be repeated with consent of department. Maximum 5 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. Presented by student 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 604.) S/N only. E, 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

(Mmajor of Business Administration)

MAJORS

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

Business Administration .......................... MBA

Matthew N. Murray, Head
Admission to the M.A. program is based on undergraduate academic performance and on scores from the general portion of the GRE. The graduate student in good academic standing has 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.

STUDENT'S RIGHT TO PETITION

Graduate students in good academic standing have the right to petition the department for modification of departmental degree requirements and redress of grievances. Petitions must be in writing and addressed to the Director of Graduate Studies.

THE MASTER'S PROGRAM

Admission to the M.A. program is based on undergraduate academic performance and on scores from the general portion of the GRE. The student may choose either the thesis or non-thesis option. The non-thesis option requires 30 hours of coursework at the 400 level or above. Of these, at least 24 hours (at least 18 hours of which are in economics) must be at the 500 level or above. Of the remaining 18 hours in economics at the 500 level or above, 12 hours must consist of 511, 512 and 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 GRE, and by recommendations. The program requires a minimum of 48 hours of coursework beyond the bachelor's degree or 24 hours beyond the master's degree, at least 24 hours of 600 Doctoral Research and Dissertation, and successful completion of the following:

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

2. Students failing a qualifying examination must 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 and to defend it successfully before the faculty.

MINOR IN ENVIRONMENTAL POLICY

The program is designed to give master's and doctoral level graduate students an opportunity to develop an interdisciplinary specialization in environmental policy. While administered through the Economics Department, the program is coordinated by a committee of representatives from the following participating departments and programs:

Agricultural Economics and Rural Sociology;
Botany; Civil and Environmental Engineering;
Ecology and Evolutionary Biology; Economics;
Forestry, Wildlife and Fisheries; Geography;
Management; Planning; Political Science; and Sociology.

Students may request admission to the minor following admission to a graduate program in one of the participating departments. Students in good standing in one of these programs may apply for admission to the minor in environmental policy. The coordinating committee will consider the admission of interested students. Applicants should have a background in both natural and social sciences evidenced by prior coursework or experience.

One course in environmental studies from the student's major discipline and one course in quantitative methods are required. These requirements may be fulfilled before or after admission to the minor. All students admitted to the minor will be required to register for at least three hours of Economics 579, Environmental Policy Research Workshop, and to complete successfully the following:

1. Ecology and Evolutionary Biology 520 or Plant and Soil Sciences 414 or Geography 433 or an equivalent course approved by the coordinating committee.

2. Six hours of coursework outside the major discipline approved by the coordinating committee.

Doctoral students seeking a minor in environmental policy must also complete in addition to above, a policy-relevant dissertation approved by the coordinating committee.

BUSINESS ADMINISTRATION CONCENTRATION

For complete listing of MBA program requirements, see Business Administration.

MBA Concentration: Economics.

Minimum course requirements are as approved by the area MBA faculty advisor.

GRADUATE COURSES

400 Special Topics (3) Topics vary. Prereq: Determined by department. May be repeated.
413 Macroeconomic Fluctuations (3) Analysis of historical data, methods of analyzing macro-economic fluctuations, theoretical explanations of cycles, and role of monetary and fiscal policies in aggregate economy. Major writing requirement. Prereq: Intermediate Macroeconomics or consent of instructor.
415 History of Economics (3) (Same as History 415.)
424 Political Economy of World Development (3) Topics vary: Latin America, Asia, Soviet Union and Eastern Europe. Analysis of major economic strategies, policies, and problems. Prereq: 201. This course includes a major writing requirement. May be repeated when topic varies. Maximum 9 hrs.
462 Economics of Resources and Environmental Policy (3) Economic analysis of environmental policy and allocation of resources. Benefits and costs of development of natural resources and impacts of growth on environment. Major writing requirement. Prereq: 201.
471 Public Finance: Optimal Government Functions and Expenditure Analysis (3) Problems of collective
583 Econometric Techniques (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 be used toward degree requirements. May be repeated. S/NC only. E

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

513-14 Macroeconomic Theory (3,3) Determination of national income, prices, and employment. Results using Keynesian, non-market-clearing, monetarist, and rational expectations paradigms.


525 Economic History of Europe (3) Nature and functioning of economic systems and policies in history of Western civilization, major issues of method and interpretation. Prereq: Graduate standing in economics or consent of instructor.

526 Economic History of the U.S. (3) Interpretation of American economic thought and policies from colonial times. Prereq: Graduate standing in economics or consent of instructor.

537 Managing in a Regulated Economy (3) Economic effects of antitrust and public utility, environmental and regulatory 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 development, regulation, environmental quality. Development of decision-making tools and conflict resolution.

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


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

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

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

615 History of Economics (3) Background for and origins, content, methods, development and conclusions of neoclassical economics: W.S. Jevons, A. Marshall, C. Menger, L.

Walras, and principal developments in microeconomics after 1800. Background for and origins, concepts, methods, and conclusions of economic theory. Prereq: Intermediate Microeconomics with B or better and Calculus.

Education

(College of Education)

MAJORS

DEGREES

Counseling

M.S.

Psychology

M.S.

Education

M.S., Ed.S., Ed.D., Ph.D.

Human Performance & Sport Studies

M.S.

Leadership Studies in Education

M.S.

The College of Education offers the Master of Science, Educational Specialist, Doctor of Education, and Doctor of Philosophy degrees in cooperation with eleven individual units:

Counselor Education and Counseling Psychology (CECP)

Cultural Studies in Education (CSE)

Education in the Sciences, Mathematics, Research and Technology (ESMRT)

Exercise Science (ES)

Holistic Teaching/Learning (HTL)

Inclusive Early Childhood Education (IECE)

Language, Communication, and Humanities Education (LCH)

Leadership Studies in Education (LSE)

Psychosocial Studies (PSS)

Rehabilitation, Deafness, and Human Services (RDHS)

Sport and Physical Activity (SPA)

The College also offers initial teacher licensure programs at the undergraduate and 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 unit application form and letters of recommendation as indicated on the chart of Majors and Degree Programs. For additional information about the various programs of study and admission, write to the Graduate Center in the College of Education, CA 213, The University of Tennessee, Knoxville, TN, 37996-3400, tel. (423) 974-0906, www.utk.edu/advising/advising.html.

THE MASTER'S PROGRAMS

College Student Personnel

Students who major in College Student Personnel (LSE) are prepared to enter the field of student personnel administration in colleges, universities, and community or junior colleges. The program has both a thesis and non-thesis option. A minimum of 36 hours, which includes 6 hours of practicum experience, is required in either option. Students must complete a minimum of 12 hours in Higher Education courses.

Counseling

The master's degree with a major in Counseling offers concentrations (with abbreviated unit designations) in:

Community counseling (CECP)

Rehabilitation counseling (RDHS)

School counseling (CECP)

The program includes thesis and non-thesis options. The concentration in community counseling is fully accredited by the Council for Accreditation of Counseling and Related Educational Programs (CACREP) and requires completion of 60 hours of coursework plus supervised practicum and internship experiences working with clients. The concentration in rehabilitation counseling is fully accredited by the Council on Rehabilitation Education, Inc. and requires 54 semester hours, including internship. A minimum of 12 hours of Rehabilitation, Deafness and Human Services courses is required. The concentration in school counseling is fully accredited by the Council for
Accreditation of Counseling and Related Educational Programs and requires 48 hours of coursework, including supervised practicum and internship experiences working with clients. A final examination is required of all students.

Education
The master's degree with a major in Education has two tracks. Track 1 is intended for students who are licensed to teach English, foreign language, mathematics, natural science, social science, early childhood special education, modified and comprehensive special education, or education of the deaf and hard of hearing. (Non-licensed applicants to Track 1 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 (with abbreviated unit designations)**
- Art education (LCHE)
- Curriculum, assessment, and instruction (ESMRT)
- Education of the deaf and hard of hearing (RDHS)
- Elementary education (HTL and IECE)
- English education (LCHE)
- Foreign language/ESL education (LCHE)
- Instructional technology (ESMRT)
- Mathematics education (ESMRT)
- Modified and comprehensive special education (HTL)
- Reading education (HTL)
- Science education (ESMRT)
- Social foundations (CSE)
- Social science education (HTL)
- Special education: early childhood (IECE)

The thesis option requires the completion of 30 hours, including 6 hours of Thesis 500. The non-thesis option requires the completion of 33 hours of coursework (36 hours for special education concentrations). Both options require a minimum of 12 hours in the major discipline (18 hours for special education concentrations).

**Track 2 - Concentrations (with abbreviated unit designations)**
- Art education (LCHE)
- Education for the deaf and hard of hearing (RDHS)
- Elementary teaching (HTL and IECE)
- Modified and comprehensive special education (HTL)
- Secondary teaching (ESMRT, HTL, and LCHE)
- Special education: early childhood (IECE)

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

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

**Educational Psychology**
The master's degree with a major in Educational Psychology is offered with concentrations (with abbreviated unit designations): individual & collaborative learning (PES)

**Education**

**Human Performance and Sport Studies**
The master's degree with a major in Human Performance and Sport Studies offers concentrations (with abbreviated unit designations): Exercise science (ES)
 Sport studies (CSE)
 Sport management (SPA)

Applicants must submit a unit admission application and 3 letters of recommendation. Both thesis and non-thesis options are available. The non-thesis option requires 32 hours, including a project, and a course in research design or an approved specialized research class. The thesis option requires the completion of 30 hours, including 6 hours of Thesis 500. Both options require a minimum of 12 hours of sport studies, exercise science, or sport management courses.

**Leadership Studies in Education**
The master's degree program with a major in Leadership Studies in Education offers a concentration in educational administration and supervision (LSE), requiring a minimum of 30 hours, including 6 hours of Thesis 500, for the thesis option, or 33 hours for the non-thesis option.

The concentration in educational administration and supervision consists of a minimum of 18 hours of coursework in Educational Administration and Supervision. A final oral examination is required for the thesis option, with a written exam at the option of the committee. A final written comprehensive examination is required for the non-thesis option, with an oral exam at the option of the committee. Students entering either of these options must complete the introductory core consisting of Educational Administration and Supervision 513, 515, 516, and 535 or a demonstrated computer proficiency. These courses are prerequisites to other courses in the unit.

**THE SPECIALIST IN EDUCATION PROGRAM**
The Educational Specialist degree program with a major in Education encompasses concentrations (with abbreviated unit designations): Curriculum, assessment, and instruction (ESMRT)
 Educational administration & supervision (LSE)
 Elementary education (HTL)
 English education (LCHE)
 Foreign language/ESL education (LCHE)
 Instructional technology (ESMRT)
 Mathematics education (ESMRT)
 Reading education (HTL)
 School counseling (CECP)
 School psychology (PES)
 Science education (ESMRT)
 Social science education (HTL)

The instructional and curricular concentrations require completion of a minimum of 30 hours of coursework beyond the master's degree, including 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 60 hours beyond the baccalaureate, including a 6-hour cognate within or external to the college, and a highly recommended internship. Both thesis and non-thesis options are available. The school counseling concentration requires a minimum of 22 hours beyond the master's degree for not fewer than 60 hours beyond the baccalaureate, including practicum and internship experiences. The school psychology concentration requires the completion of a minimum of 60 semester hours beyond the baccalaureate. Refer to Degree Requirements under The Graduate School for complete program requirements.

**THE DOCTOR OF EDUCATION PROGRAM**
The Ed.D. program with a major in Education is available in the following concentrations (with abbreviated unit designations): Curriculum, assessment, and instruction (ESMRT)
 Educational psychology: collaborative learning (PES)
 Elementary education (HTL)
 English/foreign language/ESL education (LCHE)
 Instructional technology (ESMRT)
 Leadership for teaching and learning (LSE)
 Mathematics education (ESMRT)
 Reading education (HTL)
 Science education (ESMRT)
 Social science education (HTL)

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 adult education requires the completion of a minimum of 90 hours beyond the baccalaureate degree. Coursework is required in statistics and research design. Comprehensive examination in the concentration, supporting specialization, and cognate area(s), as well as an oral examination on the dissertation, are also required.

The concentration in educational psychology: collaborative learning requires the completion of a minimum of 90 hours beyond the baccalaureate degree and incorporates a cohort model through which students participate in core courses as a group. This program offers an alternative residency which includes a two-year, on-campus, continuous enrollment in six to nine hours per semester including summers. During this time period, students are enrolled in a doctoral seminar (630) for four of the six semesters and participate with faculty on research teams for 12 of the required hours. Contact the program coordinator for additional information and program requirements.

The requirements for the concentrations in educational administration and supervision and higher education are determined on an individual basis by each student's doctoral committee. Course requirements include a 6-9 hour cognate within the college and a 6-9 hour minimum external to the college. Additional course requirements include completion of two consecutive semesters of Educational Adminis-
Early childhood special education
Elementary education
English, foreign language, ESL education
Exercise science
Instructional technology/curriculum
Leadership studies (educational administration and supervision; higher education)
Literacy studies (reading/language arts)
Mathematics, science, and social science education
Rehabilitation and special education
Research/assessment/evaluation
School psychology

Residence is three consecutive semesters of full-time coursework. The program requires coursework in both a supporting concentration and a cognate area, as well as either foreign language or computer proficiency. Coursework in statistics and research design is required in all specializations. Pre-dissertation research participation is also a requirement.

For the Ph.D. with a major in Education under Counseling Education and Counseling Psychology and under Psychoeducational Studies units, two applications are required: one for the Ph.D. in Education program and one for the unit that specifies which specialization is desired, in addition to the application for admission to The Graduate School.

Under Counseling Education and Counseling Psychology, the following minimum number of hours is required, according to which field the student follows: counseling psychology, 98; counselor education, 98. The concentration in counseling psychology requires a year-long practicum sequence and the equivalent of a year's full-time work as an intern in an appropriate counseling setting.

Under Psychoeducational Studies, the following minimum number of hours is required in each program: educational psychology, 92; school psychology, 97. The concentration in educational psychology also requires a supervised practicum experience in classroom teaching.

The guidelines for each program may be consulted for further requirements.

TEACHER LICENSURE

In addition to the above cited degree programs, the College of Education offers graduate level teacher licensure courses. Students completing requirements for initial teacher licensure earn 24 semester hours of graduate credit which may be applied to a 36 semester hour Track 2 master's degree with a major in Education.

To earn initial teacher licensure, students must complete undergraduate prerequisite courses, gain admission to The Graduate School as a degree seeking student, and the following 24 hours of coursework:

**Full Semester**

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>575 Internship</td>
<td>4</td>
</tr>
<tr>
<td>---</td>
<td></td>
</tr>
<tr>
<td>574 Analysis of Teaching for Professional Development</td>
<td>2</td>
</tr>
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</table>

**Spring Semester**

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>584 Internship</td>
<td>8</td>
</tr>
<tr>
<td>591 Clinical Studies</td>
<td>4</td>
</tr>
<tr>
<td>TOTAL</td>
<td>24</td>
</tr>
</tbody>
</table>

Further details concerning the teacher licensure program and the Track 2 master's degree program are available through the College of Education Graduate Center (Claxton Addition, Room 211).

MINOR IN GERONTOLOGY

Graduate students in the units of Counselor Education and Counseling Psychology, Exercise Science, or Psychoeducational Studies, may pursue a specialized minor in gerontology. This interdisciplinary minor may give the student an opportunity to work in the field of aging as an aspect of their professional careers.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs also allows legal residents of these states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S. program in Counseling is available to residents of Alabama (concentration in rehabilitation counseling only). The M.S. program in Education is available to residents of the states of Kentucky (concentration in education of the deaf and hard of hearing or early childhood special education), Louisiana (concentration in foreign language/ESL education-Track 1 only), or Maryland, South Carolina, Virginia, or West Virginia (concentration in education of the deaf and hard of hearing). The M.S. program in Performance and Sport Studies is available to residents of Kentucky. The M.S. program in Education is available to residents of the state of Florida (concentration in educational psychology, educational administration and supervision/higher education, educational psychology, or school psychology). Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE COURSES

510 Advanced Educational and Clinical Procedures (3-6) Integration of advanced educational and clinical procedures; skills and knowledge for implementing instruction and for consulting with other persons in treatment of exceptional individuals. May be repeated. Maximum 6 hrs.

517 Seminar (1-3) Curriculum, instructional technology, educational psychology, secondary education, or social foundations as related to goals of students; program may be repeated. Maximum 6 hrs. S/NC or letter grade. E

532 Instructional Research: Analysis and Application (3) Analysis of research on instruction. Translation and application of research findings into instructional performance. Prereq: Consent of instructor. F, Su

540 Topics in Improvement of Instruction (1-3) Special conferences, workshops, and institutes. May be repeated. Maximum 6 hrs. S/NC only. E

562 Direction and Supervision of Student Teaching (1) Methods of teaching and supervision of student teaching; elements of clinical supervision; overview of research. F, Su

568 Teacher-Parent-Community Relations (3) Techniques for effective communication between parents and teachers: instruction of parents; preparation of students; parent involvement; volunteer programs; influence of community on educational processes. Prereq: Consent of instructor. F, Su

574 Analysis of Teaching for Professional Development (3) Strategies to document and analyze effectiveness of teaching and of professional development. Study and application of various approaches. Coreq: 575. F

575 Professional Internship in Teaching (1-8) Intensive teaching and teaching-related experiences in professional settings in public schools. Enrollment limited to
The Education in the Sciences, Mathematics, Research, and Technology unit participates in graduate programs leading to degrees. Majors, and concentrations in:

**Master of Science**

**Education**
- Track 1-curruculum, assessment, and instruction
- Track 1-instructional technology
- Track 1-science education
- Track 2-secondary teaching

**Educational Specialist**
- Curriculum, assessment, and instruction
- Instructional technology
- Mathematics education
- Science education

**Doctor of Education**
- Instructional technology/curriculum
- Mathematics/science/social science education
- Research/assessment/evaluation

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

**GRADUATE COURSES**

475 Utilization of Instructional Media (3) Basic concepts of communication and instructional development for improving instruction through use of media. (Same as Information Sciences 475.) E

485 Teaching Mathematics, Grades 7-12 (3) Preparation of teaching plans, evaluation, materials for teaching mathematics; teaching simulation and directed observation in schools. Prereq: Admission to Teacher Education Program. F

496 Teaching Science Grades 7-12 (3) Methods, materials, recent trends in science and environmental education programs for secondary schools. Prereq: Admission to teacher education, F

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

502 Registration for Use of Facilities (3-15) Required for the student not otherwise enrolled during any semester when he or she wishes to utilize educational resources. May be used toward degree requirements. Prereq: Consent of instructor. S/NC only. E


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

520 Techniques of Research in Education (3) Study and application. F

521 Computer Applications in Classroom (3) Computer applications and peripheries in school and classroom. Appropriate for all grades and subject as well as non-school instructional situations. Prereq: Micromcomputer and Instructional Design, Applications of Instructional Technology in Elementary and Middle School Teaching, or Introduction to Instructional Computing. E

522 Programs and Materials in Elementary School Mathematics (3) Examination, development and use of materials for creating an active learning environment for learning mathematics in elementary and middle schools. Prereq: 530, 543, or equivalent.

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

531 Teaching Science in Elementary and Middle Schools (3) Recent trends in methods, materials, and content in teaching elementary school science. Prereq: Course in teaching elementary school science or consent of instructor.

535 Program Evaluation in Education (3) Issues and practices in planning and conducting program and curriculum evaluation in a variety of settings. Fundamentals of design, measurement, evaluation, and delivery systems. Prereq: Consent of instructor. (Same as Higher Education 535.)

541 The High School Curriculum (3) Identification of problems associated with curriculum study, Tennessee curriculum framework, assessment of trends in programs of local, regional, and national significance.

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

557 The Junior High and Middle School Curriculum (3) Curriculum and instructional design for junior high and middle school. Characteristics of students, curriculum design, instructional patterns, and organization and structure of junior high and middle school.

558 Curriculum Planning and Development (3) Foundations and principles of curriculum planning and development. Historical analysis of curriculum theory, principles of planning and development, and classroom applications for improved learning.

560 Student Assessment (3) Processes for assessing and reporting student progress; interpretation and use of available assessment data. Methods of assessment other than tests and measurements: portfolios, performance tasks, exhibitions.

561 Educational Statistics (3) Applications of descriptive and inferential statistics to educational and instructional problems. Use of electronic calculators in educational research. Prereq: One year of college mathematics, an elementary course in statistics, or consent of instructor. E

565 Instructional Trends and Issues in Science Education (3) Analysis of current trends in science instruction, instructional issues facing elementary, secondary, and community college science teachers, and application of experimental theory to teaching biological, physical, and environmental sciences. Prereq: 496, Holistic Teaching/Learning 422, or equivalent.

566 Administering Instructional Media Programs (3) Leadership roles and responsibilities of professional media administrator in variety of organizational settings.

569 Advanced Production of Audiovisual Software (3) Hand and mechanical lettering, flat picture mounting-laminating, overhead projection, audio production, TV studio orientation, sync-taping, multi-screen presentations, and editing techniques. (Same as Information Sciences 569.)

572 Nature of Mathematics and Science Education (3) Teaching and assessment of mathematics and science based upon student conceptions of nature of mathematics and science.

573 Instructional Design and Interactive Multimedia (3) Basic instructional design and development of interactive multimedia programs. Use of appropriate authoring program for writing instructional program; Macintosh as computer platform.

577 Introduction To Data Processing In Curriculum and Instruction (3) Analysis of current activities in educational computing and data processing. Current, instructional, research, and classroom management applications from microcomputers to super computers. Prereq: Consent of instructor. E

Education in the Sciences, Mathematics, Research, and Technology

(Majors of Education)

MAJOR

DEGREES

Education

M.S., Ed.S., Ed.D., Ph.D.

M. Everett Myer, Leader

Professors:

Dessart, Donald J., Ph.D. ....... Maryland
Frandsen, Henny, Ph.D. ...... Illinois
French, Russell, Ph.D. ......... Ohio State
Hipple, Theodore W., Ph.D. ... Illinois
McEntire, Lonnie D., Ed.D. .... Indiana
Myer, M. E. (Lisbon), Ph.D. .... Florida
Roeske, C. E., Ph.D. ........... Ohio State

Associate Professor:

Connelly, Mary Jane, Ed.D. ....... VPI
Grant, A. D., Ph.D. ............. Wisconsin
Melear, C. T., Ph.D. .......... Ohio

Assistant Professor:

Robinson, Stephanie O., Ph.D. .... Florida
586 Teaching Probability & Statistics (3) Teaching of probability and statistics in schools, elementary through college. Prerequisites: Consent of instructor. Prequeq: 485 or equivalent.

588 Instructional Theory and Design (3) Relationship of curriculum to instruction; examination of instructional and related learning theories; instructional models and teaching styles. Prerequisites: Consent of instructor. Prequeq: 485 or equivalent.

590 Seminar in Mathematics Education (3) Current issues influencing instruction in mathematics in schools. Prerequisites: Consent of instructor. Prequeq: Consent of instructor. Opportunities for individual projects. Prequeq: 485 or equivalent.

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

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

595 Special Topics (1-3) May be repeated. S/NC or letter grade. E

596 Curricular Trends and Issues in Science Education (3) Analysis of elementary and secondary curriculum projects in biological, physical, and environmental science. Impact of current learning theories on future curriculum development. Prerequisites: Prequeq: 486, Holistic Teaching/Learning 422, or equivalent. Prequeq: or coreq: 565 or consent of instructor.

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

604 Seminar in Curriculum and Instruction (1) Required 2 consecutive semesters. S/NC only. E

623 Using Research for Curriculum Improvement (3) Research methodology; application to descriptive/survey curriculum materials. Critical reading of research, methodology and teaching styles. Prerequisites: Consent of instructor. Prequeq: 485 or equivalent.

628 Advanced Studies in Science Education (3) Analysis of current research in science education and implications of research for classroom practice. Prerequisites: Prequeq: May be repeated. Maximum 9 hrs. S/NC only. E

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

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

655 Special Topics (1-3) May be repeated. S/NC or letter grade. E

670 Research Trends in Science Education (3) Analysis of current research trends in science education and relationship of such trends within broader educational community. Prerequisites: Prequeq: 628.

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**Electrical Engineering**

(Graduate Level)

### MAJOR

**DEGREES**

**Electrical Engineering**

M.S., Ph.D.

T. V. Blatock, Acting Head

Professors:

Alexeff, Igor (Emeritus), PE, Ph.D. --- Milwaukee, Wis., Ph.D.

Bajer, Vilmos I., Ph.D. --- Georgia Tech

Birdwell, J. Donald, Ph.D. --- MIT

Bishop, Joseph L., Ph.D. --- Florida State

Boudinot, Donald W., Ph.D. --- Vanderbilt

Gonzalez, R. C. (Distinguished Prof.), Ph.D. --- Florida

Hewett, Leonard, Ph.D. --- New York

Kennedy, Eldredge J., Ph.D., Ph.D. --- Tennessee

Lawler, J. S. (Liaison), Ph.D. --- Michigan State

Neff, Herbert P. (Emeritus), Ph.D. --- Auburn

Pace, Marshall O., Ph.D. --- Georgia Tech

Pierro, J. Frank (Distinguished Prof.), Ph.D. --- Georgia Tech

Pujol, Alfonso J. (UTSI), Ph.D. --- Vanderbilt

Roberts, M. J. Ph.D., Ph.D. --- Florida

Rochelle, Robert W. (Emeritus), Ph.D. --- Maryland

Roth, J. D., Ph.D. --- Cornell

Symonds, Frederick W., Ph.D. --- Nottingham

Tillman, James D. (Emeritus), Ph.D. --- Auburn

Associate Professors:

Abidi, M. A., Ph.D. --- Tennessee

Bomar, Bruce W. (UTSI), Ph.D. --- Tennessee

Crilly, Paul B., Ph.D. --- New Mexico State

Johnson, Roy D. (UTSI), Ph.D. --- Case Western Reserve

Koch, Daniel Ph.D. --- Missouri (Rolla)

McHale, James M., Ph.D. --- Tennessee

Wallace, J. Wayne, Ph.D. --- North Carolina

**Assistant Professors:**

Smith, L. Montgomery (UTSI), Ph.D. --- Tennessee

Smith, Philip W., Ph.D. --- Virginia

Whitaker, Ross T., Ph.D. --- North Carolina

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The Electrical Engineering Department has a graduate committee to administer, promote and advance the general well-being of the graduate program.

### THE MASTER'S PROGRAM

Graduate work leading to the Master of Science with a major in Electrical Engineering may be completed during one academic year of full-time study, or two to three years of part-time study.

#### Admission Requirements

Students applying for admission to the Master of Science program and who hold a B.S. or B.A. in Electrical Engineering are considered for admission on an individual basis. The minimum expectation is an undergraduate cumulative grade-point average of 3.0 out of 4.0 and a GPA of 3.0 for the senior year. All applicants whose native language is not English, including those who have earned degrees at U.S. institutions, must score at least 550 on the TOEFL exam to be considered for admission to the program.

Students who hold the B.S. or B.A. in a field other than electrical engineering are also expected to have a minimum cumulative grade-point average of 3.0 and a minimum senior year average of 3.0 in that field. These students should also have a background equivalent to that obtained by earning credit with a minimum 3.0 grade-point average in the Electrical Engineering courses normally taken at the 200 and 300 levels in the Bachelor's program in this department, and two senior Electrical Engineering courses (and any labs associated with them) in the student's area of interest. Students from fields other than electrical engineering who have met the admission standards except for this background will be admitted only as non-degree students until they have completed coursework to provide this background.

### Master's Degree Requirements

Students may choose between a thesis option and a project (non-thesis) option M.S. program. All students must file a Master's Program Plan with the departmental graduate committee to administer, promote, and manage the student's master's committee.

Students may change between the thesis and project options, one time, by filing an amended Master's Program Plan.

#### Thesis Option:

Specific requirements of the thesis option are a minimum of 30 semester hours including:

1. Electrical Engineering 503 and 504.

2. Six semester hours of mathematics at the 400 level or above selected from a list approved by the graduate committee, or 6 semester hours of EE courses at the 500 level or above, or 6 semester hours of non-EE courses approved by the student's master's committee and the graduate committee.

3. An additional 12 semester hours of 500-level work in electrical engineering including 6 semester hours in the student's major area of electrical engineering and 6 semester hours in a second area of electrical engineering approved by the student's master's committee.


5. A final oral examination covering the thesis and related coursework.

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Electrical Engineering (College of Engineering)
Non-Thesis Option: Specific requirements of the project (non-thesis) option are a minimum of 33 semester hours including:
1. Electrical Engineering 503 and 504.
2. Six semester hours of mathematics at the 400 level or above selected from a list approved by the graduate committee, or 6 semester hours of EE courses at the 500 level or above, or 6 semester hours of non-EE courses approved by the student's master's committee and the graduate committee.
3. An additional 18 semester hours of 500-level work in electrical engineering courses, with at least 8 hours of 500-level work in each of two areas of electrical engineering.
4. Electrical Engineering 501 (project in lieu of thesis) with a minimum grade of B. This course will be administered by the student's master's committee. A written project proposal describing what the student will do in the course must be submitted in advance for the graduate committee's approval. A written final report and oral presentation is required and one copy of the final draft must be submitted to the graduate committee.
5. A final written examination covering the project and related coursework.

The Department of Electrical Engineering and the Department of Nuclear Engineering jointly offer a master's degree program in the field of fusion energy. Students may have the opportunity to do their master's thesis at the Fusion Energy Division of the Oak Ridge National Laboratory or at the Plasma Science Laboratory, affiliated with the Electrical Engineering Department. A limited number of Graduate Research Assistantships are available at each location. The department also participates in a joint program in mixed-signal VLSI and CAD tools for filter design.

THE DOCTORAL PROGRAM

The Ph.D. degree program with a major in Electrical Engineering may be pursued in the concentration areas of circuit theory, computers, electro-optics, communication theory, electro-magnetic theory, plasma engineering, power systems, solid-state electronics, power electronics, and control systems.

Applicants must submit scores on the Graduate Record Exam. A TOEFL score of 550 is required for non-native speakers of English, including those who have earned degrees at U.S. institutions. Specific departmental requirements for the Ph.D. include the following:
1. A Master of Science or Master of Engineering degree.
2. A minimum of 24 semester hours of coursework beyond the Master's, excluding research and dissertation credit. These hours must include:
   a. A minimum of 12 semester hours in electrical engineering at the 500 and 600 levels.
   b. A minimum of 9 semester hours of 600-level coursework. At least 3 hours of this work must be in an area other than the student's major area.
   c. A minimum of 6 hours of mathematics courses at the 500 level or above and approved by the electrical engineering graduate committee.
3. One foreign language if the student's committee feels that a reading knowledge of a foreign language is crucial to the student's research efforts.
4. Satisfactory performance on a qualifying examination and on a comprehensive examination. The qualifying examination is prepared by the Electrical Engineering faculty and consists of two 4-hour written examinations covering courses required in the undergraduate electrical engineering curriculum through the junior level. The qualifying examination is offered each year in May and August and is to be taken the first time it is offered after the student enrolls in the program. A student who fails the qualifying examination must take and pass the examination the next time it is offered to remain in the program. A minimum of 18 hours of coursework must be completed after the student has taken the qualifying examination the first time.
5. A comprehensive examination is required by The Graduate School. In this department the comprehensive exam is administered by the student's committee; the exam results are reported to the graduate committee for approval; and the exam file is in the department. The comprehensive exam is given when the student is ready to apply for admission to candidacy. The comprehensive exam consists of both written and oral parts. The written part consists of at least two sections: a complete review of the literature in the student's dissertation topic, and a review of the major tools to be used in the dissertation work. The student's committee may require additional written sections. The students must demonstrate a mastery of the dissertation area, ability to think analytically and creatively, and ability to complete the dissertation satisfactorily. The oral part consists primarily of a professional presentation of a proposal for dissertation work and its defense. The committee may cover additional topics in the oral part.
6. Participation in departmental seminars.

Some of the electrical engineering courses are offered in the evening. Engineers working in industry are encouraged to participate in the department's graduate program. Departmental graduate courses are also available at the Space Institute, Tullahoma.

Department actions regarding a graduate student may be appealed in writing, first to the departmental graduate committee and then to the department faculty. A comprehensive examination is required by The Graduate School. In this department the comprehensive exam is administered by the student's committee; the exam results are reported to the graduate committee for approval; and the exam file is in the department. The comprehensive exam is given when the student is ready to apply for admission to candidacy. The comprehensive exam consists of both written and oral parts. The written part consists of at least two sections: a complete review of the literature in the student's dissertation topic, and a review of the major tools to be used in the dissertation work. The student's committee may require additional written sections. The students must demonstrate a mastery of the dissertation area, ability to think analytically and creatively, and ability to complete the dissertation satisfactorily. The oral part consists primarily of a professional presentation of a proposal for dissertation work and its defense. The committee may cover additional topics in the oral part.

GRADUATE COURSES

Note: Courses required in the Electrical Engineering undergraduate curriculum cannot be used toward the M.S. or Ph.D. programs. No 400-level course may be used toward a graduate degree in Electrical Engineering except when required by the program.

400 Senior Design (5) Major design project focusing student's attention on practical problems and current design needs. Not used toward the M.S. or Ph.D. programs.
411 Digital Signal Processing and Filter Design (3) Discrete-time signals and systems, sampling, discrete Fourier transforms, analog filter characteristics, nonrecursive and recursive filter design, and CAD tools for filter design. Level 1 design projects which require laboratory work. Prec: completion of all junior EE courses.
412 Linear Control System Design (4) Classical and modern techniques for design and compensation of linear feedback control systems. Prec: design, state variable pole placement design. Level 2 design projects which require laboratory work. Prec: 411.
431 Operational Amplifiers (3) Linear and nonlinear circuits using operational amplifiers. Prec: Linear System Analysis, Linear System Components, Systems and Power Laboratory.
441 Digital Communications (3) Discrete Fourier Transform. Prec: Linear System Analysis, Linear System Components.
445 Electro-Acoustics (3) Wave equation for sound, radiation from piston, impedance, etc. Prec: Linear System Analysis, Linear System Components.
443 Antennas and Propagation (3) Linear antennas, arrays and simple spatially varying fields. Prec: Linear System Analysis, Linear System Components. Wave propagation in earth bound free space, earth’s troposphere and ionosphere, reflections from earth, effects on link reliability. Prec: Linear System Analysis, Linear System Components.
451 Microprocessors and Microcontrollers in Electrical Engineering (3) Project oriented course using microcomputer kit having monitor program and development system with cross-assemblers, file management, and emulator capability. Prec: interfacing and hardware/software tradeoffs in interrupt driven applications. Grade dependent upon number of projects completed, homework
solutions, and engineering design notebook. Level 1 design projects which require laboratory work. Prereq: 451.

452 Organization and Design of Digital Systems and Computers (4) Considerations for hardware organization of computer and digital systems; ALU and CPU structure, memory organization, control systems, I/O systems, microprocessor control unit and different interrupt structures. Level 2 design projects which require laboratory work. Prereq: 451.

463 Physics of Fusion Energy (3) High temperature plasma physics, plasma interacting with magnetic fields, principles of magnetic fusion reactors, and engineering and physics constraints on fusion reactors. Level 1 design projects, Prereq: Senior standing. May not be credited toward degree requirements. S/N only. E

464 Fusion Technology (3) Principles and phenomenology of tokamak reactors, alternative magnetic confinement concepts, advanced fusion fuels, fusion technology, plasma engineering, and fusion reactor design studies. Level 2 design projects which integrate material in 463 and 464. Prereq: 463 or equivalent. (Same as Nuclear Engineering 463.)

465 Principles of Industrial Plasma Engineering (3) Plasma physics and technology relevant to industrial applications of plasmas. Basic principles of kinetic theory, electrodynamics, and plasma physics; sources of electrons, ions, and energy; DC electrical discharges and sources; RF plasmas and plasma sources. Level 1 design projects. Prereq: Senior standing.

466 Applications of Industrial Plasma Engineering (4) Plasma treatment of surfaces; ion interactions with solids and plasmas, design of plasma processing; plasma chemistry; electrical breakdown; switchgear and corona; plasma lighting devices; applications of electrohydrodynamics, and research and development plasma processes. Level 1 design projects, which require laboratory work. Prereq: 465 or consent of instructor.

471 Introduction to Pattern Recognition (3) Design of learning and adaptive machines. Elementary decision theory, perceptron algorithm, Bayes classification rule, learning algorithms, syntactic and semantic pattern recognition, adaptive classifiers. Level 1 design projects. Prereq: Senior standing. Non-majors require consent of instructor.

472 Introduction to Digital Image Processing (3) Basic methods for digitizing, storing, processing, and displaying images. Computational procedures for image enhancement, restoration, coding, and segmentation. Level 1 design projects. Prereq: Senior standing. Non-majors require consent of instructor.

481 Power Electronics (3) Principles and characteristics of power semiconductor devices, single-phase and polyphase phase-controlled converters, converter control, ac phase controlled inverters, and drive converter principles, industry applications. Level 1 design projects, which require laboratory work. Prereq: Frequency Domain Analysis, or Coreq: Advanced Digital Signal Processing.

482 Power Electronics Circuits (4) Voltage-fed inverters, PWM principles, control of inverters, dc-dc converters, dc machines, resonant converters, stepper motor drives, brushless dc machine principles. Level 2 design projects which require laboratory work. Prereq: 481.

489 Special Topics (3) Recent developments and current practice. Prereq: Senior standing.

491 Special Topics (3) Basic design and current practice. May not be repeated to satisfy senior requirements for graduation. Level 1 or level 2 design projects which may require laboratory work. Prereq: Completion of all junior EE courses or consent of instructor.

495 Senior Seminar (1) Current topics. Prereq: Completion of all junior Electrical Engineering courses or consent of Instructor. S/N or letter grade only.

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

501 Project in lieu of Thesis (3) May not be used toward degree requirements. May be repeated. S/N only.

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


505 Digital Signal Processing I (3) Discrete-time signals and systems, sampling, fast Fourier transform (FFT) and fast convolution, design of FIR filters and IIR filters.

506 Digital Signal Processing II (3) Filter properties in the Z and Fourier transform domains, structures for digital filters, sampling and reconstruction, hardware implementation of digital filters.

507 Application of Numerical Linear Algebra in Systems and Control Engineering (3) (Same as Chemical Engineering 507 and Mechanical Engineering 507.)

511 Linear Systems Theory (3) State space models of linear time-invariant systems, state transition map, matrix exponential, controllability, observability, realiztion theory, and stability theory. Coreq: 503.

512 Multivariable Linear Control System Design (3) Design of controllers for multivariable systems, which satisfy constraints on robustness to plant uncertainties, disturbance rejection, command following. Prereq: 511.

515 Adaptive Control and System Identification (3) Adaptive control of linear deterministic and stochastical systems, adaptive filtering and prediction, parameter estimation for deterministic and stochastic systems. Prereq: 511 or 519.


519 Control Systems Design II (3) Digital control, variable structure control, state-space design of SISO systems, use of estimators and observers, comparison of classical and state-space methods of control system design, considerations for control system instrumentation. Prereq: 518.


522 Power Systems Analysis II (3) Operation and control of interconnected power systems, transient and dynamic stability. Formulating and solving problems in matrix-vector form with application to large scale power systems. Prereq: 521.

523 Power Electronics and Drives (3) Forced commutated inverters, advanced voltage source inverters, dc motor drives, resonant converters, stepper motor drives, brushless dc machine principles. Level 2 design projects which require laboratory work. Prereq: 522.

524 Power Electronics Circuits (4) voltage-fed inverters, PWM principles, control of inverters, dc-dc converters, dc machines, resonant converters, stepper motor drives, brushless dc machine principles. Level 2 design projects which require laboratory work. Prereq: 481.

527 Control Systems Analysis and Design I (3) Matrix- vector representation of control systems, use of estimators and observers, comparison of classical and state-space methods of control system design, considerations for control system instrumentation. Prereq: 518.

531 Advanced Analog Electronics I (3) Physical operation of modern electronic devices, semiconductor devices; diodes, bipolar transistors, JFETs, and MOSFETs. Small signal equivalent circuits and noise models of active devices. Project laboratory. Prereq: 431, 432, or consent of instructor.


545 Introductory Microwave Networks and Components (3) Scattering and transfer representation for multipolar unilater and bilateral microwave and millimeter wave devices. Component and system parameter measurement by modern microwave methods. Electronic oscillators and amplifiers, frequency sweep oscillators, transient time devices, parametric devices, mixers, switches.

551 Digital System Design I (3) Design considerations for combinational and sequential circuits. Iterative network diagnostics of digital circuits. The design process.

552 Digital System Design II (3) State identification and structure realizations of sequential machines. Digital system architecture design: microprogramming and interrupt control. Prereq: 551.

561 Plasma Diagnostics I (3) Principles of active, passive, perturbing and nonperturbing diagnostic methods, used in low temperature plasmas, and high temperature plasmas of interest in fusion research. Laboratory safety, data reduction and presentation, microprocessor based displays, and reduction of time series data. Prereq: 461, 463, or consent of instructor.

562 Plasma Diagnostics II (3) Laboratory instruction in operation of plasma diagnostic instruments in plasma science laboratory, experience with high voltage, vacuum, RF, and digital data handling techniques. Prereq: 561.

565 Industrial Plasma Engineering I (3) Low temperature plasma physics relevant to industrial applications: kinetic theory, particle dynamics, magnetic field, gaseous discharges, and electron, ion, and plasma sources. Prereq: Graduate standing or consent of instructor.

566 Industrial Plasma Engineering II (3) Continuation of 565. Industrial applications of plasma physics: plasma deposition and etching, space propulsion systems, plasma chemistry, plasma lighting devices, insulators, sensors and sensors, materials processing with plasma arcs, and related topics. Prereq: 565 or consent of instructor.

571 Pattern Recognition (3) Decision-theoretic and structural approaches to pattern recognition. Deterministic and statistical decision rules, feature extraction and representation, syntactic and semantic methods. Prereq: 471 or consent of instructor.

572 Digital Image Processing (3) Spatial and transform processing of images. Neighborhood operators, image enhancement, restoration, and noise suppression techniques. Image representation and description. Prereq: 472 or consent of instructor.

573 Vision and Sensing for Robotics and Automation I (3) Acquisition, processing, integration, and interpretation of multiple views. 2D and 3D sensors; image processing; machine vision; pattern recognition; and autonomous navigation in solids, transistors, and liquids. Prereq: 472 or consent of instructor.

574 Vision and Sensing for Robotics and Automation II (3) Aspects of robot programming and motion using various sensing modalities. Sensor integration and application of sensor models as applied to autonomous and teleoperated robotic systems. Prereq: Consent of instructor.


596 Graduate Seminar (1) Topics of Interest discussed in weekly seminar. May be repeated. Maximum 6 hrs. S/NC or letter grade.

599 Special Topics (1-3) May be repeated. Maximum 9 hrs.

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

614 Optimal Control (3) Deterministic and stochastic dynamic programming in continuous and discrete time, minimum principle and maximum principle, computational methods in optimal control. Prereq: 611.

617 Special Topics in Systems Theory I (3) Topics of current interest to students and faculty: large scale systems, model order reduction, algebraic and geometric system theories, and advanced design methods. Prereq: 503 and consent of instructor.

618 Special Topics in Systems Theory II (3) Topics of current interest to students and faculty, large scale systems, model order reduction, algebraic and geometric system theories, and advanced design methods. Prereq: 617.

623 Advanced Power Electronics and Drives (3) Phase-controlled cycloconverters, cycloconverter-fed ac drives, resonant converters, vector and scalar control of synchronous machines, static Kramer drives, static Scherbius drives, VSCF generation, modern control theory in ac drives.

624 Electrical Insulation (3) Principles, testing, and case studies. Basic principles of aging, losses, charging, conduction, and breakdown in vacuum, gas, liquid, solid, and composite insulating systems. Testing with low-noise instrumentation, pulse height analysis, optics, acoustics, and bridges; associated statistics and distributed parameter effects. Case studies drawn from active research, power systems, electronic circuits and devices, shielding, and stress grading. Prereq: 503, 504, and consent of instructor.

631 Advanced Topics in Electronic Instrumentation I (3) Based on particular interests of students. Fundamental physical processes in instrumentation transducers: thermoelectric, magnetoelastic, electromechanical, and quantum-mechanical devices. Prereq: 531-32 and consent of instructor.


643 Detection and Estimation Theory (3) Detection theory; coding theory; system identification. Signals with unknown parameters; optimal filter synthesis; adaptive systems; sequential detection; suboptimal detection. Prereq: 504 or consent of instructor.

644 Coding and Information Theory (3) Structure of algebraic and probabilistic codes, linear codes, convolutional codes, error-correcting codes, decoding methods. Identification theory; error-aware communication, stochastic, and hierarchial methods. Prereq: 643.

651 Computer-Aided Design of VLSI Systems I (3) Fabrication of microelectronic devices; computer architecture design; algorithmic state machines; partitioning; structured design methodology. Prereq: 551-52 or consent of instructor.

652 Computer-Aided Design of VLSI Systems II (3) Computer-aided design tools; design and implementation of fully custom very large scale integrated (VLSI) circuits; design for testability; testing of fabricated chips. Prereq: 551.

653 Advanced Plasma Physics I (3) Basic concepts of high temperature plasma physics. Magnetohydrodynamics and kinetic descriptions of plasma, plasma transport, plasma waves, equilibrium, and stability. Prereq: Physics 541-2, 461-2, or 503-4, or consent of instructor. (Same as Physics 663.)

664 Advanced Plasma Physics II (3) Plasma heating and radiation phenomena. Advanced topics of current interest. Must be taken in sequence. Prereq: 663.

671 Image Processing and Robotics I (3) Three-dimensional scene modeling and recognition, multi-sensor systems, robot vision, stereo vision, shape theory. Prereq: 671.

672 Image Processing and Robotics II (3) Stereovision, multi-sensor systems, scene modeling and recognition, robot vision, shape theory. Prereq: 672.

691 Advanced Graduate Seminar (1) Research in department may be repeated. S/NC or letter grade.

692 Special Topics (1-3) Advanced topics of current interest to Ph.D. students in Electrical Engineering. May be repeated. Maximum 9 hrs.

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Engineering Science

See Mechanical and Aerospace Engineering and Engineering Science

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English

(College of Arts and Sciences)

MAJOR

DEGREES

English

M.A., Ph.D.

D. Allen Carroll, Head

Professors:


Associate Professors:

Atwill, Janet, Ph.D. .... Purdue Bensel, Myers, Linda D., Ph.D. .... Oregon Dumas, Bethany K., Ph.D. .... Arkansas Durin, Allen, Ph.D. .... Washington Ehr, Russell, Ph.D. .... Rensselaer Howes, Laura L., Ph.D. .... California Jennings, La Verne, Ph.D. .... North Carolina Papke, Mary E., Ph.D. .... McGill Smith, Arthur, Ph.D. .... Houston Zornick, John (Liaison), Ph.D. .... Columbia

Assistant Professors:


The Department of English offers the Master of Arts and the Doctor of Philosophy degrees with a major in English. Thesis and non-thesis options are available for the M.A. as well as a special concentration in writing.

Detailed information about the master's and doctoral programs, and about individual graduate courses, may be obtained by writing the Director of Graduate Studies in English, 306 McClung Tower. A prospective student must contact the department to receive the proper information and forms with which to apply. For additional information, please visit the graduate website through the College of Arts and Sciences homepage at www.artsci.utk.edu.

The Department of English does not accept students in non-degree or provisional status. A student who wishes to enter the department must apply in degree-seeking status for his/her application to receive consideration for admission to any graduate program in English.

THE MASTER'S PROGRAM

Requirements

Coursework: A minimum of 24 semester hours in English beyond the B.A. to include 6 hours at the 600 level; 12 additional hours at the 500-600 level (Only 3 hours of 593 Independent Study may be applied toward the M.A.); and 6 hours for graduate credit at any level, including the 400 level. In this coursework, students must maintain at least 3.0 GPA.

Thesis Option: Written under the direction of a faculty member of the department and approved by a committee of two other faculty members. Six semester hours of credit will be given.

Non-Thesis Option: Six hours of additional courses at the 500-600 level, making a total of 30 hours of required coursework.

Language Requirement: Evidence of proficiency in one foreign language, to be fulfilled in one of the following ways:

1. Completion of the second year of a language at college level with a grade of C or better.

2. Completion of French 302 or German 332 at UT Knoxville with a grade of B or better.
3. Passing of the regular Ph.D. foreign language examination as currently administered at UT Knoxville.

Capstone Experience Requirement: An integral part of all options in the master's degree program in English is a capstone experience which allows the student to synthesize and apply the knowledge and skills gained through the completion of course work in a substantial way. Examples of capstone experiences include, but are not limited to, the completion of a thesis or the formal public presentation of a paper at a professional meeting or departmental colloquium. All capstone experiences normally occur after the completion of 24 hours of coursework and must be approved by the Director of Graduate Studies.

Final Examination: A candidate presenting a thesis must pass a one-hour oral examination; a candidate presenting a creative project must pass a ninety-minute oral examination. The examination consists of a short thesis defense, but chiefly of questions covering the general history of English and American literature, not merely the coursework taken. A reading list of primary works designed to help the student prepare for these questions is available in the office of the Director of Graduate Studies in English.

A non-thesis student must pass a written examination, followed by a one-hour oral examination, both consisting of the same sort of questions as the examination taken by the thesis student.

Residence Requirement: There is no residence requirement for the M.A., but students should attempt to pursue a full-time program whenever possible.

WRITING CONCENTRATION

The master's program with writing concentration is intended for those students who plan to do free-lance writing, specialize in teaching writing courses at the college level, or work as professional writers in business or industry.

Requirements

The requirements for the writing concentration are the same as those for the thesis option above with the following exceptions:

Coursework: Writing students may substitute two 400-level writing courses for two 500-level courses. Students must take at least 9 hours in writing and 9 in literature, the remaining 6 to be selected from any English courses at the proper level. Of the courses in writing, at least 3 hours must be taken at the 500 level; additional 500-level courses are strongly recommended.

Writing Projects: One of the following writing projects for six hours of credit:

1. A thesis, using research to analyze some aspect of writing or rhetorical theory.
2. A creative project, such as a collection of poems or short stories, a short novel, a play, or a creative work of non-fiction prose.

The nature and length of each project will be determined by the Director of Graduate Studies after consulting with the student and the project director. In addition to the director, two other English faculty members will supervise and approve the project; at least one should be from the literature faculty.

Final Examination: The reading list may be modified by the M.A. examining committee, meeting as a body with the student, to reflect the candidate's particular writing emphasis. However, most of the oral examination should focus upon the literature outlined in the original reading list.

THE DOCTORAL PROGRAM

Requirements

A student must successfully complete a program of study, normally 6 full semesters as outlined below, approved by the candidate's committee or the Director of Graduate Studies in English.

Coursework: At least 51 semester hours beyond the B.A. (of which at least 24 semester hours must be beyond the M.A.) to include at least 21 semester hours at the 600 level; at least 15 semester hours at the 500 level or above (only 3 hours of 593 Independent Study may be applied toward the M.A. and 3 after the M.A.); a special three-hour course in teaching composition; and 12 additional hours at any level, including the 400 level. Up to 6 of these additional hours may be taken in some cognate field or fields such as history, philosophy, French. These courses must be drawn from those approved for graduate credit. All other coursework must be in the English department. In this coursework, students must normally maintain a 3.5 GPA.

Dissertation: Twenty-four semester hours of dissertation. These represent the research for and writing of the dissertation. The research and dissertation will be directed by a faculty member of the department and approved by a doctoral committee of three or four other faculty members.

Language Requirement: A language requirement met in one of the following ways:

1. Two languages approved by the Director of Graduate Studies in English. The requirement for each language may be fulfilled by (a) completion of French 302 or German 332 with a grade of B or better; (b) completion at UT Knoxville of any two courses on the 300 level or above in the foreign language or literature with at least a grade of B in each course; (c) passing of the regular Ph.D. foreign language examination as currently administered at UT Knoxville.
2. One modern language approved by the Director of Graduate Studies in English. This requirement must be fulfilled by a passing grade on the language examination given by UT Knoxville and completion of two courses given in the foreign language at the 400 level or above, at least one course to be at the 500 or 600 level. A minimum grade of B must be received in each course.

One modern language approved by the Director of Graduate Studies in English and intensive study of the English language. This requirement must be fulfilled by completion of (a), (b), or (c) in option 1. for one foreign language; and completion of 6 semester hours in English language courses with grades of B or better, at least three of which must be from English 508 or 509 History of the English Language (offered in alternate years only). For the other 3 hours, the student may either complete the history of the language sequence or choose one other course in language taught in the Department of English at the 500 or 600 level and approved by the Director of Graduate Studies in English. These courses will not count toward the minimum number of courses for the Ph.D., and anyone electing this language option may not take the comprehensive examination in linguistics.

Examinations: (1) A 4-hour qualifying examination taken before the end of the first year of Ph.D. coursework; this examination is given three times a year, with the M.A. written examination. (2) A comprehensive written examination which may be divided as the department directs; see the English Department graduate brochure. The comprehensive examination is given twice a year, normally in March and September. Before a student may take it, he/she must have completed all coursework required. A student must also have met all requirements for foreign languages before beginning the first part of the examination.

Dissertation Defense: A one-hour examination on the dissertation and other related areas.

Residence Requirement: Two consecutive semesters as a full-time student. For students not on teaching assistantships, full-time consists of 9 or more hours of coursework and/or dissertation hours each semester. For students on assistantships, full-time consists of at least 6 hours of courses and/or dissertation hours and 3 hours of teaching each semester.

GRADUATE COURSES

Note: Students enrolling in English graduate courses must first register in the office of the Director of Graduate Studies in 306 McClung Tower.

401 Medieval Literature (3) Reading and analysis of selected medieval literary masterpieces in modern English.

402 Chaucer (3) Reading and analysis of Canterbury Tales and Troilus and Criseyde in Middle English.

404 Shakespeare I: Early Plays (3) Shakespeare's dramatic achievement between 1601 and 1613. Reading and discussion of selected plays from romantic comedies, including Twelfth Night; English histories, including Henry IV; and early tragedy, including Hamlet.

405 Shakespeare II: Later Plays (3) Shakespeare's dramatic achievement between 1601 and 1613. Reading and discussion of selected plays from great tragedies, including Othello, problem plays, including Measure for Measure; and dramatic romances, including The Tempest.

406 Renaissance Drama (3) English theatre between 1590 and 1640 through reading of representative plays by Shakespeare's contemporaries: Marlowe, Webster, Jonson.

409 Spenser and his Contemporaries (3) Principal achievements in prose and poetry of sixteenth century authors: Spenser, Wyatt, Marlowe, More, Sidney, and Bacon.

410 Milton, Donne and their Contemporaries (3) Principal achievements in prose and poetry of first two-thirds of seventeenth century; poetry of Milton, Donne, Marvell; and prose of Browne, Bacon, Weelton.

411 Literature of Restoration and Early Eighteenth Century: Dryden to Pope (3) Survey of English literature and culture from 1660 to 1745.

412 Literature of Later Eighteenth Century: Johnson to Burns (3) Survey of English literature and culture from 1745 to 1800.

413 Restoration and Eighteenth-Century Genres and Modes (3) A major genre or literary mode: drama, novel, poetry, non-fiction prose, satire, romance, or epic, written between 1660 and 1800. May be repeated.

414 Romantic Poetry and Prose I (3) Wordsworth, Coleridge, and Blake; readings from Lamb, De Quincey, and other prose writers.

415 Romantic Poetry and Prose II (3) Keats, Shelley and Byron; readings from Hazlitt, Peacock, and other prose writers.
416 Victorian Poetry and Prose I (3) Tennyson, Pre-Raphaelites, Carlyle, Newman, and Mill.

419 Victorian Poetry and Prose II (3) Browning, Arnold, Hopkins, Hardy, Ruskin, Darwin, and Wilde.

420 The Nineteenth-Century British Novel (3) Scott to Hardy.

421 Modern British Novel (3) Works from authors such as Joyce and Woolf through contemporary British fiction writers.

422 Women Writers in Britain (3) Literary consciousness and works of women writers in Britain. Topics vary: Marie de France, Margery Kempe, Aemilia Lanyer, Elizabeth Cary, A. von Behr, Frances Burney, Mary Wollstonecraft, Mary Shelley, George Eliot, Virginia Woolf, and Doris Lessing. May be repeated. Maximum 6 hrs. (Same as Women’s Studies 422.)

423 American Romanticism and Transcendentalism (3) Prose and poetry of American Renaissance; from c. 1830 to end of Civil War: Cooper, Poe, Hawthorne, Melville, Emerson, Thoreau, Stowe, Douglass, Whitman, and Dickinson.

424 American Realism and Naturalism (3) Literature from time of the Civil War to 1917: Twain, Howells, James, Jewett, Freeman, Crane, and Norris.

424 Modern American Literature (3) World War I to present.

425 American Novel before 1900 (3) From earliest sentimental novels through Cooper and Brown, and major figures to 1900: Hawthorne, Melville, Stowe, Clemens, and James.


436 Southern Literature (3) Southern writing from colonial period to twentieth century: frontier humorists, local color writers, and Southern literary renaissance.

437 American Humor (3) Early nineteenth century to twentieth century: Mark Twain.

438 Topics in Black Literature (3) Contents vary: particular genres, authors, or themes from 1845 to present: Langston Hughes, Paul Robeson, Malcolm X, Bob Marley, James Baldwin, Toni Morrison, and Richard Wright and Gwendolyn Brooks, writing by Black women, international Black literature in English, and Black American autobiography.

439 Modern British and American Poetry (3) From Yeats and Frost to Auden, Stevens, and more recent poets.

440 Modern Drama, 1880-1945 (3) Survey of British, American, and international drama from the advent of modern drama to the end of World War II.

441 Contemporary Drama (3) Survey of British, American, and international drama since World War II.

442 Twentieth-Century International Novel (3) Fiction in English translation from such writers as Kafka and Camus through contemporary authors.

445 Persuasive Writing (3) Writing and analyzing persuasive texts in public, private, and academic contexts. Prereq: Advanced Expository Writing or consent of instructor.

446 Writing, Layout, and Production of Technical Documents (3) Principles of design for desktop publishing. Production of various documents to be incorporated into professional portfolio. Prereq: Technical and Professional Writing or consent of instructor.

460 Technical Editing (3) Editing technical material for publication. Principles of style, format, graphics, layout, and production management. Prereq: Technical and Professional Writing or consent of instructor.

462 Writing for Publication (3) Principles and practices of writing for publication. Dissertation, theses, articles, and reports in science and technology. Prereq: Technical and Professional Writing or consent of instructor.

463 Advanced Poetry Writing (3) Further development of skills acquired in basic writing poetry course. Prereq: 365 or consent of instructor.

464 Advanced Fiction Writing (3) Further development of skills acquired in basic writing fiction course. Prereq: 365 or consent of instructor.

465 Writing, Layout, and Production of Technical Documents (3) Principles of design for desktop publishing. Production of various documents to be incorporated into professional portfolio. Prereq: Technical and Professional Writing or consent of instructor.

470 Special Topics in Rhetoric (3) Topics vary. Prereq: Advanced Expository Writing. Consent of instructor. May be repeated with consent of department. Maximum 6 hrs.

471 Sociolinguistics (3) Study of language in relation to society. Empirical and theoretical focus. Large-scale units: tribes, nations, social groups. Prereq: 371 or 372 or Linguistics 200 or consent of instructor. (Same as Linguistics 471 and Sociolinguistics 471.)

472 American English (3) Phonological, morphological, and syntactic characteristics of major social and regional varieties of American English: origins, functions, and implications for cultural pluralism. Prereq: 371 or 372 or Linguistics 200 or consent of instructor. (Same as Linguistics 472.)

474 Teaching English as a Second or Foreign Language (3) Major issues surrounding teaching ESL/EFL: political implications of teaching ESL/EFL, introduction to second language acquisition: learner variables in language learning: traditional and innovative approaches to ESL/EFL: basic features of American English grammar necessary for teaching ESL. Prereq: Second year of foreign language or consent of instructor. (Same as Linguistics 474.)

475 Teaching English as a Second or Foreign Language II (3) Issues, principles, and techniques in teaching grammar, speaking, pronunciation, and writing in ESL/EFL. Observations and teaching practice in ESL classes and development of ESL materials and tests. Prereq: 474. (Same as Linguistics 475.)

476 Second Language Acquisition (3) How humans learn second languages. Theoretical models and research: differences between first and second language acquisition; learner variables; socio-cultural factors; and implications for second language instruction. (Same as Linguistics 476.)

479 Literary Criticism (3) Historical survey of major works of literary criticism.

480 British and American Ballad and Folk tale (3) Popular ballads and folk tales of English, Scottish, and North American tradition.

481 Studies in Folklore (3) Topics vary. May be repeated with different topics. Maximum 6 hrs.

482 Major Authors (3) Content varies. Concentrated study of at least one of the following: modern novelists; narrative writers in British American literature: e.g., Donne, Pope, Austen, Tennyson, Whitman, Faulkner, Lawrence, Baldwin, or Morrison.

483 Special Topics in Literature (3) Topics vary. May be repeated. Maximum 6 hrs.

484 Special Topics in Writing (3) Original writing integrated with reading; usually taught by professional author. Topics vary. May be repeated. Maximum 6 hrs.

485 Special Topics in Language (3) May be repeated. Maximum 6 hrs with consent of department. (Same as Linguistics 485.)

486 Special Topics in Criticism (3) Content varies. Theoretical and practical approaches to British and American literature. May be repeated with consent of department. Maximum 6 hrs.

487 Special Topics in Film (3) Content varies. Popular directors, film genres, national cinema movements, or other topics. May be repeated with consent of department. Maximum 6 hrs. (Same as Cinema Studies 487.)

488 Language and Law (3) Language in Anglo-American legal process: focus on differences between spoken and written language; lexical and syntactic ambiguity; pragmatics; speech act analysis; and language rights of linguistic minorities. Prereq: Foundation of the English Language or The Structure of Modern English or consent of instructor. (Same as Linguistics 488.)

489 Introduction to Rhetoric and Composition (3) Historical, theoretical, and empirical modes of inquiry in rhetoric and composition and implications for teaching of composition. Prereq: Advanced Expository Writing or consent of instructor.

490 Rhetoric of Legal Discourse (3) Application of basic principles of persuasive writing to legal materials. Issues of identification and argument through written position papers, briefs, and memoranda. Critical reading and discussion. Prereq: Technical and Professional Writing or consent of instructor.


501-2 Registration for Use of Facilities (1-3) 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. Maximum 3 hrs. each. (Same as Registration for Use of Facilities 401-3.)

504-5 Reading and Analysis in Selected Areas of English Literature (3) Contents vary: genres, themes, literary movement, or other coherent emphasis. May be repeated. Maximum 6 hrs. each.

506-7 Reading and Analysis in Selected Areas of American Literature (3) Contents vary: genres, themes, literary movement, or other coherent emphasis. May be repeated. Maximum 6 hrs. each.

508 History of the English Language (3) Phonological, morphological, and syntactic development of English language: Old and Middle English. F, A

509 History of the English Language II (3) Phonological, morphological, and syntactic development of the English language with concentration on developments after 1500, especially in American English. Sp, A

513-14 Readings in Medieval Literature (3) Reading and analysis of selected masterpieces of Old and Middle English literature and their Continental sources in Modern English. May be repeated. Maximum 6 hrs. each.

520-21 Readings and Analysis in Selected Areas of Sixteenth- and Seventeenth-Century Prose, Poetry, and Drama (3,3) Contents vary: genres, themes, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

530-31 Readings in English Literature of the Restoration and Eighteenth Century (3,3) Topics vary: genres, poetry, prose, fiction, drama; or period. Restoration, earlier eighteenth century, later eighteenth century. May be repeated. Maximum 9 hrs. each.

540-41 Readings in English Literature of the Nineteenth Century I and II (3,3) Contents vary: genres, themes, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

550-51 Readings in American Literature from the Colonial Period to the Present (3,3) Contents vary: genres, themes, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

552 Readings in Black American Literature (3) Contents vary: genres, themes, literary movement, or other coherent emphasis. May be repeated. Maximum 6 hrs.

560-61 Readings in Twentieth-Century Literature (3,3) Contents vary: genres, themes, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

576 Introduction to Contemporary Criticism (3) Introductory survey of contemporary literature critical of New Criticism to present.

580 Fiction Writing (3) Advanced fiction projects under supervision of instructor and time for independent study. Prereq: Extended background in reading and writing fiction. May be repeated. Maximum 6 hrs.

581 Colloquium in Poetry Writing (3) Major poetic projects or continuation of project begun in 463. Individual consultation with instructor supplementing class analysis; readings in contemporary poetry and theory. Prereq: 463 or consent of instructor. May be repeated. Maximum 6 hrs.

582 Special Topics in Writing (1-3) Topics vary. May be repeated. Maximum 6 hrs. Enrollment by consent of director of graduate studies only.

583 Special Topics in Language (3) Topics vary: genres, modes, and other literary subjects not in standard period divisions.
Entomology and Plant Pathology

(College of Agricultural Sciences and Natural Resources)

MAJOR DEGREE
Entomology and Plant Pathology M.S.
Charles D. Pless, Acting Head

Professors:
Bernard, Ernest C., Ph.D. Georgia Gerhardt, Reid R. (Liaison), Ph.D. NC State Hilty, James W. (Emeritus), Ph.D. NC State Johnson, Leander F. (Emeritus), Ph.D. Lambdin,ouis L., Ph.D. Louisiana State

Associate Professors:
Grant, Jerome F., Ph.D. Clemson Gwin, Kimberly D., Ph.D. NC State Reddick, Bradford B., Ph.D. Clemson Windham, Mark T., Ph.D. Clemson

Assistant Professor:
Owley, Bonnie H., Ph.D. NC State

The Department of Entomology and Plant Pathology offers a graduate program leading to the Master of Science with a concentration in entomology or plant pathology. Students in entomology may specialize in crop entomology, medical and veterinary entomology, insect biology, pest management or biological control. Students in plant pathology may specialize in foliar and stem fungal diseases, soilborne pathogens, disease physiology, biocontrol, plant nematology, virology. For specific information, contact the department head.

THE MASTER'S PROGRAM

Admission Requirements
For admission to the M.S. degree program, a student must meet all requirements of The University of Tennessee Graduate School and must have completed (1) general botany or introductory plant physiology and pathology, or consent of instructor. 3 hrs. and 1 lab. Sp, A

Degree Requirements
The student must complete a written thesis based on original research and the completion of a minimum of 24 hours of coursework for graduate credit, approved by the student's advisory committee. Included in the course requirements are two acceptable seminar presentations for 1 hour each. An oral final

exam must be passed to the satisfaction of the advisory committee after the thesis has been completed. A minor is not required, but may be selected at the option of the student. The minor will include at least 10 hours and not more than 10 hours of graduate-level credit in the minor department. The student's committee shall include a member of the faculty from the minor department to assist in designating courses required for the minor.

GRADUATE COURSES

410 Diseases and Insects of Ornamental Plants (3) Symptoms, identification and management of diseases and insects that affect plants in greenhouse, nursery, and landscape environments. Prereq: Plant Pathology or Economic Entomology or consent of instructor. Sp, A

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

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

510 Plant Disease Fungi (4) Morphology, taxonomy, biology, and genetics of plant pathogenic fungi. Isolation and identification of plant pathogenic fungi. Prereq: 313 or consent of instructor. 2 hrs. and 2 labs. (Same as Ornamental Horticulture and Landscape Design 511.) F, A

512 Soilborne Plant Pathogens (3) Causal agents; host-parasite-soil environment interactions; epidemiology and biological control. Prereq: Plant Pathology or consent of instructor. F, A

514 Bacterial Plant Diseases (4) Morphology, taxonomy, biology, and genetics of bacterial plant pathogens; infection and disease development, pathogenesis and importance; diagnosis, detection, effect of environment, and management of bacterial plant diseases; beneficial plant-bacterial interactions. Prereq: Plant Pathology or consent of instructor. 3 hrs. and 1 lab. Sp, A

515 Physiology of Plant Disease (3) Biochemical and physiological events involved in host-pathogen interactions. Mechanisms of disease resistance. Prereq: Introductory plant physiology and pathology, or consent of instructor. F, A

520 Plant Parasitic Nematodes (4) Morphology, physiology, taxonomy, ecology, and management of plant parasitic nematodes, host-parasite relationships. Prereq: 6 hrs. biology or science or consent of instructor. 2 hrs. and 2 labs. Sp, A

521 Plant Virology (3) Symptomatology, epidemiology, and management of virus infection; structure, morphology, replication, transmission, purification, characterization, and classification of plant viruses; virology, plant pathology, virology, virology, virology. Prereq: 313 or consent of instructor. 2 hrs. and 1 lab. Sp, A

523 Field Crop and Vegetable Insects (2) Identification, biology and management of insects affecting commercial vegetable and home garden crops. Prereq: 321 or basic entomology course. 1 hr. and 1 lab. F, A

525 Medical and Veterinary Entomology (3) Morphology, taxonomy, biology, and control of arthropod parasites and vectors of pathogens of humans and animals. Ecology and behavior of vectors in relation to pathogen transmission and control. Prereq: 321 or 325, or consent of instructor. 2 hrs. and 1 lab. Sp, A

530 Integrated Pest Management (3) Principles and application of biological, cultural, genetic, behavioral, and chemical methods of control to maintain pest populations below economic threshold levels. Prereq: 321, or consent of instructor. (Same as Plant and Soil Science 530.) F, A

531 Special Problems in Entomology (1-3) Comprehensive individual study of current problems. May be repeated. Maximum 6 hrs. E

532 Special Problems in Plant Pathology (1-4) Comprehensive individual study of current problems. May be repeated. Maximum 6 hrs. E

533 Concentrated Study in Entomology (1-3) Selected subjects in entomology for advanced students. Concentrated in time and subject matter. Prereq: 321 or basic

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

610 Studies in Old English Language and Literature (3) Old English grammar with readings in prose and poetry. F, A

611 Studies in Beowulf (3) Translation and critical study of Beowulf. Prereq: English 610 or consent of instructor. Sp, A

620 Studies in Medieval English Language (3) Seminar in literature and literary genres of Medieval English literature, read in Old and Middle English. Subject matter varies from year to year. May be repeated. Maximum 9 hrs.


623-70-71 Studies in Renaissance Literature (3, 3, 3) Seminar in literature and literary genres of Renaissance literature. Prereq: consent of instructor. May be repeated. Maximum 9 hrs. each.

630-31 Studies in Shakespearean Drama (3, 3) Seminar in Shakespearean drama. Prereq: consent of instructor. May be repeated. Maximum 9 hrs. each.

640-41 Studies in Restoration and Eighteenth-Century Literature (3, 3) Seminar in Restoration and Eighteenth-Century literature. Prereq: consent of instructor. May be repeated. Maximum 9 hrs. each.

650 Studies in English Romanticism (3) Seminar content varies: particular literary figure or figures, genre, theme, or other coherent focus. May be repeated. Maximum 9 hrs.

651-52 Studies in Victorian Literature (3, 3) Seminar content varies: particular literary figure or figures, genre, theme, or other coherent focus. May be repeated. Maximum 9 hrs. each.

660-62 Studies in American Literature (3, 3) Seminar content varies: American literature before 1830, frontier, realism, women's literature, Irving, Cooper, Poe, Emerson, Thoreau, Hawthorne, Melville, Whitman, Dickinson, James, and Twain. Prereq: 660, 661 or 662. May be repeated. Maximum 9 hrs. each.


680 Topics in English Language (3) May be repeated with consent of director of graduate studies. Maximum 9 hrs.


686 Studies in Creative Writing (3) Content varies. Connection between theory and practice of writing. May be repeated. Maximum 9 hrs.

Environmental Engineering
See Civil Engineering

Exercise Science
(College of Education)

MAJORS

DEGREES

Education ........................................ Ph.D.
Human Performance and Sport Studies .... M.S.

W. Liemohn, Leader

Professors in:

Capon, Edward K. (Emeritus), Ph.D.............. Iowa
Howley, Edward T., Ph.D. ....................... Wisconsin
Kozar, Andrew J. (University Prof.), Ph.D. .... Michigan
Liemohn, W. P., Ph.D. ......................... Louisiana
Namey, T. C., M.D......,. Washington (St. Louis)
Rockett, Ian R. H., Ph.D. ...................... Brown
Welch, Hugh (Emeritus), Ph.D. ............... Florida

Associate Professor:
Bassett, David R., Jr., Ph.D. .................. Wisconsin

Assistant Professors:
Thompson, Dixie, Ph.D. ....................... Virginia
Zhang, Songying, Ph.D. ....................... Oregon

The Exercise Science unit participates in graduate programs leading to degrees, majors, and concentrations in:

Master of Science
Human Performance and Sport Studies
Exercise science

Doctor of Philosophy
Education

Exercise science

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

The unit promotes and integrates scientific research, education, and practical applications of exercise science to maintain and enhance health, fitness, performance, and quality of life. The unit offers an undergraduate major in Exercise Science that will prepare students for careers in fitness and provide the science-background needed for application to graduate programs in exercise science, physical therapy, cardiac rehabilitation, public health, exercise psychology, athletic training, or public school teaching. Graduate students and faculty focus on research dealing with theoretical and applied aspects of exercise and sport.

ADMISSION REQUIREMENTS

Applicants are required to complete the unit application which will be sent to all persons upon their initial inquiry about the program. This is in addition to The Graduate School application.

The following retention policy applies to all graduate students seeking a degree in the Exercise Science unit:

1. Graduate students are required to maintain an overall 3.0 GPA.
2. Any student who falls below this standard will be advised in writing by the unit leader of the need to discuss the matter with his/her advisor.
3. If a student's overall GPA remains below 3.0 for a second semester, the student will have his/her degree status revoked.

GRADUATE ASSISTANTSHIPS

A limited number of graduate assistantships are available for qualified women and men who are graduates of accredited colleges or universities. These assistantships are open to students in the master's and doctoral programs. Students interested in these opportunities should file their applications before February.

Letters should be addressed to Graduate Assistants Coordinator, Exercise Science Unit, The University of Tennessee, Knoxville, TN 37996-2700.

GRADUATE COURSES

400 Physiology of Exercise (3) Functions of body in muscular work: physiological aspects of fatigue, training and adaptation to environment. Prereq: Human Physiol. for general physiol., 2 hrs and 1 lab. (Same as Biochemistry and Cellular and Molecular Biology 405.)

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. E

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

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

508 Research in Exercise Science (3) Research for writing of thesis and institutional review board proposals; presentation of research through free communications and poster presentations; calculation and interpretation of statistics related to common research designs used in research; and use of computer software. E

509 Graduate Seminar in Public Health (1) (Same as Public Health 509, Nutrition 509, Nursing 509, Public Health 509, Psychology 509, Social Work 509, Sociology 509.)


513 Biomechanics of Orthopedic Rehabilitation (3) Effect of physical activity on bone and soft tissue development, anatomical and mechanical implications of exercise, theoretical bases for rehabilitative programs. E

516 Therapeutic Exercise (3) Therapeutic exercise programs designed for specific conditions: McKenzie, peripheral neuropathy, based on specific biomechanical considerations; an overview of the biomechanical mechanisms of activities; neurological sequelae of injury. E

521 Analytic Epidemiology (3) Epidemiologic strategies for evaluating research questions concerning causes, prevention and treatment of morbidity and mortality. Presentations by experts working with large population-based datasets. Research process: grant writing and protocol preparation. Prereq: Course in statistics or consent of instructor.

525 Epidemiology of Injury and Violence (3) Epidemiologic methods to describe magnitude and examine etiology of unintentional and intentional injury. Alternative approaches for preventing or controlling occurrence of injury and violence in both general population and high-risk sub-populations.

541 Special Topics (1-3) Advanced study in selected areas of exercise science. May be repeated.

563 Laboratory Techniques in Exercise Physiology (3) Laboratory course in experimental methodology and instrumentation: techniques of blood gas sampling, blood flow measurements, blood chemistry, and gas analysis. Prereq: 450.

565 Advanced Physiology of Exercise (3) Quantitative approach to current and classical questions in exercise physiology. Prereq: 480 and 563.


568 Physical Activity and Positive Health (3) Review of clinical, epidemiologic, and experimental evidence concerning relationship and effects of exercise on health-related components of fitness. Prereq: Elementary statistics, 480 and 414 or equivalents. (Same as Public Health 568.)

569 Fitness Testing, Programming, and Leadership for Diverse Populations (2) Clinical experience in selecting, administering, and evaluating exercise tolerance tests on cycle ergometer and treadmill. Individual fitness programs for diverse populations. Practice in leading variety of activities aimed at improved fitness. Prereq: 480 and 414. (Same as Public Health 569.)

570 Cardiac Rehabilitation Practicum (1-3) Supervised experience in hospital-based exercise programs for patients with cardiovascular or pulmonary disorders. Use of telemetry monitoring; leading safe exercise regimens counseling participants on safe exercise guidelines. Prereq: educational class on topic applicable to participants. Prereq: 480 and 567. Coreq: 569. May be repeated. Maximum 6 hrs.

585 Seminar in Gerontology (1) (Same as Human Ecology 585, Counselor Education and Counseling Psychology 585, Nursing 585, Public Health 585, Psychosocial Studies 585, Social Work 585, Sociology 585.)

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

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

601 Research Seminar in Exercise Science (1) Research topics in different aspects of exercise science. May be repeated. S/NC only. E

622 Directed Independent Research (3-6) Prereq: Doctoral student or consent of instructor. May be repeated. S/NC or letter grade. E

631 Seminar in Exercise and Applied Physiology (1) Selected topics in exercise and environmental physiol-ogy. Prereq: 563 and 565. May be repeated with consent of instructor.

644 Research Participation in Applied Physiology (1-6) Participation in research with faculty member whose interests coincide with those of student. S/NC only.

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

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

Finance
(College of Business Administration)

MAJOR

DEGREES

Business Administration ................. MBA, Ph.D.

James W. Wanstley, Head

Professors:
Black, Harold A. (James F. Smith, Jr., Prof.), Ph.D................. Ohio State

Associate Professors:


**BUSINESS ADMINISTRATION CONCENTRATIONS**

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

**MBA Concentration:** Finance.

The curriculum offers courses for those interested in careers in corporate financial management, security analysis and investments, banking and financial institutions, and real estate.

Minimum course requirements are three courses: Finance 510 (6 hours), plus two from the following: 512, 522, 532, 551, and 581.

**Ph.D. Concentration:** Finance.

Minimum course requirements are finance seminars 641, 642, 651, 652.

**GRADUATE COURSES**

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

510 Contemporary Concepts and Methods in Finance (3) Strategic issues and broad-based valuation concepts in finance; integrative approach in investments, corporate finance and institutions areas. Prereq: Business Administration 504 and 505 or consent of instructor.

512 Problems in Financial Management (3) Readings and cases that apply finance theory to real-world investment, financing, and asset management problems. Prereq: Business Administration 504 and 505 or consent of instructor.

522 Portfolio Analysis and Management (3) Portfolio theory and evidence of behavior of security returns with view to determining national investment policy. Statistical analysis of risk and return of portfolios, portfolio evaluation and revision, capital market theory, and extensions of portfolio analysis. Prereq: Business Administration 504 and 505 or consent of instructor.

532 Financial Institutions (3) Analysis of management policies of financial institutions: asset, liability and capital management, legal, economic and regulatory environment and implications for management. Financial institution structure and competition and changing trends in U.S. financial system. Prereq: Business Administration 504 and 505 or consent of instructor.

551 Financial Management of a New Enterprise (3) Financial issues associated with formation, control, and long-term planning of new enterprise. Acquisition of venture capital. Prereq: Business Administration 504 and 505 or consent of instructor.

581 Real Estate Investment and Finance (3) Financial and market analysis used to make real estate investment decisions. Effects of variety of financing options on rate of return on income-producing properties. Effect of various financing options on consumer's decisions to purchase.

Relationship between primary and secondary mortgage markets and impact of those markets on cost and availability of funds for real estate lending. Effects of government intervention (taxation, subsidization, and regulation) in both real estate and mortgage markets. Prereq: Business Administration 504 and 505 or consent of instructor.

599 Special Topics in Finance (1-3) Topics vary. Prereq: Consent of Instructor. May be repeated. Maximum 6 hrs. S/N or letter grade.

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


642 Seminar in Finance II: Theory of the Firm (3) Financial theory of firm and financial decision making under conditions of uncertainty, equilibrium models of firm, option pricing, agency theory, capital structure, economics of information, and dividend policy.

651 Advanced Seminar in Finance I (3) Recent theoretical and empirical developments in macro-finance literature. Topics vary. May be repeated. Maximum 6 hrs.

652 Advanced Seminar in Finance II (3) Recent theoretical and empirical developments in macro-finance literature. Topics vary. May be repeated. Maximum 6 hrs.

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**Food Science and Technology**

(College of Agricultural Sciences and Natural Resources)

**MAJOR DEGREES**

Food Science and Technology ..... M.S., Ph.D.

Clark J. Brekke, Head

Professors:


Associate Professors:

Loveday, H. D., Ph.D. ..... Kansas State Mount, J. R., Ph.D. ..... Ohio State

Assistant Professors:

Beetie, S. E., Ph.D. ..... Oregon State Golden, D. A. (Liaison), Ph.D. ..... Georgia Hubert, G., Ph.D. ..... Illinois van Laar, R. L., Ph.D. ..... Utah

The Department of Food Science and Technology offers the Master of Science and Doctor of Philosophy degrees. Students in the doctoral program may choose research in the concentration areas of food processing, food chemistry, food microbiology or sensory evaluation of foods. Commodity interests (meats, dairy, fruits, vegetables, bakery products) can be emphasized in any of the areas by careful selection of courses and the research topic. Minors are available in cognate fields. For detailed information, contact the department head.

Graduate School rating forms or letters of recommendation from at least three people are required. Respondents should be familiar with the applicant's scholastic ability and professional potential.

**THE MASTER'S PROGRAM**

Applicants must have a B.S. in food technology, food science or a related scientific field.

**Thesis Option**

1. Prior to research for the thesis, the student must develop a detailed written research plan. Registration for 6 hours of 500 Thesis is required.

2. In addition to the thesis requirement, a minimum of 24 semester hours of graduate coursework is required. This work must be approved by the student's committee and a minimum of 14 hours must be courses numbered above 500. The committee may require additional coursework if the student's progress or background indicates such need.

3. All students are required to take 2 hours of 501 Seminar in their program and are expected to attend this course and participate in discussions during their master's program. Completion of 510 or equivalent is also required.

4. An oral, final examination covering the thesis and coursework is required.

**Non-Thesis Option**

1. In lieu of a thesis, students are required to complete a problem in cooperation with their employer (company or governmental agency) and their faculty committee. Students working on a problem must register for 6 hours of 503. In addition to the requirement for 6 hours of 503, students are required to complete a minimum of 24 semester hours of graduate coursework is required. This work must be approved by the student's committee and a minimum of 14 hours must be courses numbered above 500. The committee may require additional coursework if the student's progress or background indicates such need.

2. All students are required to take 2 hours of 501 Seminar in their program and are expected to attend this course and participate in discussions during their master's program. Completion of 510 or equivalent is also required.

4. Students will be required to take a written comprehensive examination covering their coursework. In addition, an oral, final examination covering the problem and coursework is required. The oral examination will be held on the Knoxville campus.

**THE DOCTORAL PROGRAM**

1. Completion of a master's degree in the field, or a closely related field, or passing a special qualifying examination is required for admission. Scores on the GRE aptitude test are also required.


3. A minimum of 72 hours beyond the Bachelor's degree, excluding credit for the master's thesis, is required. Of this, 24 semester hours must be 600 Doctoral Research and Dissertation.

4. At least 24 hours of coursework numbered above 500 are required exclusive of doctoral research and dissertation. At least 6 of
the 24 hours must be courses numbered above 600.

5. A minimum of 6 hours of courses for graduate credit must be taken outside the Department of Food Science and Technology.

6. All candidates must complete 601 (2 hrs.) and are expected to attend 601 during their Ph.D. program.

7. Each candidate must pass both written and oral comprehensive examinations prior to admission to candidacy. Major professors will advise candidates on competencies expected. A final oral examination is required that includes a defense of the dissertation and subject matter that the student's committee considers appropriate.

GRADUATE COURSES

430 Sensory Evaluation of Food (3) Principles and methods of sensory evaluation of foods. Prereq: Basic statistics. 2 hrs and 1 lab. F

452 Science of Dairy Foods (3) Science and technology of processing of milk and its products. Prereq: Food Laws and Regulations, Food Chemistry, Food Microbiology, and Lab, and Food Preservation or consent of instructor. 2 hrs and 1 lab. Sp

460 Meat Science (3) Carcass characteristics and quality, meat structure and composition, aging, quality determination, and cooking. Prereq: Food Industry or consent of instructor. 3 hrs. Sp

469 Meat Science Lab (1) Slaughter and processing methods for beef, pork, lamb, and poultry. Coreq: 460. Sp

470 Food Crop Products (3) Food products from plants; types, manufacturing systems, quality attributes, and utilization. Prereq: Food Preservation and 3 hrs biological sciences or consent of instructor. Sp

480 Cereal Science and Bakery Products (3) Chemistry and technology of processing cereal grains, interactions of ingredients during production and storage of baked products. Prereq: Food Laws and Regulations, Food Chemistry, and Food Preservation or consent of instructor. 2 hrs and 1 lab. Sp

495 Food Processing System Analysis and Evaluation (3) Design and evaluation of food processing operations to produce safe and acceptable quality food products. Prereq: Food Chemistry, Food Microbiology, Food Preservation or consent of instructor. 3 hrs. Sp

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

501 Seminar (1) Individual reports and discussions on topics from current literature. May be repeated. Maximum 3 hrs. F

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

503 Problems in Lieu of Thesis (2-3) May be repeated. S/N only.

510 Instrumental Analysis of Food (3) Modern instrumental methods for control of food manufacturing processes. Prereq: Food Chemistry. 2 hrs and 1 lab. F

511 Color of Foods (2) Chemical basis, measurements, and reactions involved in color changes in foods. Manufacture and application of ingredients used to modify color of foods. Prereq: Food Chemistry or equivalent. 1 hr and 1 lab. F/A

512 Flavor of Foods (2) Chemical basis, measurements, and reactions involved in flavor changes in foods. Manufacture and application of ingredients used to modify flavor of foods. Prereq: Food Chemistry or equivalent. 1 hr and 1 lab. F/A

515 Food Carbohydrates, Proteins and Lipids (4) Advanced study of chemical and physical attributes of carbohydrates, protein, and lipid components of foods; effects of components on production, and safety and nutritionally acceptable food products. Prereq: Food Chemistry or equivalent. 3 hrs and 1 lab. Sp

520 Food and Industrial Fermentations (3) Microbiology, biochemistry and technology of food-related fermentations involving dairy products, meat, cereals, fruits and vegetables. Production of industrial processes and by-product utilization. Prereq: Food Microbiology and Lab, Food Preservation, Biochemistry and Cellular and Molecular Biology 410 or equivalent. 2 hrs and 1 lab. Sp/A

521 Advanced Food Microbiology (3) Extrinsic and intrinsic factors associated with food and food processing that relate to growth, survival, inhibition, and recovery of foodborne pathogens and spoilage organisms. 2 hrs and 1 lab. Sp/A

540 Food Product Development (3) Art, science and technology of developing and marketing new food products. Prereq: Food Preservation. 2 hrs and 1 lab. Sp/A

560 Advanced Meat Science (3) Physical and chemical changes that occur in conversion of muscle to meat; effects of postmortem changes in meat quality. Prereq: Food Chemistry or equivalent. 1 hr and 1 lab. Sp/A

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

601 Seminar (1) Reports and directed discussion on research topics from current literature. May be repeated. Maximum 3 hrs. F

620 Food Toxicology (2) Basic and applied concepts in food toxicology; toxicological aspects of processed foods. Mode of action, prevention, identification, and control of food toxicants in food supply. Prereq: Food Chemistry, 521, or consent of instructor. Sp/A

640 Advanced Food Processing (3) Role of processing treatments in modification of food properties; texture, flavor and color characteristics. Prereq: Food Preservation, 510, 511, 512 or consent of instructor. Sp/A

Forestry, Wildlife and Fisheries

(College of Agricultural Sciences and Natural Resources)

MAJORS

DEGREES

Forestry ............... M.S.
Wildlife and Fisheries Science ........... M.S.

George M. Hopper, Head

Professors:

Core, H. A. (Emeritus), Ph.D. .......... Arizona Deardorff, B. L., Ph.D. .......... Colorado State
Dimmick, R. W., Ph.D. .......... Oregon Hopper, G. M., Ph.D. .......... VPI
Hill, T. K., Ph.D. .......... Auburn Ostermeier, D. M., Ph.D. .......... Syracuse
Potter, M. R., Ph.D. .......... Georgia Rennie, J. C., Ph.D. .......... NC State
Rennie, J. C., Ph.D. .......... Georgia Schneider, G., Ph.D. .......... Michigan State

Wilson, J. L., Ph.D. .......... Tennessee Winistorfer, P. M., Ph.D. .......... Iowa State

Assistant Professors:

Hay, R. L., Ph.D. ................. VPI Schlarbaum, S. E., Ph.D. .......... Colorado State

Graduate study leading to the Master of Science with majors in Forestry and in Wildlife and Fisheries Science is offered by the Department of Forestry, Wildlife and Fisheries. The Master of Business Administration, with a concentration in forest industries management, is available for qualified students. This degree program is offered by the College of Business Administration with participation by the Department of Forestry, Wildlife and Fisheries. The Doctor of Philosophy can be achieved through the University's Department of Ecology and Evolutionary Biology.

The mission of the Department of Forestry, Wildlife and Fisheries is to advance the management and utilization of natural resources in Tennessee, the region and beyond through programs in teaching, research, and extension.

THE MASTER'S PROGRAMS

Both thesis and non-thesis options are available for the major in Forestry; a thesis is required in Wildlife and Fisheries Science. For admission, the student must have a Bachelor's degree from an accredited institution in forestry, wildlife, fisheries, or other natural resource area. Applicants must take the general Graduate Record Examination (GRE) with minimum scores required. Graduate School rating forms or letters of recommendation from three individuals familiar with the applicant's academic ability are required. The department also has an application that must be submitted at the time of application to The Graduate School.

THESE OPTION

1. Prior to research for the thesis, the student is required to develop a detailed written research proposal. Registration for 6 hours of Thesis (Forestry 500 or Wildlife and Fisheries Science 500) is required.

2. A graduate committee of no fewer than 3 faculty members must be selected by the second semester of residence. At least one member shall be from outside the department. In addition to the thesis requirement, a minimum of 24 hours of graduate coursework is required. This work must be approved by the student's committee and no more than 10 hours of the minimum 30 can be below the 500 level. The committee may require additional coursework if the student's progress or background indicates such need.

3. All students are required to include Forest 512 or Wildlife and Fisheries 512, Seminar, in their programs. This course is required of each graduate student in residence fall semester.

4. An oral examination covering the thesis and coursework is required.
Non-Thesis Option (Forestry only)

1. Thirty-five hours of graduate coursework of which 23 must be at the 500 level or above is required.
2. A graduate committee of no fewer than 3 faculty members will be selected. At least one member shall be from outside the department. The committee will meet and schedule the student’s program during the first semester in residence.
3. Three hours of Forestry 511 are required.
4. Nine hours of coursework in the department must be at the 500 level or above, exclusive of Forestry 511.
5. Final comprehensive written and oral examinations shall be taken upon completion of no fewer than 26 hours of approved study.

MINOR IN ENVIRONMENTAL POLICY

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

ACADEMIC COMMON MARKET

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

Forestry

GRADUATE COURSES

421 Forest and Wildland Resource Economics (3) Production functions, supply-demand and market analysis; non-marketed products and projects; economic analysis and decision models; investment and financial analysis; managerial economics; taxes; forest products marketing. Prereq: Forest Resource Analysis or consent of instructor. F

422 Forest and Wildland Resource Policy (3) Policy formulation; criteria for policy determination; forest and wildland law and regulation; theory of conflict resolution; formal and informal resolution. Prereq: Senior standing or consent of instructor. F

423 Wildland Recreation Planning and Management (3) Planning processes, master and site planning, design projects; management strategies; methods of visitor recreation site management; case studies. Weekend field trips. Prereq: Wildland Recreation or consent of instructor. 2 hrs and 1 lab. Sp

433 Wood Adhesives and Glued Wood Products (2) Theory and practice of adhesive bonding of wood; wood substrate-adhesive interface for bonding; principles of adhesion; wood adhesives; gluing of solid wood and composite wood manufacturing practices; laboratory manufacture and testing of adhesives; adhesive bond strength and glued-wood product performance; day field trips. Prereq: Wood Properties and Uses and Wood Identification, or consent of instructor. 1 hr and 2 labs. F

434 Wood Processing and Machining (2) Primary log breakdown and secondary processing into major products. Fundamentals of machining technology for major types of cutting operations: sawing, boring, planing, veneer cutting, and laser machining; day field trip. Prereq: Wood Properties and Uses and Wood Identification, or consent of instructor. 1 hr and 2 labs. Sp

435 Wood Drying and Preserving (2) Discussion of wood-moisture relationships. Introduction to commercial wood drying equipment and practices. Proper use, specification, and disposal of preservative treated wood. Day field trips. Prereq: Wood Properties and Uses and Wood Identification, or consent of instructor. 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 repeated toward degree requirements. May be repeated. S/N only. E

511 Problem Analysis in Forest Resources (3) Problem identification, analysis and solution in forest resources management. Identity, analyze and prepare written report. Topic and report must have approval of graduate committee. Available only to students in non-thesis option for M.S. in Forestry. E

512 Seminar (1) Current developments in forestry. Required of all graduate students in residence fall. May be repeated. Maximum 2 hrs. S/N only. F

520 Advanced Forest Tree Biology (3) Growth, reproduction, and physiology of trees; forest ecology; variability and taxonomy of forest trees. Prereq: Graduate standing in forestry or biological science, or consent of instructor. F

530 Advanced Forest Resource Management (3) Analysis of forest management problems as exemplified in public agencies and private firms. Forest organization and computerized resource systems; financial and operational planning tools, as applied to forest resource management. Prereq: Senior-level forest management or consent of instructor. F

540 Genetics in Forestry (3) Genetic improvement of forest trees, selection of superior genotypes; field testing for genetic variability, tree breeding; development of seed orchards; hybridization; tree cytology and tissue culture; use of biochemical variation in breeding and management of forest genetics research. Prereq: Silvicultural methods and Biology 220 or consent of instructor. Sp

550 Recreation Planning for Forests and Associated Lands (3) Planning process for recreation development on forests and associated lands. Analysis and critique of specific contemporary alternatives. Overnight field trips. Prereq: Senior level in forest recreation or consent of instructor. F

570 Management & Policy of Forest Resource Organization (3) Theory and application of management as applied to natural resource organizations: institutional direction and culture, and strategic management. Development of policy as planning tool and as results from conflict resolution. Linkage between policy development and execution, and structure and management of organizations. Prereq: Forest administration and policy or consent of instructor. F

580 Advanced Silviculture (3) Silvicultural characteristics, silvicultural practices and systems applied to commercially important hardwoods and softwoods. In-depth analyses of silvicultural practices and systems. Use of prescribed fire, pesticides, in regeneration and management; computer modeling of stand dynamics, structure, growth/yield. Prereq: Undergraduate silviculture coursework or consent of instructor. 2 hrs and 1 lab. Sp

585 Advanced Forest Biometry (3) Application of sampling techniques to forest inventory; fixed and variable plot sampling; lit sampling; Poisson sampling; regression estimation; multistage and multiphase sampling. Growth and yield predictors for even-aged and uneven-aged forests. Prereq: Land Measurement Techniques and Forest Resource Inventory or consent of instructor. F

590 Advanced Topics in Forestry (1-3) Recent advances and concepts; research techniques and analysis of current problems. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

593 Independent Study in Forestry (1-4) May be repeated. Maximum 6 hrs. E

595 Advanced Forest Tree Biology (3) Growth, reproduction, and physiology of trees; forest ecology; variability and taxonomy of forest trees. Prereq: Graduate standing in forestry or biological science, or consent of instructor. F

596 Environmental Impacts in Natural Ecosystems (3) Current environmental problems impacting natural ecosystems: climatic change, acid deposition, air pollution, species declines, and introductions of exotic species. Management methodologies for reestablishing environmental problems. Overnight field trips. Prereq: 416 or equivalent or consent of instructor. Applicable to majors in Forestry and in Wildlife and Fisheries Science. Sp

598 Forest and Wildland Resource Economics (3) Production functions, supply-demand and market analysis; non-marketed products and projects; economic analysis and decision models; investment and financial analysis; managerial economics; taxes; forest products marketing. Prereq: Forest Resource Analysis or consent of instructor. F

599 Forest and Wildland Resource Policy (3) Policy formulation; criteria for policy determination; forest and wildland law and regulation; theory of conflict resolution; formal and informal resolution. Prereq: Senior standing or consent of instructor. F

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

511 Problem Analysis in Forest Resources (3) Problem identification, analysis and solution in forest resources management. Identity, analyze and prepare written report. Topic and report must have approval of graduate committee. Available only to students in non-thesis option for M.S. in Forestry. E

512 Seminar (1) Current developments in forestry. Required of all graduate students in residence fall. May be repeated. Maximum 2 hrs. S/N only. F

520 Advanced Forest Tree Biology (3) Growth, reproduction, and physiology of trees; forest ecology; variability and taxonomy of forest trees. Prereq: Graduate standing in forestry or biological science, or consent of instructor. F

530 Advanced Forest Resource Management (3) Analysis of forest management problems as exemplified in public agencies and private firms. Forest organization and computerized resource systems; financial and operational planning tools, as applied to forest resource management. Prereq: Senior-level forest management or consent of instructor. F

540 Genetics in Forestry (3) Genetic improvement of forest trees, selection of superior genotypes; field testing for genetic variability, tree breeding; development of seed orchards; hybridization; tree cytology and tissue culture; use of biochemical variation in breeding and management of forest genetics research. Prereq: Silvicultural methods and Biology 220 or consent of instructor. Sp

550 Recreation Planning for Forests and Associated Lands (3) Planning process for recreation development on forests and associated lands. Analysis and critique of specific contemporary alternatives. Overnight field trips. Prereq: Senior level in forest recreation or consent of instructor. F

570 Management & Policy of Forest Resource Organization (3) Theory and application of management as applied to natural resource organizations: institutional direction and culture, and strategic management. Development of policy as planning tool and as results from conflict resolution. Linkage between policy development and execution, and structure and management of organizations. Prereq: Forest administration and policy or consent of instructor. F

580 Advanced Silviculture (3) Silvicultural characteristics, silvicultural practices and systems applied to commercially important hardwoods and softwoods. In-depth analyses of silvicultural practices and systems. Use of prescribed fire, pesticides, in regeneration and management; computer modeling of stand dynamics, structure, growth/yield. Prereq: Undergraduate silviculture coursework or consent of instructor. 2 hrs and 1 lab. Sp

585 Advanced Forest Biometry (3) Application of sampling techniques to forest inventory; fixed and variable plot sampling; lit sampling; Poisson sampling; regression estimation; multistage and multiphase sampling. Growth and yield predictors for even-aged and uneven-aged forests. Prereq: Land Measurement Techniques and Forest Resource Inventory or consent of instructor. F

590 Advanced Topics in Forestry (1-3) Recent advances and concepts; research techniques and analysis of current problems. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

593 Independent Study in Forestry (1-4) May be repeated. Maximum 6 hrs. E

Worlde and Fisheries Science

GRADUATE COURSES

440 Wildlife Techniques (2) Methods of wildlife damage control, forest, farmland, wildland wildlife management, identification of wildlife field signs, wildlife capturing techniques and management planning and preparation. Weekend field trip. Prereq: Principles of Wildlife and Fisheries Management or consent of instructor. 1 hr and 1 lab or field. F

442 Fisheries Techniques (2) Active and passive sampling techniques for fish and aquatic organisms; population estimation methods; fish handling and transport; food habits analysis; marking and tagging techniques; age determination and incremental growth analysis; stream assessment; equipment and instruments, fish population and maintenance; safety in sampling methods. Weekend field trip. Prereq: Principles of Wildlife and Fisheries Management or consent of instructor. 1 hr and 1 lab or field. F

443 Fisheries Science (3) Quantification and management of freshwater fishers; population estimation, age and growth, biological assessment, and stocking. Prereq: Principles of Wildlife and Fisheries Management or consent of instructor. 2 hrs and 1 lab. Sp

444 Ecology and Management of Wild Mammals (3) Biological and ecological characteristics of game mammals and endangered mammals. Current principles and practices of wild mammal management. Prereq: Principles of Wildlife and Fisheries Management or consent of instructor. 2 hrs and 1 lab. One weekend field trip required. Sp

445 Ecology and Management of Wild Birds (3) Biological and ecological characteristics of game birds, endangered birds, and bird pests. Current principles and practices of wild bird management. Prereq: Principles of Wildlife and Fisheries Management or consent of instructor. 2 hrs and 1 lab. Sp

490 Ethics in Wildlife and Fisheries Management (1) Ethical bases for decision-making and application of methodologies in practice of wildlife and fisheries management. Seminars by ethical wildlife and fisheries scientists and managers, and forest biologists for students with diverse perspective of ethical behavior in wildlife and fisheries.
practices of wildlife and fisheries management. Lectures, panel discussions, and case studies. Team taught. Prereq: Senior standing. Sp

500 Thesis (1-15) PNP 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. Max. 5 hrs. SNC only. F

512 Seminar in Wildlife and Fisheries Science (1) Current developments in wildlife and fisheries science. Required of all graduate students in residence in fall. May be repeated. Maximum 2 hrs. SNC only. E

520 Planning and Administration of Fisheries and Wildlife Programs (2) Factors influencing policy and program planning activities of fisheries and wildlife agencies. Decision-making policies, case histories. Sp, A

525 Endangered Species Management and Conservation of Biodiversity (2) Status, ecology and management of endangered wildlife and plant species. Historic aspects, policy implications and philosophical issues surrounding recovery efforts. Approaches to monitor and manage for biodiversity. Prereq: Graduate standing or consent of instructor. Sp, A

530 Wildlife Diseases (2) Necropsy of birds and mammals. Recognition of various diseases and methods of preparing pathological material as in field and lab. Investigative procedures concerning wildlife diseases. Prereq: 1st year biology, 444 or 445, or consent of instructor. (Same as Comparative and Experimental Medicine - Veterinary Medicine 530) F, A

540 Predator Ecology (2) Dynamics of terrestrial vertebrate predator populations in human-altered and relatively unaltered environments. Prereq: 444 or 445 or consent of instructor. F, A

545 Population and Habitat Analysis (2) Detail characteristics, assumptions, and current technologies for fish and wildlife population analysis. Technological, methodological and goals for wildlife habitat analysis. Use of computers. Prereq: Animal Science 571 or Statistics 538 or consent of instructor. F, A

555 Fish Culture (3) Principles, concepts and techniques of culturing economically important fish and shellfish species. Prereq: 443 or consent of instructor. 2 hrs. and 1 lab. Sp, A

556 Recirculating Aquaculture (3) Growing fish in intensive, indoor systems with reconditioned water. Techniques of solids removal, nitrification, and gas balance. Practical experience with operating system. Prereq: 443 or consent of instructor. Sp, A

560 Advanced Topics in Wildlife and Fisheries Science (1-3) Recent advances and concepts, research techniques and analysis of current problems. Prereq: 443, 444, 445, or consent of instructor. May be repeated. Maximum 6 hrs. E

583 Independent Study in Wildlife and Fisheries Science (1-4) May be repeated. Maximum 8 hrs. E

Hammond, E. H. (Emeritus), Ph.D. ....... California
Jumper, Sidney R. (Liaison), Ph.D. .... Tennessee
Long, Robert G. (Emeritus), Ph.D. Northwestern
Minkel, C. W., Ph.D. .................. Syracuse
Paludan, C. T. (UTSI), Ph.D. .......... Denver
Puapischer, Lydia, Ph.D. ............. Southern Illinois
Ralston, Bruce, Ph.D. ................. Northwestern
Schmide, Theodore H. (Emeritus), Ph.D. .......... Wisconsin

Associate Professors:
Brinkman, Leonard W., Jr., Ph.D....... Wisconsin
Hardan, Carol P., Ph.D. ............... Colorado
Horn, Sally P., Ph.D. ................. California
Rehder, John B., Ph.D. ............... Louisiana State

Bryan, Deborah (Visiting). Ph.D. ...... Ohio State
Orvis, Kenneth H., Ph.D. .......... California

The department offers the Master of Science and Doctor of Philosophy. The master's degree emphasizes development of professional competence as a geographer and offers opportunities to gain substantial depth in a concentration or a major technique. An emphasis in geographic information systems is available for students who have appropriate backgrounds in mathematics and computer science. The doctoral program is for those who have demonstrated proficiency in conducting independent research. The department is particularly well-qualified to direct graduate work in location analysis, transportation geography, urban and rural geography, cultural ecology, and the geography of the natural environment. The faculty is qualified to direct students from a variety of approaches ranging from historical and humanistic to rigorously analytical and GIS-based.

THE MASTER'S PROGRAM

The department offers the thesis and non-thesis options for the Master of Science. Both options require a minimum of 30 semester hours beyond the completion of a sound undergraduate major program. At least two-thirds of the total hours in the degree program must be at or above the 500 level and must include 501 (at each offering during residency) and 504, 515, 599, 9 hours of 600-level seminars, and (at each offering during residency) 501. A final examination is required in both programs.

THE DOCTORAL PROGRAM

The doctorate is a research degree and is granted only to those who demonstrate proficiency in conducting independent research. Students must have a broad foundation and understanding of the discipline; these should have been achieved in a comprehensive master's program. Course requirements for the degree shall be determined by the student's faculty committee in accordance with specific interests and needs. The program must include 504, 515, 599, 9 hours of 600-level seminars, and (at each offering during residency) 501. A minimum of 9 hours must be earned in related fields outside the department. Competence in cartography and quantitative techniques is required. Additional tools, including languages, will be required as appropriate to the student's areas of research specialization. Examinations required for admission to candidacy include a written comprehensive; written examinations on two special fields; and an oral examination on the student's program, the special fields, and the dissertation proposal. Also required is a final oral examination on the dissertation and on other aspects of the program as determined by the student's doctoral 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.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville. The in-state tuition basis. The Ph.D. program in Geography is available to residents of the states of Alabama, Arkansas, Mississippi, Virginia, or West Virginia. The master's program is also available to residents of Texas. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE COURSES

411 Computer Mapping and Geographic Information Systems (3) Concepts, management, and presentation of data for spatial analysis; cartographic data structures. Prereq: 310 and Introduction to Maps, Aerial Photographs, and Cartography or consent of instructor. 2 hrs and 2 labs.

412 Advanced Cartography Techniques (3) Cartographic design and data display techniques for reference and thematic maps. Basic principles and methods of map reproduction. Prereq: Introduction to Maps, Aerial Photographs, and Cartography or consent of instructor. 2 hrs and 2 labs.

413 Remote Sensing: Types and Applications (3) Principles and uses of remote sensing imagery, digital data, and spectral data; geographic interpretation and mapping techniques. Prereq: 310 or consent of instructor.

415 Quantitative Methods in Geography (3) Geographic application of statistical techniques, point pattern analysis, analysis of areal units. Prereq: Mathematics 15 or two semesters of calculus or consent of instructor.

421 Geography of Folk Societies (3) Geographical study of folk culture, traditional material culture and rural settlement, examples from eastern North America and selected design areas. Prereq: 101-02 or 320 or consent of instructor.

425 Historical Geography of the United States (3) Survey of changing human geography of United States during four centuries of settlement and development. Changing population patterns, development of agricultural and urban regions, and patterns of urban-industrial development. Prereq: 361 or consent of instructor.

433 The Land-Surface System (3) Characteristics of surface water, sedimentation, and surface materials, and their regional interrelationships. People as evaluators and agents of change. Prereq: Geography of the Natural Environment or consent of instructor.

434 Climatology (3) General circulation system leading to world patterns of climate. Climatic change and modification, and interrelationships of climate and human activity. Prereq: Geography of the Natural Environment or Meteorology or consent of instructor.

436 Biogeography (3) Changing distribution patterns of plants and animals on variety of spatial and temporal scales. Effects of continental drift, Pleistocene climatic change, and human activity on world biota. Prereq: Geography of the Natural Environment or consent of instructor.

456 Water Resources (3) Global water resources and hydrologic processes: water availability, flooding, and water quality issues from physical and economic geo-
519 Graduate Practicum in Cartography/Remote Sensing (3) Consent of instructor. Maximum 6 hrs. Prereq: 421 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

441 Urban Geography of the United States (3) Concepts and theories concerning development and significance of systems of cities and internal morphology of cities in United States. Prereq: World Geography or Economic Geograpy: Core Concepts or consent of instructor. Writing intensive. (Same as Urban Studies 441.)

443 Rural Geography of the United States (3) Geographical appraisal of rural areas of United States: small towns and urban fringes. Problems and potentials of rural America. Prereq: World Geography or Economic Geography: Core Concepts or consent of instructor.

445 Geography of Resources (3) Study of factors related to variations in resource availability from time to time and place to place: energy and metallic resources. Prereq: 101-02 or 340 or consent of instructor.

449 Geography of Transportation (3) Examination of transportation systems, their effects on trade patterns, land use, location problems, and development. Prereq: 340 or consent of instructor.

450 Process Geomorphology (3) (Same as Geology 450.)

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

501 Colloquium in Geography (1) Discussion of departmental research, current research literature, and general topics. Registration required of resident graduate students whenever offered. May be repeated. Maximum 6 hrs. Prereq: Applied graduate degree. S/N C only.

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

504 Research Design (3) Geographical research from selection of topic and development of research design through field work and final report.

505 Directed Research (2-6) Research on problems as defined by individual students. Prereq: Written consent of instructor and department prior to registration. May be repeated with consent of instructor. Maximum 9 hrs. S/N C or letter grade.

506 Directed Readings (2-6) Readings on topics of interest as defined by individual students. Prereq: Written consent of instructor and department prior to registration. May be repeated with consent of instructor. Maximum 9 hrs. S/N C or letter grade.

509 Topics in Geography (2-3) Topics vary. Prereq: Consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs. S/N C or letter grade.

513 Topics in Remote Sensing (3) Applied research using imagery for interpretation and mapping of geographic data. Prereq: 413 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

515 Topics in Quantitative Geograpy (3) Multivariate analysis applied to problems in geography; research problems utilizing appropriate computer programs; usefulness to geographic research of techniques developed by other disciplines. Prereq: 415 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

517 Geographic Information Management and Processing (3) Concepts and methods in management of geographic information. Database design, manipulation, sampling, and analysis. Prereq: Consent of instructor.

519 Graduate Practicum in Cartography/Remote Sensing (2-6) Prereq: Written consent of department before registration. May be repeated with consent of instructor. Maximum 6 hrs.

521 Topics in Cultural Geography (3) Examination of trends, problems, and methods in cultural geography. Prereq: 421 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

522 Topics in Global Change (3) Emerging trends, anticipated problems, and methods in global change research and response. Prereq: 432 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

531 Topics in Physical Geography (3) Examination of trends, problems, and methods in geography of land surface systems and in modern climatology. Prereq: 433 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

533 Topics in Climatology (3) Trends, problems, and methods in area of climatology. Prereq: 434 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

535 Topics in Biogeography (3) Examination of trends, problems, and methods in biogeography. Prereq: 435 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

541 Topics in Urban Geography (3) Analysis of research on urban systems, internal morphology, urban problems and urban spatial behavior. Prereq: 441 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

549 Topics in the Geography of Transportation (3) Examination of trends, problems, and methods in transportation. Prereq: 439 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

551 Topics in Environmental Geomorphology (3) (Same as Geology 551.)

552 Topics in the Geography of Geomorphology (3) Regional Geomorphology (3) (Same as Geology 553.)

577 Biological Conservation (3) Analytical treatment of political, economic, and environmental impacts of fragmentations and reconfiguration of population, as practiced in U.S. and abroad. Prereq: Consent of instructor.

591 Foreign Study (1-15) See College of Arts and Sciences. Prereq: Written consent of department prior to registration. S/N C or letter grade.

592 Off-Campus Study (1-15) See College of Arts and Sciences. Prereq: Written consent of department prior to registration. S/N C or letter grade.

593 Independent Study (1-15) See College of Arts and Sciences. Prereq: Written consent of department prior to registration. S/N C or letter grade.

599 Geographic Concept and Method (3) Traditional and modern geographic thought; readings on nature, scope, problems, and methods of geography. Prereq: Consent of instructor.

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

609 Seminar in Geography (2-3) Topics vary. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

613 Seminar in Natural Hazards (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

633 Seminar in Physical Geography (3) Prereq: 533 or consent of instructor. May be repeated. Maximum 6 hrs.

634 Seminar in Climatology (3) Prereq: 534 or consent of instructor. May be repeated. Maximum 6 hrs.

635 Seminar in Biogeography (3) Prereq: 535 or consent of instructor. May be repeated. Maximum 6 hrs.

641 Seminar in Urban Geography (3) Prereq: 541 or consent of instructor. May be repeated. Maximum 6 hrs.

643 Seminar in Rural Geography (3) Prereq: 543 or consent of instructor. May be repeated. Maximum 6 hrs.

649 Seminar in Geography of Transportation (3) Prereq: 549 or consent of instructor. May be repeated. Maximum 6 hrs.

663 Seminar in Geography of the American South (3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

673 Seminar in Geography of Latin American (3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

677 Seminar in Biological Conservation (3) Conduct of original research. Prereq: 577 or consent of instructor. May be repeated. Maximum 6 hrs.

591 Foreign Study (1-15) See College of Arts and Sciences. Prereq: Written consent of department prior to registration. S/N C or letter grade.

The Department of Geology offers both the M.S. and Ph.D. degrees in Geology. Persons interested in these programs should contact the Director of Graduate Admissions in the department.

For admission, an applicant must provide transcripts of previous university work, two rating forms or letters of recommendation, and GRE scores (general). Students are normally admitted only with matriculation status.

Prerequisites for both degrees is a Bachelor's degree, including coursework in mineralogy, optical mineralogy, petrology, stratigraphy, paleontology, structural geology, and field geology. One year each of coursework in calculus and chemistry and one year of coursework in biology, physics, or statistics are also required. Applicants lacking any of these prerequisites may be admitted, but the deficiencies must be removed within the first year without graduate credit. Substitutions may also be allowed.

MEETING THE MAJOR PROGRAM

The department offers the thesis option in the master's program. Graduation requires successful oral defense of a written thesis and a minimum 3.0 GPA in all graduate coursework.

Course requirements are a minimum of 30 semester hours, including:

1. Six hours of Thesis 500.
2. Registration in 595 during the first year in residence. Two hours may be counted toward the 30-hour minimum. This requirement may be waived in unusual circumstances.
3. Sixteen hours of geology courses, with at least 14 hours at the 500 or 600 level, including at least one course from any three of the following five groups.

Group 1: 410, 460, 480, 530, 563, 565.
Group 2: 420, 520, 525, 545, 546, 556.
Group 3: 470, 570, 571, 575, 576.
Group 5: Any 400- or 500-level courses with graduate credit from related departments (allied sciences, mathematics, and engineering), selected with approval of advisor.

4. Eight hours of additional graduate coursework.

THE DOCTORAL PROGRAM

The prerequisite for the Ph.D. program, in addition to the M.S. program, is either a master's degree in Geology, or a Bachelor's degree plus completion of 9 hours of coursework from the list in #3, above, including one course from each group. These courses may be taken while completing other course requirements.

Graduation requires passing a comprehensive examination, taken no later than the end of the second year, completion of all course requirements with a minimum 3.0 GPA, completion of the language requirement, and successful oral defense of the dissertation.

The comprehensive examination includes both written and oral parts in which the candidate will be tested on his/her knowledge of the area concerning the proposed dissertation and of related fields. The candidate is expected to be conversant in a wide field of geological sciences.

A minimum of 24 hours of graded coursework beyond the master's degree is required in addition to the 24 hours of Dissertation 600. The coursework includes the sum of 9 hours of 600-level geology courses, 9 hours of 500-level or higher geology courses, and 6 hours of additional graduate coursework. Extra-departmental coursework is encouraged.

The student must demonstrate a reading knowledge of a foreign language in which there is a body of geological literature, as approved by the student's dissertation committee. The foreign language requirement may be waived for Ph.D. students whose native language is not English and who have demonstrated mastery of the English language, as determined by the student's dissertation committee.

GRADUATE COURSES

401 Quantitative Methods in Geology (3) Applications of calculus and differential equations to problems in earth sciences. Examples of diffusion equation in hydrodynamics, wave equation in geophysics, mechanical modeling and boundary conditions in structural geology and tectonics. Prereq: The Dynamic Earth or Earth, Life, and Time, 2 semesters of Calculus.


420 Palaeoecology (4) Principles of ecological analysis as applied to fossils and fossil assemblages: data collection and interpretation. Laboratory designed around preparation of sciometric reports based on field and laboratory analysis. Writing emphasis course. 3 hrs and 1 lab.

421 Invertebrate Paleontology (4) Survey of invertebrate animal phyla: skeletal structure and preservation, functional morphology, ecology, and stratigraphic distribution. Prereq: Paleobiology or consent of instructor. 2 hrs and 2.25 lab hrs.

440 Field Geology (5) Summer field courses for advanced undergraduate geology majors and first-year graduate students in geology. Taught off-campus and requires full time of student. Synthesis of major aspects of geological sciences in societal context. Field techniques demonstrated, practiced, and applied to solution of geologic problems. Knowledge of completion of major core courses and consent of instructor.

450 Process Geomorphology (3) Integrative approach to development of surface of earth based upon case histories, maps, remote sensing imagery. Prereq: 101-02. (Same as Geography 450.) 2 hrs and 1-2 hr lab.

455 Basic Environmental Geology (3) Applications of geologic sciences toward comprehension of effects of geologic processes on humans and effects of human activities on earth's environments. Prereq: The Dynamic Earth or environmental science. 2 hrs and 1-2 lab or field period.

460 Principles of Geochimistry (3) Application of chemical principles to geologic problems. Crystal chemistry and relation between basic atomic structure and distribution of behavior of elements in earth's crust. Prereq: Chemistry 120-03. Recommended prereq: 330. 2 hrs and 1 lab.

470 Applied Geophysics (3) Basic principles of geophysical exploration: applications to environmental problems. Seismic and electromagnetic methods. Prereq: 6 hours of geology courses numbered above 300, Elements of Physics.

471 Fieldwork in Geophysics (4) Geophysical investigations applied to solution of problems in tectonics, geophysics, or environment. Summer field course off-campus. Requires full time for 2 or more weeks. Prereq: 470 or consent of instructor.

475 Physical and Chemical Systems of the Earth (3) Development of physical earth from solar nebula to present. Formation, composition and evolution of hydrosphere, crust, mantle, and core. Interdependence of earth's surface, atmosphere, hydrosphere and geosphere. Chemical and isotopic processes of interior, and earth's temperature. Historical perspective on major controversies of past, and problems unresolved today. Prereq: 16 hrs of geology courses numbered 300 and above, 2 hrs and 1 discussion.

480 Principles of Economic Geology (4) Ore-forming processes, classification of mineral deposits, survey of different types of mineral deposits and their development, and metallogenesis. Prereq: 310 and 330 or equivalents. Recommended prereq: 460. 1 hr and 2 hr lab.

485 Principles of Hydrogeology (3) Physical principles of flow, flow equations, geologic controls, aquifer analysis, water well design/testing, introduction to transport processes. Prereq: The Dynamic Earth; Calculus; Fundamentals of Physics or equivalent, or consent of instructor. (Same as Civil Engineering 445.)

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

505 Structure of the Southern and Central Appalachian (2) Structural development of Southern and Central Appalachian from extensional and Late Proterozoic... Prereq: Structural Geology or equivalent. 3 hrs and 1 lab.

510 Clay Mineralogy (3) Origin, chemistry, structures, and properties of clay minerals; application of mineralogical techniques in clay mineral studies. Prereq: 310 and 568 or equivalent. 2 hrs and 1 lab.

521 Data Analysis in Geology and Environmental Science (3) Application of statistical and other quantitative techniques using computers to analyze geological data: environmental problems.

530 Petrogenesis of Crystalline Rocks (4) Origin and properties of igneous and metamorphic rocks, magmatic and tectonic processes. Prereq: Structural Geology or equivalent. 3 hrs and 1 lab.

535 Ground Water Hydrology (3) (Same as Environmental Engineering 535.)

540 Seminar in Local Geology (1) Introduction of geology of Southern Appalachians. 1 hr plus field trips.

545 Sandstone Petrology/Physical Sedimentology (4) Field and microscopic analysis of foraminiferal calcite rock types; physical processes of sedimentation, transport, and deposition; and formation of sedimentary structures. Prereq: 340 or equivalent. 3 hrs and 1 lab.

546 Carbonate Sedimentology (4) Environments of deposition of modern and ancient carbonate sediments and diagenesis of resultant rocks; field and laboratory analysis of sample material and preparation of scientific reports. 3 hrs and 1 lab.

550 Regional Geomorphology (3) Integrative approach to study of natural geomorphological regions stressing links and similarities across boundaries, unique characteristics of major divisions, provinces, sectors, and districts. May be repeated with consent of instructor. Maximum 6 hrs. (Same as Geography 550.)

556 Late Age Environments and Global Climate Change (3) (Same as Ecology and Evolutionary Biology 556.)

557 Quaternary Geology (3) Perturbation, processes, and patterns within Quaternary ecosystems; climatic change and vegetation records dating last 2.5 million years. Prereq: Consent of instructor.

563 Stable Isotope Geochemistry (3) Theoretical aspects of stable isotope fractionation and applications to geologic systems: isotope exchange, variations in natural waters, diagenetic, hydrothermal and metamorphic systems. Prereq: General Chemistry or equivalent.

565 Chemical Petrology (3) Application of thermodynamics to geologic materials. Thermodynamics of crystallization, solution, and solidification of the heterogeneous multiphase plane of equilibrium; the dissolution of heat through earth; Prereq: Chemistry 120-03. Mathematics 114-142. Recommended prereq: Physical Chemistry.

568 Geochemical Analysis (3) Collection and treatment of geochemical data using electron microprobe, x-ray fluorescence, and atomic absorption spectrophotometry techniques. Prereq: 310 or consent of instructor. 2 hrs and 1 lab.

570 Advanced Structural Geology (4) Current topics in structural geology and tectonics of mountain belts; re-cent literature. Prereq: 370 or equivalent, or consent of instructor. 3 hrs and 1 lab or seminar.

572 Fracture Analysis (3) Field and subsurface characterization, and mechanical properties of natural fractures: role in groundwater flow. Prereq: Structural Geology or equivalent, or consent of instructor.

575 Tectonics (4) Evolution of Earth's lithosphere in context of plate tectonics. Formation of continents through comparative anatomy of mountain belts, including Appalachian, Alps, Urals, Caledonians, Cordillera, Andes, and Himalayas. Prereq: Structural Geology or consent of instructor. 3 hrs and 1 lab or seminar.

576 Reflection Seismology (3) Imaging subsurface features using reflected seismic waves. Energy sources, modes of wave propagation, field procedures, computer data processing, and pitfalls. Applications to tectonic and environmental problems. Prereq: 470 or consent of instructor.

585 Contaminant Hydrogeology (3) Physical transport processes, isotopes and groundwater age dating, processes influencing inorganic and organic contaminants, sampling and monitoring methods, remediation or contaminated groundwater, aquifer protection. Prereq: 485 or 535, 480 or 581, or Environmental Engineering 535 or equivalent, or consent of instructor.

586 Field and Laboratory Methods in Hydrogeology (3) Research methods. Measurement of hydraulic properties, drilling, sampling and instrumentation, tracer experiments. Field trips. Prereq: consent of instructor. 3 hrs and 1 lab.

590 Special Problems in Geology (1-3) Directed study or special topics. Prereq: Consent of instructor. May be repeated. Maximum 10 hrs.

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

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

593 Independent Study (1-15) See College of Arts and Sciences.
THE MASTER'S PROGRAM

The minimum requirements are 24 semester hours of course credit and eight hours of Thesis research. German 510 and 519-20 are required, as are three courses on German literature or culture, one of which may be at the 400-level. In addition, students must take three further courses, one of which may be chosen from 411-12 or 485. All Graduate Teaching Assistants should take 512, and other candidates may take 512 or any other 500-level course. With the instructor's permission, M.A. candidates may take 600-level courses. A maximum of three 400-level courses may be counted toward the 24 semester hours of course credit.

THE DOCTORAL PROGRAM

The Ph.D. in Modern Foreign Languages is offered jointly by the Department of Germanic, Slavic and Asian Languages and the Department of Romance Languages and requires advanced training in a major language and either a second language or applied linguistics. Students whose language of first concentration is French or Spanish should consult the section on Romance Languages.

Admission Requirements

Applicants must have completed a B.A. in either French, German or Spanish to be accepted into this program. Both graduates of institutions in the United States and those with undergraduate degrees from institutions outside the United States must have a grade point average of at least 3.0. Consideration will also be given to applicants who do not have an undergraduate degree in one of the three foreign languages but have the equivalent of an undergraduate major in one of them.

Degree Requirements

Candidates with German as a first concentration must complete a minimum of 63 semester hours of coursework beyond the bachelor's degree in addition to 24 hours of research. The course work must be distributed as follows:

1. First Concentration: German. A minimum of 30 hours of German courses beyond the bachelor's degree, distributed as follows:
   - 400-level: A maximum of 6 hours of 400-level classes taken for the M.A. may be applied.
   - 500-level: A minimum of 21 hours must be taken. These must include German 512, 519, 520, and 560. These hours are excluded. If 512 is used as part of a second concentration in applied linguistics, another course must be substituted in the first concentration.
   - 600-level: A minimum of 12 hours must be taken, exclusive of dissertation hours.

2. Second Concentration. A minimum of 18 hours beyond the bachelor's degree, taken in the field of applied linguistics or in a second language, either French, Italian, Russian or Spanish. Twelve of these hours must be at the 500 level or above.

For students choosing applied linguistics as an area of second concentration, reading competence in a second language is required. Competence will be determined by translation of a text from the foreign language into English, the test to be administered by the department offering the language.

A comprehensive examination on the first and second concentrations must be passed before the student may be admitted to candidacy. The candidate is required to defend his/her dissertation in an oral examination.

The Ph.D. is a terminal degree. Doctoral students are strongly encouraged to reside and study abroad and will be assisted in identifying potential sources of financial support (e.g., Fulbright, McClure, Rotary fellowships).

For additional courses, see Romance Languages.

ACADEMIC COMMON MARKET

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

Asian Languages

GRADUATE COURSES

451 Readings in Chinese Literature (3) Prereq: Mastery of intermediate-level Chinese or consent of instructor. May be repeated. Maximum 8 hrs.

451 Readings in Japanese Literature (3) Prereq: Mastery of intermediate-level Japanese or consent of instructor. May be repeated. Maximum 8 hrs.
German

GRADUATE COURSES

331-32 Elements of German for Upper-Division and Graduate Students (3,3) Elements of language, elementary and advanced readings, and a final 10,000 word translation project. Open to graduate students preparing for language examinations, and upper-division students desiring reading knowledge of the language. No credit for students having completed 101-02 or 107-30. May be repeated. Maximum 6 hrs. Undergraduate credit only.

411-12 Advanced Conversation and Composition (3,3) Prereq: 311-12 or equivalent or consent of department.

415 Special Topics (3) Topics vary. May be repeated. Maximum 6 hrs.

420 Selected Topics in German Literature from 1750 to the Present (3) Prereq: 6 hrs of 300-level courses (excluding 331-32 and courses in English translation) or equivalent.

421 German Lyric Poetry (3) Prereq: 6 hrs of 300-level courses (excluding 331-32 and courses in English translation) or equivalent.

422 German Drama (3) Prereq: 6 hrs of 300-level courses (excluding 331-32 and courses in English translation) or equivalent.

423 German Narrative Prose (3) Prereq: 6 hrs of 300-level courses (excluding 331-32 and courses in English translation) or equivalent.

424 German Literary Movements (3) Survey of major periods in development of German literature since 1750; problems and techniques of periodization.

425 Introduction to Descriptive Linguistics (3) (Same as French 425, Spanish 425, Linguistics 425, and Russian 425.)

426 Methods of Historical Linguistics (3) Phonetics, distinctive feature analysis, sound change types, nature of sound change, principles of reconstruction, and fundamental assumptions about language change through time. Survey of non-phonological linguistic change, language families, Proto-Indo-European, and other proto languages. Prereq: 6 hrs of upper division foreign language courses (excluding courses in translation or graduate reading courses). (Same as Russian 425, French 425, Spanish 425, and Linguistics 425.)

435 Structure of the German Language (3) Contrastive English-German segmental and suprasegmental phenomena, contrastive English-German linguistic structures, selected topics in advanced German grammar and syntactic analysis. Prereq. 6 hrs of upper division German language courses (excluding courses in translation and graduate reading courses). (Same as Linguistics 435.)

436 History of the German Language (3) Development of German language from Indo-European through Proto-Germanic, Old High German, Middle High German to New High German. Internal and external linguistic history of German speech. Prereq. 6 hrs of upper division German language courses (excluding courses in translation or graduate reading courses). (Same as Linguistics 436.)

465 Business German (3) Survey of German used in fields of business, government, administration, and economics. Prereq: 6 hrs of upper division German excluding courses in translation and graduate reading courses.

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

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

510 German Phonetics and Advanced Grammar (3) Advanced work in phonetics, pronunciation, and selected topics in German grammar. For teachers and prospective teachers. Prereq: Consent of instructor.

512 Teaching a Foreign Language (3) Practical application of methods for teaching and evaluating basic language skills and foreign language skills, and cultural knowledge through seminars, demonstrations, peer teaching, and observation of foreign language classes. Required of all M.A. and Ph.D. students holding GTAs, except those whose previous training or experience warrants excuse by department.

519 Bibliographical Methods (1) Bibliographical methods, major reference works and bibliographical problems in language and literature.

520 Proseminar (2) Advanced training in use of bibliographical and research tools; illustrative problems; paper preparation.

541 Medieval German Language and Literature (3) Introduction to Middle High German.


552 German Enlightenment, Rococo, and Sturm und Drang (3) Content varies. May be repeated. Maximum 6 hrs.

553 German Classicism and Romanticism (3) Content varies. May be repeated. Maximum 6 hrs.

554 German Realism and Naturalism (3) Content varies. May be repeated. Maximum 6 hrs.

555 Modern German Literature 1890-1945 (3) Content varies. May be repeated. Maximum 6 hrs.

556 Modern German Language 1945-Present (3) Content varies. May be repeated. Maximum 6 hrs.

566 German Language Literacy and Criticism (3)

561-56 Directed Readings In German Language and Literature (3,3)

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

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

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

592 Independent Study (1-15) See College of Arts and Sciences. Letter grade or S/NC.

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

621 Seminar in German Language (3) May be repeated. Maximum 18 hrs.

631 Seminar in German and Germanic Philology (3,3)

Russian

GRADUATE COURSES

401-02 Advanced Grammar, Conversation, and Composition (3,3) Prereq: Russian Composition and Conversation or equivalent. (Same as Russian and East European Studies 401-02.)

425 Introduction to Descriptive Linguistics (3) (Same as French 425, German 425, Spanish 425, and Linguistics 425.)

426 Methods of Historical Linguistics (3) (Same as French 425, German 425, Spanish 425, and Linguistics 425.)

430 Selected Topics in Russian Literature (3) Content varies. May be repeated. Maximum 9 hrs.

451-52 Senior Seminar (3,3) For majors in Russian; minors admitted at discretion of instructor. Intensive study of language, literary style, and literary criticism based on selected major novels. (Same as Russian and East European Studies 451.)

510 Russian Phonetics and Advanced Grammar (3) Phonetics, pronunciation, stylistics, and selected topics in Russian grammar. For teachers and prospective teachers. Prereq: Consent of instructor.

560 Studies in Russian Literature (3) Content varies. May be repeated. Maximum 9 hrs.

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

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

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

Health and Safety Sciences

(College of Human Ecology)

MAJORS

Health Promotion and Health Education ... M.S.

Human Ecology .................................. Ph.D.

Public Health ................................. M.P.H., M.S.-M.P.H.

Safety Education and Service ............ M.S.

Charles B. Hamilton, Head

Professors:

Gorski, June, Dr.P.H. ....................... UCLA

Hamilton, Charles B. (liaison). ........ Dr.P.H. ....................... Oklahoma

Kirk, Robert H., H.S.D. ............... Indiana


Associate Professors:

Puskey, R. Jack, Ph.D. ............... Iowa

Zemel, Paula, Ph.D. ...................... Wayne State

Assistant Professors:

Ellison, Jack S. (liaison), Ed.D. .... Tennessee

Fitzhugh, Eugene C., Ph.D. ............ Alabama

Smith, Susan M. (liaison), Ed.D. .... Tennessee

The Health and Safety Sciences Department offers graduate programs leading to the Master of Science with majors in Health Promotion and Health Education; and Safety Education and Service; and to the Master of Public Health degree in Public Health. The department provides doctoral preparation through a concentration in Human Ecology. Inquiries should be directed to the department head. Application packets are available by request to the department.

The department fosters a natural unifying of disciplines that contribute to a holistic approach to healthy living and the enjoyment of life. The academic disciplines focus on assisting students, clients, and faculty to develop a healthy and safe lifestyle that considers the dimensions of disease and injury prevention; and to prepare persons for competent practice of their respective disciplines, including scholarly, creative and management endeavors. The department is committed to the educational value of community-based experiential learning.

Health

A graduate program leading to the Master of Science with a major in Health Promotion and Health Education (thesis and non-thesis options), requiring completion of 30 semester hours.

The Doctor of Philosophy with a major in Human Ecology offers a concentration in community health.

THE PH.D. CONCENTRATION

The community health concentration integrates the behavioral and natural sciences with public health, community health education, health promotion and the safety sciences to...
prepare scholars with an interest in improving the health of the nation.  

Requirements include:
1. Minimum 21 hours of foundation courses: 610, 620, 6 hours of statistics, 3 hours of specialized research methods, and 6 hours of natural or behavioral sciences.
2. Minimum 21 hours in primary specialization: 530, 540, 650, 655, 660 and 6 hours of electives.
3. Minimum 12 hours in supporting specialization in a focused area: public health, safety, gerontology or a program approved by doctoral committee.
4. Minimum 6 hours in a cognate area.

GRADUATE COURSES

400 Consumer Health (3) Survey of major consumer health care providers and health care services; selecting, purchasing, evaluating and financing medical and health care services/products. (Same as Public Health 400.) Sp

405 Alcoholism and Alcohol Education (3) Problems of alcoholism. Factors which make alcoholism serious, health and safety problem. Various types of institutional educational and intervention programs. F

406 Death, Dying and Bereavement (3) Aspects of dying, death and handling trauma of loss. Medical, financial, physical, legal and social implications of death. F, Sp

420 Sex Education As It Relates to Human Sexuality (3) Exploration of science of human sexuality. Trends, issues, and content of sex education. E

425 Women's Health (3) Factors influencing women's health and women's health care providers in nation's health care delivery systems. Health problem/concerns of women and techniques for prevention, maintenance and/or correction. (Same as Women's Studies 425.) E

430 Suicide and Crisis Intervention (3) Factors which make suicide serious health problem. Assessment, intervention, and prevention techniques. Sp

435 Substance Use and Abuse (3) Drug and alcohol abuse problems and suspected causes. Pharmacology of drugs and effects on society. Strategies for intervention and education. Sp

465 Aging and Health (3) Aging process in health perspective as related to health promotion and wellness of aged. F, Sp

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

509, 510, 520, 560 Internship in Safety and Health (3-6) (Same as Safety 509, 510, 520, 560.) F

510 Internship/Research in Safety and Health (3-6) (Same as Safety 510.) F

511 Critical Analysis of Writing and Research (3) Analysis of writing and research in health related areas. 

520 Advanced Research Techniques in Health (3) Advanced theory and techniques of research design and methodologies in health discipline. Prereq: 580, 610. Sp

550 Health Aspects of Gerontology (3) Knowledge and understanding of biologic, psychological, and sociocultural aspects of aging as related to health and wellness of individual. (Same as Public Health 550.) F

555 Seminar: In Nation's Health (3) Comprehensive study of definition, determinants, resources and health status of nation. (Same as Public Health 555.) F

560 International Health (3) Study of quality of health, health promotion and health services in countries through-out world. (Same as Public Health 660.) Sp


Public Health

Graduate study with a major in Public Health leads to the Master of Public Health (M .P.H.). Three professional preparation concentrations are available: community health education, gerontology, and health planning/administration. The M .P.H. program is accredited by the Council on Education for Public Health. A minor in statistics is available to interested M.P.H. students due to public health affiliation with the Intercollegiate Graduate Statistics Programs.

ADMISSION REQUIREMENTS

A statement of the applicant's educational and career goals and three rating forms are required. Request application packet from the department. Preferential consideration for admission to degree status shall be given to those with a minimum undergraduate grade-point average of 2.8 and with at least one year of professional experience in a health-related occupation. As a restricted program, non-degree admission requires department recommendation. Deadlines for completed applications are 1 February for Summer term and 1 April for Fall semester.

THE MASTER'S PROGRAM

The M.P.H. is a non-thesis program requiring completion of 36 semester hours of coursework including 9 weeks of field practice. The field internship provides a full-time experience with an affiliated health agency or organization utilizing one or more health programs. Of importance, the experience allows the student to apply academic theories, concepts, and skills in an actual work setting. Students must complete all assigned prerequisite courses and 21 semester hours of the curriculum with a minimum overall GPA of 3.0 prior to placement in the field.

As an alternative to field practice, preparation of a master's essay may be used to fulfill the professional skills development component of the curriculum. Approval must be received from the Public Health Academic Program Committee and is contingent on consent of major advisor, formal written proposal by the student, and completion of an additional research methods course. Written guidelines stipulating expectations and eligibility criteria are available.

Requirements include:
1. Public Health Foundation courses (16 hours): 509, 510, 520, 530, 540, 555.
2. Internship (6 hours): 587, 588.
3. Concentration of Study (16 hours).

Required and recommended electives will be selected by the student in consultation with the major advisor. A list of courses is available for each concentration: community health education, gerontology, and health planning/administration.

DUAL M.S.-M.P.H. PROGRAM

The College of Human Ecology offers a coordinated dual program leading to the conferral of both the Master of Science with a major in Nutrition (public health nutrition concentration) and the Master of Public Health. The dual program allows students to complete both degrees in less time than would be required to earn both degrees independently. The program is designed to meet the needs of students who are interested in the benefits of majors in both nutrition and public health. Therefore, it accommodates the interests of students who: 1) plan a career in public health nutrition and want to acquire the knowledge and skills of the nutritionist and public health professional; 2) plan a career in nutrition and want to acquire the knowledge and skills and the perspective of the public health professional; or 3) plan a career in public health and want to acquire the knowledge, skills and perspective of the nutritionist.

Admission Requirements

Applicants for the M.S.-M.P.H. program must make separate application to, and be competitively and independently accepted by, the Department of Nutrition for the M.S., Department of Health and Safety Sciences for the M.P.H., and the Public Health Academic Program Committee.

Students who have been accepted by both departments may apply for approval to pursue the dual program anytime prior to, or after, matriculation in either or both departments. Such approval will be granted, provided that dual program studies be started prior to entry into the fourth semester of the M.S. and M.P.H. programs.

Curriculum

A dual degree candidate must satisfy the requirements for both the M.S. (public health nutrition concentration) and the M.P.H., as well as the requirements for the dual program. All candidates for the dual degree must successfully complete the Master of Science and the Master of Public Health (PH 555), two credits of Seminar in Public Health (PH 509), and a minimum of 60 credits. The Department of Nutrition will award a maximum of 9 semester hours of credit toward the M.S. degree for successful completion of approved graduate level courses offered in the Department of Health and Safety Sciences. The Department of Health and Safety Sciences will award a maximum of 11 semester hours of credit toward the M.P.H. degree for successful completion of approved courses offered in the Department of Nutrition. All courses for which cross-credit is awarded must be approved.
by the Public Health Academic program Committee and the student's graduate committee. A single block field experience (or public health internship) is required of all students and the analytical field paper incorporates public health nutrition and the student's public health concentration.

Dual degree students who withdraw from the program before completion of the requirements for both degrees will not receive credit towards the M.S. or M.P.H. degree for courses taken in the other program, except as such courses qualify for credit without regard to the dual program.

Approved Dual Credit
M.S. courses to be counted toward the M.P.H. program must include 10 semester hours of Field Study in Community Nutrition (NTR 515) and 1 semester hour of Graduate Seminar in Public Health (NTR 509). M.P.H. courses to be counted toward the M.S. include Public Health Administration (PH 520), Biostatistics (PH 530), and Epidemiology (PH 540).

MINOR IN GERONTOLOGY
Graduate students in Public Health may pursue a specialized minor in gerontology. This interdisciplinary minor gives the student an opportunity for combining the knowledge about aging in American society with his/her major concentration. Please refer to Human Ecology for specific requirements.

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

COURSE REGISTRATION
Non-degree students must obtain permission from the department head to register for 500-level public health courses. Prerequisite coursework and advisement must be met before admission to the M.P.H. program must be completed promptly, with a grade of B or better, typically within the first semester or two of enrollment in graduate studies.

GRADUATE COURSES
400 Consumer Health (3) (Same as Health 400)
410 Health in the Work Environment (3) Fundamental activities in field of industrial health aimed at reducing health problems for employees. Workplace health hazards and problems of concern to nurses, medical staff, management, engineers and others in industrial health and safety fields. Prereq: Consent of instructor. May not be taken for credit by occupational health concentration majors.
493 Directed Independent Study (1-3) Individual in-depth study of selected issues. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when students use University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N only. E
509 Graduate Seminar in Public Health (1) In-depth discussion of timely topics reflecting scope of public health as discipline and integration with many other academic and professional disciplines. Speaks both internal and external. May be repeated. Maximum 4 hrs. Same as Nutrition 509, Exercise Science 509 and Social Work 509. S/N only. F, Sp
520 Public Health Policy and Administration (3) Administrative considerations of community-based health care programs and public health practice. Health policy formulation, political environment and governmental involvement in health, legal responsibilities, and managerial concepts/techniques/process. F, So
521 Organization Theory and Health Care Delivery (3) Administrative and organization theory related to health facilities; operation and management of community hospital. Case discussions and problem-solving exercises; managerial functions and skills.
523 Management in Extended Care Settings (3) Managerial concepts and theoretical foundations essential to supervision and administration of domiciliary health services programs. Management and operation of health services programs for patients and clients in settings which provide activities of daily living and special psychosocial and environmental needs. Programs for home health services, comprehensive medical rehabilitation, nursing homes, congregate living centers and similar type health programs. Prereq: 521 or consent of instructor.
525 Financial Management of Health Programs (3) Financial management concepts and practices applied to health services programs. Fundamentals of budgeting, costing, financing, rate setting, financial reporting and control. Opportunities to apply techniques. Prereq: 520 or consent of instructor. Sp
530 Biostatistics (3) Application of descriptive and inferential statistical methods to health-related problems and programs. Microcomputer applications. Use and interpretation of vital statistics and introductory research methodology. Prereq: Introductory statistics or consent of instructor. E
540 Principles of Epidemiology (3) Distribution and determinants of health-related outcomes in specified populations with application to control of health problems. Historical origins of theoretical frameworks; research design, data and error sources, measures of frequency and association, etiologic reasoning, disease screening, and injury control. Prereq or coreq: 520; F, Sp
550 Principles and Practices of Community Health Education (3) Theoretical foundations for community health education; opportunities for skill development in a variety of educational processes; and introduction for community health analysis. F
552 Community Health Problem Solving (4) Dynamics of community organization, community needs assessment, educational interventions, and application of program planning and evaluation principles. Opportunity to practice skills in realistic setting. Prereq: 550 or consent of instructor. Sp
560 Theories and Techniques in Health Planning (4) Overview of health planning concepts and methodologies; systems-oriented planning process. Major elements of planning; formulation and conceptualization of problem, plan design, evaluation and implementation. Health problems of institutions and programs. Policy, planning, and organization of health care delivery systems. Social, economic and political factors in health policy. Coordination of services. Prereq: 552.
569 Fitness Testing, Programming, and Leadership for Diverse Populations (3) (Same as Exercise Science 569.)
580 Special Topics (3) Prereq: Consent of instructor. May be repeated under different topic. Maximum 6 hrs.
585 Seminar in Gerontology (1) (Same as Human Ecology 585, Counselor Education and Counseling Psychology 585, Exercise Science 585, Nursing 585, Psychosocial-educational Studies 585, Social Work 585, and Sociology 585.)
587-88-89 Internship (3,3,3) Internship (community health education, gerontology, or health planning/administration) in either approved organization or research setting under supervision of designated preceptor. Prereq: M.P.H. or major, one semester advance notice and consent of major advisor. 589, available only for approved extended placements. S/N only. E
590 Research Methods in Health (3) (Same as Health 590.) F
593 Directed Independent Study (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E
650 Health Aspects of Gerontology (3) (Same as Health 650.) Su
655 Seminar in Nation’s Health (3) (Same as Health 655.) F
660 International Health (3) (Same as Health 660.) Sp

Safety
Graduate study with a major in Safety Education and Service (thesis and non-thesis options) leads to the Master of Science degree. The M.S. requires completion of 30 semester hours. Students may elect an internship experience with private industry or nonprofit organizations. Curricular experiences will assist graduate in preparation for certified safety professional examination.

The graduate program contributes to The University of Tennessee's mission of nursing health protection by preparing safety professionals with the knowledge and skills necessary to create and maintain safer human environments in the workplace (industrial and commercial), home, school, and community. The offering of all core classes on an evening class schedule enables those working full-time in a safety-related field to pursue the M.S. degree with a major in Safety Education and Service on a part-time basis.

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

GRADUATE COURSES
443 Sports & Recreational Safety (3) Accident prevention and injury control in sports activities; philosophy of sports safety; human environmental factors and interrela-
John R. Finger, Acting Head

MAJOR
History

DEGREES

MAJOR

History

Percentage in sports injury and control; risk-taking and decision
solution strategies; and contributions of sports medicine
to safety. 3 hrs and 2 labs. Sp

452 General Safety (3) Principles, practices, and procedures
in general safety. Safety problems in school, traffic, recreation, industry, home and other public areas. F, Su

500 Thesis (1-15) P/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

532 Behavioral Problems in Safety Education & Accident
Prevention (3) Problems of behavior, causes of accidents, and application of principles of psychology in
development of safe behavior in all segments of environment. F

533 Problems and Research in Accident Prevention (3)
Safety problems found in wide variety of accidents that
occur in community; findings of current research in behav-
ioral sciences as related to variation incidence of acci-
dents. F

534 Organization, Administration and Supervision of Safety
Programs (3) National, state and local programs; administrative, instructional and supervisory aspects.
Implementation of relevant programs. Sp

535 Emergency Management (3) Civil and defense
problems; tornadoes, floods, fires, mass civil disorders, and
nuclear and personnel attack by alien countries. Sp

572 Graduate Workshop in Safety (3) Special safety
education problems. For advanced graduate students,
teachers, supervisors, and administrators. May be re-
peated. Maximum 12 hrs.

590 Special Topics (1-3) Advanced study in selected
disciplinary or professional area of safety education.
Management. May be repeated. Maximum 12 hrs.

593 Directed Independent Study (1-3) Individual identi-
fication and study of problem/issue in safety. Extensive reading and critical analysis of safety literature.
Specific proposal to instructor before registration. May be re-
peated. Maximum 12 hrs. E

601 Internship/Research in Safety and Health (3-6)
Field experience. Significant problem identified, re-
searched, and reported in acceptable form. May be re-
peated. Maximum 6 hrs. (Same as Health 601.) E

History

(College of Arts and Sciences)

John R. Finger, Acting Head

Professors:
Bergeron, Paul H., Ph.D. ............... Vanderbilt
Chmielewski, Edward V. (Emeritus). ........................................... Harvard
Ph.D. ............................................. Harvard
Cutler, E. Wayne, Ph.D. ....... Texas
Farriss, W. Wayne, Ph.D. ......... Harvard
Finger, John R., Ph.D. ......... Washington
Hao, Arthur G., Ph.D. ............... Chicago
Hao, Yan-Ping (Lindsay Young Prof.). ........................................... Harvard
Ph.D. ............................................. Harvard
Haskins, Ralph W. (Emeritus). ........................................... California
Klein, Milton M. (Emeritus) (Distinguished Prof.). ........................................... Columbia
Ph.D. ............................................. Columbia
Moser, Harold, Ph.D. .......... Wisconsin
Ratner, Lorman A., Ph.D. .......... Cornell
Utiley, Jonathan G. (Emeritus). ........................................... Illinois
Wheeler, W. Bruce, Ph.D. ....... Virginia

Associate Professors:
Becker, Susan D., Ph.D. .......... Case Western
Bing, J. Daniel, Ph.D. ............... Indiana
Bohstedt, John, Ph.D. ............... Wisconsin
Brummett, Palmira R. (Liaison), Ph.D. , Chicago
Dion, Todd A., Ph.D. ................ Wisconsin
Johnson, Charles W., Ph.D. .......... Michigan
Muldowyk, John, Ph.D. ............... Yale
Pinckney, Paul J., Ph.D. ............... Vanderbilt

Assistant Professors:
Ash, Stephen V., Ph.D. ............... Tennessee
Bast, Robert J., Ph.D. ............... Arizona
Bradley, Owen P., Ph.D. ............... Cornell
Burman, Thomas E., Ph.D. .......... Toronto
Glover, Lorn, Ph.D. ............... Kentucky
Haiken, Elizabeth, Ph.D. ....... California (Berkeley)
Higgs, Catherine A., Ph.D. ............... Yale
Liu Liuevlicius, Vejas G., Ph.D. .......... Pennsylvania

The Department of History offers graduate students
the option of Master of Arts and Doctor of Philosophy
degrees. The M.A. program includes a thesis and non-thesis option. The doctoral program has concentrations in
American and European history with special focus on
the areas identified under group II of the M.A. program.
Detailed information may be obtained from the
Director of Graduate Studies in History who
also advises all incoming students.

THE MASTER'S PROGRAM

Admission Requirements
1. Successful completion of the M.A. degree
from an accredited institution.
2. Acceptable scores on the Graduate
Record Examination (general).

General Requirements
1. Complete History 510 at UT Knoxville.
2. Complete a minimum 6 related hours
outside the department.
3. Spend two consecutive semesters in residence.
4. Complete 9 hours in each of two Group I
fields of study.
5. Fulfill the foreign language requirement.
6. Complete two 600-level research seminars.
7. Maintain a 3.0 overall grade point average in
graduate work attempted.
8. Complete 21 hours of graduate course-
work graded A-F at UT Knoxville beyond that
required for the M.A.
9. Except by prior approval of the
Director of Graduate Studies, a student's coursework must be at the 500 level or above.

Language Requirements
Students must demonstrate competence in
one foreign language through coursework or examination. The student's doctoral committee
may specify any other languages or research
tools, such as statistics, essential for the
student's preparation. The foreign language
requirement must be fulfilled before taking the
comprehensive examination.

Comprehensive Examination
The comprehensive examination is to be
taken no later than the semester following the
term in which the student has completed the
residence, coursework, and language require-
ments. A student stands examination in one
field selected from Group I and one field
selected from Group II below. Both parts are 4-
hours, written, and taken during the same
semester. A student who fails in the M.A.
examination must

Modern Europe
Asia

Retention and Termination
A 3.0 overall grade-point average is required
to remain in good standing. M.A. students must
take the M.A. examination no later than the
semester following the completion of 30 hours.
A student who fails in the M.A. examination must
repeat the examination no later than the
following semester. A student who fails the examination a second time or does not take the
examination when required will be dropped from
the graduate program.
student who fails any one of the three parts (Group I or Group II or the Oral) which constitute the Comprehensive Exam must repeat the failed exam within the allotted time (two semesters) will be dropped from the program. Upon successful completion of the residence, coursework, and language requirements and passing the comprehensive examination, a doctoral student may be admitted to candidacy.

**Doctoral Fields**

Group I:
- Premodern Europe
- Modern Europe
- United States (colonial to present)
- East Asia
- World History

Group II:
- To be defined by the student's doctoral committee from within one of the following fields:
  - United States
  - Colonial and Early Republic
  - 19th century
  - 20th century
  - Regional
  - Military and Foreign Relations
  - Social and Cultural
  - American Political European
  - Medieval
  - Early Modern
  - Modern
  - Political and Diplomatic
  - Intellectual and Cultural
  - Social and Economic
  - National Fields

**Dissertation and Defense**

Original research forms the basis for the dissertation. Doctoral candidates must register for a minimum of 3 hours of 500 Dissertation Research each semester and must complete 24 hours of dissertation credit. A final oral defense is given on the dissertation in its historical context. The program must be completed within eight years from admission as a potential candidate.

**GRADUATE COURSES**

415 Western Economic Thought Since the 18th Century (3) Methods of study of doctrinal history. Origins and evolution of major doctrines: classical and neoclassical economics, economic theories of Keynes and his followers, principal developments of the second half of 20th century. Major writing requirement. May not be used toward graduate degree in History. Prereq: Introductory Economics or consent of instructor. (Same as Economics 415.)

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

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

510 Foundations of Graduate Study in History (3) Assumptions and methods of historians. Required of all candidates for advanced degrees. F

521 M.A. Readings (3) Directed readings in preparation for M.A. examinations. Open only to master's candidates in history. May be repeated. Maximum 6 hrs. S/NC only.

531 Topics in Premodern Europe (3) Reading seminar: secondary sources on premodern European movements and trends. Focus varies. May be repeated. Maximum 15 hrs.

532 Topics in Modern Europe (3) Reading seminar: secondary sources on movements and trends that are multinational in focus. Focus varies. May be repeated. Maximum 15 hrs.

533 Topics in European National History (3) Reading seminar: secondary sources on intra-national topics, usually British, Russian, German, or French. Focus varies. May be repeated. Maximum 15 hrs.


542 Topics in 19th-Century United States (3) Reading seminar: secondary sources on 19th-century United States. Focus varies. May be repeated. Maximum 15 hrs.

543 Topics in 20th-Century United States (3) Reading seminar: secondary sources on 20th-century U.S. Focus varies. May be repeated. Maximum 15 hrs.

551 Topics in the History of Foreign Relations (3) Reading seminar: secondary sources on foreign relations. Focus varies. May be repeated. Maximum 15 hrs.

552 Topics in Military History (3) Reading seminar: secondary sources on military history; military operations, social impact of war and naval strategy in foreign policy. May be repeated. Maximum 15 hrs.

553 Topics in European National History (3) Reading seminar: secondary sources on European National History. Focus varies. May be repeated. Maximum 15 hrs.

554 Topics in the History of Foreign Relations (3) Reading seminar: secondary sources on foreign relations. Focus varies. May be repeated. Maximum 15 hrs.

555 Topics in United States Social and Economic History (3) Reading seminar: secondary sources on U.S. social and economic history. Focus varies. May be repeated. Maximum 15 hrs.

556 Topics in European Social and Economic History (3) Reading seminar: secondary sources on social or economic history of European nations. Focus varies. May be repeated. Maximum 15 hrs.

557 Topics in Cultural and Intellectual History (3) Reading seminar: secondary sources on cultural and intellectual history. Focus varies. May be repeated. Maximum 15 hrs.

558 Topics in United States Regional and Local History (3) Reading seminar: secondary sources on regional, states, and cities of the South. Focus varies. May be repeated. Maximum 15 hrs.

559 Topics in Latin American History (3) Reading seminar: secondary sources in Latin America. Focus varies. May be repeated. Maximum 15 hrs.

560 Topics in Asian History (3) Reading seminar: secondary sources on Asian history. East Asia and Middle East. Focus varies. May be repeated. Maximum 15 hrs.

580 Topics in History (3) Reading seminar: secondary sources for new topics. Focus varies. May be repeated. Maximum 15 hrs.

585 Topics in World History (3) Reading seminar in transnational themes involving analysis of two or more world cultures. Focus varies. May be repeated. Maximum 15 hrs.

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

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

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

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

621 Directed Readings (3) Directed readings to prepare candidate for doctoral comprehensive examination. May be repeated. Maximum 1 per doctoral field. S/NC only.

632 Seminar in Modern European History (3) Research seminar in primary sources culminating in scholarly paper in modern European history. Focus varies. May be repeated. Maximum 15 hrs.


651 Seminar in Military and Foreign Relations History (3) Research seminar in primary sources culminating in scholarly paper in military or foreign relations history. Focus varies. Not restricted by national grouping. May be repeated. Maximum 15 hrs.


658 Seminar in United States Regional and Local History (3) Research seminar in primary sources culminating in scholarly paper in regional and local history. Focus varies. May be repeated. Maximum 15 hrs.

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**Holistic Teaching/ Learning**

*(College of Education)*

**MAJORS**

**DEGREES**

Education ................. M.S., Ed.D., Ph.D. 
L. Knight, Leader

Professors: 
Alexander, J. Estill (Emeritus), Ed.D. Kentucky 
Davis, A. R., Ph.D. ....................... Ohio State 
Hargis, Charles H. (Liasson), 
Ed.D. ................................ Colorado State 
Harriss, G. A., Jr., Ph.D. ......... Michigan 
Huff, P. (Emeritus), Ph.D. ........... Ohio State 
Jost, Karl J., Ed.D. ................. Oklahoma 
Knight, Lester N., Ph.D. ........... Texas 
Rowell, C. Glennon, Ed.D. ........ George Peabody 
Schindler, W. Jean, Ph.D. ........ Kent State 
Turner, T. N., Ed.D. ............... Penn State

Associate Professors: 
Chance, Charles A., Ph.D. ............. Ohio State 
Harm, Michael C., Ed.D. ............. Northern Colorado 
Hendrick, D. A., Ph.D. .............. Alabama

Instructor: 
Butterworth, Jennifer R., Ph.D. ...... Vanderbilt

The Holistic Teaching/Learning unit participates in graduate programs leading to degrees, majors, and concentrations in: 

**Master of Science**

Education 
Track 1-elementary education 
Track 1-modern and comprehensive special education 
Track 1-reading education 
Track 1-social sciences education 
Track 2-elementary teaching 
Track 2-modern and comprehensive special education 
Track 2-secondary teaching

**Education Specialist**

Education 
Elementary education 
Reading education 
Social science education
Doctor of Education

Education
Elementary education
Reading and language arts
Social science education

Doctor of Philosophy

Education
Elementary education
Literacy studies: reading and language arts

The unit also houses programs for students seeking licensure in early childhood, primary, and middle school education (grades K-8 and 1-8), reading endorsement, special education licensure, and secondary social studies. See Education Under Fields of Instruction for full description of all degree requirements.

The unit's central emphasis is on holistic, integrative, and interdisciplinary teaching/learning as opposed to teaching disciplinary subject content (e.g., science, mathematics, language arts) as separate entities. The focus on integration is similar to how children learn and how language is central to the teaching/learning process. The faculty believe that students should be prepared as teachers who can facilitate learning rather than merely dispense content. Central to the philosophy of holistic teaching/learning is knowing each individual child’s learning style, abilities, and interests.

GRADUATE COURSES

419 Psychology and Education of Students with Mild Disabilities (6) Nature and characteristics of persons with mild handicaps and educational strategies appropriate for these persons. Prereq: Special Education Principles, Special Education Strategies, 422, and Admission to Teacher Education Program. Coreq: 420. F

420 Field Experience in Modified Programs (3) Practicum in teaching in modified programs: planning, developing, implementing and evaluating instruction. Prereq: Special Education Principles and Special Education Strategies, Admission to Teacher Education and Curriculum and Instruction 422. Coreq: 420. SNC only. F

421 Elementary and Middle School Science and Social Studies Instruction (3) Methods and materials for teaching science and social studies. Development of functional literacy skills from fourth to eighth grade. Not open to students with recent course or background in teaching science and/or social studies. Prereq: Admission to teacher education. F, Sp

429 Language Arts/Reading Instruction in Elementary and Middle Schools (3) Language and language development as applied to teaching of reading (listening-speaking) and aspects of literacy (reading process/reading and writing). Not open to students with recent course in language arts methods. Prereq: Admission to teacher education. F, Sp

430 Elementary and Middle School Developmental Reading Instruction (3) Word recognition (including phonics), comprehension, evaluation, and materials. Not open to students with recent course in reading education. Prereq: Admission to teacher education. F, Sp

431 Field Experience in Comprehensive Programs (3) Prereq: Special Education Principles and Special Education Strategies. Admission to Teacher Education and Curriculum and Instruction 422. Coreq: 430. SNC only.

432 Psychology and Education of Students with Moderate/Severe Disabilities (6) Nature and characteristics of persons with moderate/severe disabilities and educational strategies appropriate for these persons. Prereq: Special Education Principles and Special Education Strategies. Prereq: Admission to Teacher Education and Curriculum and Instruction 422.

434 Topics in Reading Education (1-6) Prereq: Admission to teacher education and course in reading education. May be repeated. Maximum 6 hrs. E

454 Teaching Strategies and Issues in Social Studies Education (3) Goals, objectives, techniques, materials, and evaluation; current trends and issues in public social studies education. Prereq: Admission to Teacher Education Program.

456 Speech and Language Basis of Learning Disabilities (3) Normal and abnormal speech and language development; identification and assessment of speech and language impairments in school-age children; adaptation of oral/ written communication strategies to existing curricula.

470 Psychology of the Exceptional Child (3) Varieties of exceptional children: general characteristics and educational needs. Implications of developmental variations for teaching strategies. Opportunity to expand study upon particular exceptionality. Enrollment limited to non-special education majors.

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

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

503 Problems in Lieu of Thesis (2-3) May be repeated. Maximum 9 hrs. SNC only. E

504 Studies and Theory in Language Development (3) An overview of current trends and theories of language development in children. Prereq: 1 elementary school language arts course or consent of instructor. F

505 Elementary and Middle School Teaching Methods II (3) Applied methods of teaching reading, language arts, science, social studies, and mathematics, accommodation strategies for students with diverse needs. Prereq: Elementary and Middle School Teaching Methods I. Coreq: 575. F

506 Internships in Teaching in Special Education and Rehabilitation (3) Placement in special education or rehabilitation settings in public schools or agencies under supervision of master practitioners. Enrolment limited to those in fifth-year program. SNC only.

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

521 Teaching Social Studies in Elementary and Middle Schools (3) Planning and techniques, trends in curriculum, development of concepts and generalizations, integration of social sciences. Prereq: Course in teaching of social sciences or consent of instructor. Sp

523 Diagnosis and Correction of Children’s Difficulties in Learning Mathematics (3) Children's difficulties in learning mathematics and procedures for helping classroom teacher correct difficulties. Prereq: 522 or equivalent or consent of instructor. Sp


525 Strategies, Programs, and Materials for Teaching Elementary Social Studies (3) Analysis of new and innovative social studies program materials and techniques. Exploration of current trends in social studies education. Prereq: Consent of instructor. F

527 Elementary School Curriculum (3) Examination, evaluation, and application of curriculum design in elementary school. Trends and issues which affect elementary education. Prereq: Consent of instructor. F, Su

528 Teaching Language Arts Elementary and Middle School (3) Recent trends and current materials and methods in teaching elementary language arts (except reading). Prereq: Course in language arts for elementary or middle schools. Sp

529 Practicum in Diagnosis and Remediation of Difficulties in Learning Mathematics (3) Assessment and planning; assignment of remediation to students having difficulties in learning elementary school mathematics. Prereq: 523 or consent of instructor. Su

530 Teaching Reading in Elementary and Middle Schools (3) Trends in methods, materials, basic approaches, skill development and assessment procedures for teaching reading at elementary school level. Prereq: Course in teaching of reading or consent of instructor. F, Su

534 Seminar in Reading Education (1-6) May be repeated. Maximum 6 hrs. F

536 Psychology of Reading (3) Reading act, relationship between learning theory and reading, role of reading in child’s intellectual development. Affective and cultural factors. Prereq: 500-level course in reading education or consent of instructor.

537 Diagnosis and Correction of Classroom Reading Problems (3) Procedures, methodologies and materials for diagnosing and correcting classroom reading problems. Prereq: Course in reading education, or equivalent teaching experience under consent of instructor. Sp, Su

538 Practicum in Diagnosis of Reading Problems (3) Theoretical and practical applications of specific reading diagnostic instruments; testing of elementary and/or middle school students, preparing case study reports, and conducting parent conferences. Prereq: Course in diagnosis and correction of classroom reading problems or consent of instructor. Sp

539 Practicum in Remediation of Reading Problems (3) Application of learning methodologies in working with elementary and/or secondary school students on one-to-one or small group basis. Prereq: Course in diagnosis and correction of reading problems or consent of instructor. Sp

550 Assessment and Correction of Language Arts Difficulties (3) Procedures and materials for diagnosing and correcting language arts difficulties; analysis of children’s work. Prereq: At least one language arts course or consent of instructor. Su

553 Assessment of Exceptional Students (3) Current issues related to assessment; advanced study of evaluation models for special education; dynamic and other innovative assessment approaches; advanced study of application to educational programming; basic statistics and application in assessment.

554 Developmental Reading Practicum (2) Diagnosing and teaching children having developmental and corrective difficulties. Prereq: Course in diagnosis and correction of reading problems or consent of instructor. May be repeated. Maximum 4 hrs. Su

555 Characteristics of Affective/Motivational Functioning in Children with Disabilities (3) Definition, classification and symptoms of children with affective/motivational developmental disabilities. Comparison to normal development and that of children labeled disturbed or behavior disordered.

556 Instructional Systems for Affective/Motivational Functioning in Children with Disabilities (3) Educational strategies and methods of instruction; simulation, demonstration, and media. Teaching techniques, materials, research-based approaches, therapeutic forms of education through art, music, role play, puppetry, bibliography, and group interactions. Prereq or coreq: 555 or consent of instructor.

557 Positive Preventive Discipline (3) Instructional, classroom and preventive/practice strategies for use in the classroom which positively affect children’s affective/motivational development for children with disabilities or emotional disturbance. Research on how curriculum can encourage appropriate behavior among students. Prereq: Admission to graduate program.

579 Special Topics (1-3) Prereq: Admission to graduate program. May be repeated. Maximum 9 hrs. SNC or letter grade.

585 Teaching Secondary School Social Studies (3) Strategies, projects, materials, and programs in social studies. Prereq: Undergraduate course in teaching of social studies. F, Su

586 Seminar in Research Techniques in Special Education (3) Evaluation of appropriate research methodologies with handicapped populations.

587 Seminar: Issues and Theories in the Education of the Exceptional Child (3) An examination of current issues and trends in education of the exceptional child. Prereq: Research course or consent of instructor.

590 Application of Microcomputer Technology in Special Education and Vocational Rehabilitation (3) Application of microcomputer technology with all categories of exceptionalities and across all chronological and developmental levels.
Human Ecology

(College of Human Ecology)

DEGREE

Human Ecology ..................................................... Ph.D.

The College of Human Ecology offers the Doctor of Philosophy degrees with a major in Human Ecology.

ADMISSION REQUIREMENTS

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

THE DOCTORAL PROGRAM

Graduate study leading to the Doctor of Philosophy degree with a major in Human Ecology is available in the Departments of Child and Family Studies; Consumer and Industry Services Management; Health and Safety Sciences; Human Resource Development; Nutrition. Concentration areas are child development, family studies, community health, human resource development, nutrition science, textile science, and retail and consumer sciences. A major challenge of the doctoral program in Human Ecology is to draw upon basic research generated from the natural sciences, social sciences, humanities, and the arts, and to provide a holistic perspective that contributes to the improvement of individual and family well being. Within the College of Human Ecology, research from one discipline is enhanced by encompassing and utilizing the findings of research from other disciplines.

The Ph.D. is a research degree granted only to individuals who demonstrate proficiency in conducting original research. Course requirements for the degree are determined by the student’s faculty committee, based upon college and departmental requirements and student needs and interests. The Graduate School sets minimum requirements for the doctoral degree.

More specific information about the course of study is given under the individual academic departments that administer the Ph.D. concentration.

MINOR IN GERONTOLOGY

An interdepartmental/interdisciplinary minor in gerontology gives the graduate student an opportunity for combining the knowledge and experience about aging in American society with his/her own major concentration.

Core courses and a practicum are offered by the College of Social Work and selected departments within the colleges of Human Ecology, Education, and Arts and Sciences. A cross-listed seminar between contributing programs is designed to integrate experiences from different sources and to demonstrate the multi-faceted nature of working within an aging society.

Declaration of a Minor

Prior to earning more than one-half of the total hours required for this minor, students must complete a “Declaration of a Minor in the College of Human Ecology” form. Copies of this form are available in the Dean’s Office, Room 110, Jessie Harris Building.

Core Experience

Students must complete a core experience of 12 semester hours taken from at least three different departments including nine hours taken from outside the major department. Coursework needs to comply with the following framework:

1. Coursework: 9 hours required. A variety of coursework may be taken toward satisfaction of this requirement. Courses which are offered on a regular basis include: Health 406, 465, Public Health 650, Nutrition 518, Public Health 523, Retail and Consumer Studies 560, Social Work 586, Sociology 415, Psychosocial Education Studies 504, 522, 525, 528.

2. Applied practicum: 2 hours required. Students should register under practicum experiences in the “home” department of the supervising faculty.

3. Human Ecology 585, 1 hour required. Cross-listed with participating departments.

4. Successful completion of a written comprehensive examination covering subject matter of the minor.

Graduate Committee

At least one faculty member from the Gerontology Policy Committee who is qualified to work with graduate students, must serve on the graduate committee of each student who declares a gerontology minor. Contact Dr. Jim Moran, Associate Dean in Human Ecology, for a current list.

Admission to Candidacy

When application is made for admission to candidacy, indication of the minor must be noted on the Admission to Candidacy form.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The Ph.D. program in Human Ecology is available to residents of Alabama, Kentucky, Mississippi, Virginia (concentration in health education only), or West Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE COURSES

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

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

510 Integrative Nature of Home Economics (3) History and philosophy of home economics. Analysis of current programs and future directions in field. Examination of research, integrative framework. F,A

520 Directed Study in Human Ecology (1-3) Integrative topics. Prereq: At least 9 hrs of graduate study in college...
including courses from at least two departments or consent of instructor. May be repeated. Maximum 6 hrs.

E

525 Practicum in Human Ecology (1-6) Field based experiences. Prereq: Consent of instructor. E

546 Evaluation in Home Economics Education (3) Assessment of programs and pupil progress; techniques, methods and purposes. Prereq: 540, Coreq: 575. F,Sp

563 Family Life Education Programs (3) (Same as Child and Family Studies 553.)

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

575 Professional Internship in Teaching (1-6) 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 hours. S/NC only, F,Sp

580 Special Topics in Home Economics Education (1-3) Current issues and trends in home economics. Prereq: Consent of instructor. May be repeated. Su,A

581 Directed Study in Home Economics Education (1-3) Prereq: Consent of instructor. May be repeated. E

585 Seminar in Gerontology (1) Scope of gerontology as discipline and as related to other academic and professional disciplines. Speakers both internal and external to UTK. Prereq: Consent of instructor. May be repeated. Maximum 3 hrs. (Same as Counselor Education and Counseling Psychology 585, Exercise Science 585, Nursing 585, Public Health 585, Psychosocial Educational Studies 585, Social Work 585, and Sociology 585.) S/NC only.

591 Clinical Studies (1-4) 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.

630 College Teaching and Professional Roles in Home Ecology (3) Instructional effectiveness, techniques, organization and evaluation in college teaching. Systems and ecological theoretical framework. Professional roles and responsibilities related to higher education programs in human ecology. Sp

Human Resource Development

(Developed by Department of Ecology)

MAJORS DEGREES

Human Ecology ......................................................... Ph.D.
Human Resource Development ......................... M.S.

Gregory C. Petty, Head

Professors:

Campbell, Clifton P., Ed.D. ......................... Maryland
Cheek, Gerald D. (Emeritus), Ph.D. .............. Kansas State
Coakley, Carroll B. (Emeritus), Ph.D. .......... Wisconsin
Craig, David G. (Emeritus), Ed.D. ................ Cornell
DeJonge, Jacqueline O., Ph.D. ..................... Iowa State
Haskell, Roger W. (Emeritus), Ph.D. .............. Purdue
Petty, Gregory C., Ph.D. ......................... Missouri
Wagoner, George A. (Emeritus), M.S. .......... Indiana

Associate Professors:

Breuer, Ernest W. (Liaison), Ph.D. ............ Tennessee
Dean, Peter J., II, Ph.D. ....................... Iowa
Hanson, Robert, Ph.D. .......................... Purdue
McNinis, Jacqueline H., Ph.D. .................. Florida State

Assistant Professors:

Mimbs, Cheryl A., Ph.D. ......................... Virginia Tech
Pierce, Randal, Ph.D. .............................. Ohio State

THE MASTER'S PROGRAM

The Master of Science degree with a major in Human Resource Development provides a flexible graduate program for professionals wishing to pursue in-depth study within and across subject areas of Human Resource Development; those who work with individuals to help them enter the workforce; those who train individuals already in the workforce; and those who help individuals in the workforce advance their potential.

The M.S. degree with a major in Human Resource Development offers two concentrations, each providing opportunities for specialized interests. The training and development concentration is designed to meet the needs of professionals who work in programs encompassing all areas of human resource development. Applicants without an undergraduate degree in an area related to human resource development may be required to take 501 as a prerequisite and to complete an internship as part of their program. The teacher licensure concentration is specifically for students who seek initial teacher licensure in family and consumer sciences education, business and marketing education, and technology education. This program requires admission to Teacher Education and has specific prerequisites. Thesis and non-thesis options are available for both tracks.

Admission Requirements

Training and Development Concentration applicants are to submit an application for admission to The Graduate School, three letters of reference from individuals familiar with their potential for success in academic work, and a statement describing personal career objectives directly to the Department of Human Resource Development. Applicants must meet the admission requirements of The Graduate School and present evidence of ability to do graduate work, including a GPA of 2.5 on a 4.0 scale for the last two years of undergraduate work. Any student below this level of academic quality must justify admission via other exceptional credentials. If the applicant has prior work experience in human resource development, a reference letter should also be provided by the work supervisor. Recent Graduate Record Examination or Miller's Analog Test scores are required of all applicants except for those applying for the teacher licensure concentration. Students who have not passed the Graduate Record Examination or Miller's Analog Test scores will be required to take one as part of their graduate program. All applicants are required to be interviewed by the department admissions board.

Teacher Licensure Concentration applicants are to submit an application for admission to The Graduate School and are to be admitted to the Teacher Education Program in order to progress in the Professional Education coursework. Admission to the teacher licensure program requires a minimum 2.5 GPA for Technology Education, Business and Marketing Education, Family and Consumer Sciences Education. In addition, applicants are to have a satisfactory student conduct record;

a satisfactory speech and hearing evaluation; passing scores on the Pre-Professional Skills Test or an ACT composite score of 21 or an Enhanced ACT composite score of 22 or a SAT combined score of 990; and a satisfactory Admissions Board interview.

Degree Requirements

Training and Development Concentration - The 36-hour thesis option (33 hours if thesis work is waived) includes 3 hours of research methodology (504) and dependent on the student's prior coursework, may also require 3 hours of statistics. All students must complete the departmental core of eighteen hours consisting of 504, 510, 511, 512, 557 and 559. The thesis option requires six hours of Thesis 550 and an oral comprehensive examination.

The 39-hour non-thesis option (36 hours if thesis work is waived) is the same as described above except for an additional three hours of specialization coursework and a six hour (503) culminating experience or problem(s) in lieu of thesis (rather than a thesis) approved by the student's committee. A written and oral comprehensive examination is required.

Teacher Licensure Concentration - The 36-hour thesis option (33 hours if thesis work is waived) includes 3 hours of research methodology (504) and dependent on the student's prior coursework, may also require 3 hours of statistics. The core (9 hours) of the internship program is 521, 522, HE 574 and 591 (1 hour). The internship experience (575) is twelve hours of credit and is the culminating experience. Students choose another 3 hours of coursework to support their teaching field. The thesis option requires six hours of Thesis 550 and an oral comprehensive examination.

The 39-hour non-thesis option (36 hours if thesis work is waived) is the same as described above except that students select nine hours of coursework to support the teaching field. The non-thesis option requires a comprehensive written and oral examination.

Note: For students in the Nashville area, only the training and development concentration is available.

THE PH.D. CONCENTRATION

Admission Requirements

Applicants are to submit an application for admission to The Graduate School, five letters of reference from persons familiar with their potential for success in doctoral work, and a statement describing personal career objectives directly to the Department of Human Resource.

Applicants must hold a master's degree from an accredited institution and present evidence of ability to do Ph.D. work, including having maintained a graduate GPA of 3.0 on a 4.0 scale or better. If the applicant has prior work experience in human resource development, a reference letter should also be provided by the work supervisor. Graduate Record Examination scores are required of all applicants. All applicants are required to be interviewed by the department admissions board.

Any person whose native language is not English must submit results of the Test of English as a Foreign Language (TOEFL). A minimum score of 600 is required for admission consideration.
Degree Requirements
The Doctor of Philosophy degree with a major in Human Ecology and a concentration in human resource development is for graduate students who seek careers in higher education or as administrators of HRD. The curriculum is designed to enable students to achieve professional objectives, develop needed competencies, and gain desirable experiences and understanding of human resource development. Students must possess a master's degree before acceptance to the program. A minimum of 95 hours beyond the baccalaureate is required.

Concentration (15 hours): Must include courses to support Human Resource Development and may be taken from the master's degree.

Departmental Core (17 hours): Must include 510, 511, 512, 557, 559 or equivalents and 604.

Specialization (12 hours): Must support a career path of university faculty member or manager of education/training.

Cognate (6 hours): Must be obtained from an academic unit outside the department, support specialization, and be represented by a committee member.

Related Studies (6 hours): Research and theory in support of theoretical framework.

Research and Statistics (15 hours): Statistics must include advanced statistics such as multivariate analysis and computer application, 9 hours minimum; research methodology must include 504 and 610 or equivalents, 8 hours minimum.

Internship (0-6 hours): Required for those changing career path.

Dissertation (24 hours): Must be original research project.

Detailed information regarding the Ph.D. concentration program of study may be obtained from the departmental liaison for graduate studies.

Note: For latest update, check the homepage of Department of Human Resource Development (http://hrd.he.uitk.edu).

GRADUATE COURSES

415 Coordination Techniques (3) Necessary procedures, duties and responsibilities to implement, maintain, and evaluate successful cooperative education program. Prereq: Senior standing and consent of instructor. Sp.

430 Principles and Organization of Business and Marketing Education (3) Historical background and development needs. Principles of vocational education in business and marketing, curriculum implications; establishing, evaluating, and improving programs.

455 Learner and Program Evaluation (3) Assessing effectiveness of training or educational programs; developing performance-based measures; evaluating job performance; and measuring learner progress. Prereq: Program Planning for Training, Development, and Education.

476 Supervised Occupational Experience (3) Practical field experience in business/industry/community-based settings related to area of study. Prereq: Senior standing and consent of advisor. May be repeated. Maximum 9 hrs. E

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

501 Survey of Human Resource Development (3) Training and development as practiced in organizations: needs assessments, transfer of work skills, evaluation, development of training program proposals, assessment of personal competencies, values, goals, and training program design and administration.

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

503 Problems in Lue of Thesis (3) May be repeated. Maximum 6 hrs. S/N only. E


505 Selection, Placement, and Follow-up Procedures in Human Resource Development (3) Methods and procedures utilized in establishing criteria for training selection and placement in instructional programs and in jobs. Collecting, analyzing, and reporting follow-up data appropriate for making program improvements. Prereq: Consent of instructor. Sp, Su

506 Developing Organizational Resources (3) Strategies for developing human and organizational resources through community partnerships and learning. Effective utilization of human resources through active learning programs. Sp.

509 Internship in Human Resource Development (3) Practical field experiences in selected settings under supervision of practitioner and departmental representative. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

510 Foundations of Human Resource Development (3) Historical, philosophical, economical, social, and psychological foundations of vocational, technical and specific training; influence of influences on development. Fundamental principles and contemporary objectives. Prereq: Consent of instructor.


512 Human Resource Management (3) Process-systems approach to human resource management: independent human resource activities (planning, work design, staff development, training and development, compensation, etc.) and organizational goals.

513 Special Topics in Human Resource Development (1-3) Specific objectives, activities, and evaluation. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E

514 Individual Study in Human Resource Development (3) Prereq: Consent of supervising instructor. Approval form must be filed in office of department head. May be repeated. Maximum 6 hrs. E

515 Microcomputer Operations and Programming in Education (3) Microcomputer software design in BASIC, assembly language, and PROLOG programming for education and training applications. Hands-on experience in operating and programming microcomputers, writing, debugging, and running educational programs using sequential data files. Prereq: Teaching, administrative, or related experience in education or training, or consent of instructor.

516 Microcomputer Software Development (3) Advanced software design in BASIC, assembly language, and PROLOG programming for education and training applications. Prereq: 515 or consent of instructor.

521 Design and Development of Instruction (3) Curriculum development and program planning; design of instruction; development of teaching materials for classroom and educational purposes. Intended for students in family and consumer sciences, business, marketing, technology and/or industrial education. F


531 Organization and Supervision of VOE and Marketing Programs (3) Developing office/market-occupations, guidelines in cooperative laboratory, and model office programs. Trends in office and marketing education, physical facilities, state plans, instructor qualifications, and advisory committees. Prereq: Consent of instructor. F, Su

550 Administration of Industrial Education Programs (3) Developing, staffing, administering and evaluating, trade, industrial and technical education programs in secondary and post-secondary school settings. Prereq: Consent of instructor. Sp.

551 Supervision of Industrial Education Programs (3) Techniques used to improve industrial education programs. Staff development, curriculum improvement, and program updating techniques. Prereq: 450 or equivalent. F, Su

552 History and Philosophy of Industrial Education (3) Social, political, and economic events that impact development of industrial education. Philosophical problems, concepts, values, and principles of industrial education. Prereq: Consent of instructor. F, Su

553 Planning Technical Education Facilities (3) Preparation of educational specifications, site selection, and working relationships with other professionals involved in process of planning technical education facilities. Prereq: Consent of instructor. Sp, Su.

554 Technical Program Planning (3) Instructional systems relating to analysis, design, development, implementation, and evaluation of trade, technical supervisor and related training. Prereq: Curriculum development course and consent of instructor. F, Su

555 Curriculum Planning for Industrial Education Programs (3) Developing performance-based, criterion referenced instructional programs. Prereq: 374 or 554 or consent of instructor. Sp, Su.

556 Organizational Development (3) Strategies and interventions for organizational development; training and development of staff, models, assessment, organizational change and consultant's role. Prereq: 512 or consent of instructor. F

557 Methods of Teaching Conceptual Content (3) Proper selection and effective application of methods for teaching and learning conceptual content. Communication strategies for conceptual content comprehension, retention and application.

558 Seminar in Industrial Education (1-3) Current issues, innovations, problems associated with technical programs. Prereq: 12 hrs of graduate courses. May be repeated. Maximum 6 hrs.

559 Program Evaluation (3) Concepts, principles, practices, theories, and trends related to program evaluation. Planning and conducting a comprehensive program evaluation in various settings. Fundamentals of design, measurement, return-on-investment (ROI), and presentation and dissemination of results to stakeholders.

560 International Perspective of Workforce Training (3) Examination and comparison of workforce systems in highly industrialized countries. Development of training programs, out-of-school training systems, update training of incumbent workers, retraining displaced workers, transfer of new technologies, and role and responsibilities of businesses, private sector organizations/agencies, and state and federal government agencies.

562 Grant Writing and Project Implementation (3) Writing grant proposals, negotiating with funding sources, implementing and maintaining funded programs, and closing out projects at end of funding support.

564 Self-Directed Work Teams (3) Theory and practice of implementing self-directed work teams, motivating employees, increasing employee productivity via teams and related issues.

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

601 Curriculum Planning in Human Resource Development (3) Curriculum theory, models, contents, planning evaluation and implementation of specialized program areas. Prereq: 555 or equivalent.


610 Research Development in Human Resource Development (3) Proposal development, theoretical base, research design, sampling, application of statistics, and evaluation of research in human resource development.
Inclusive Early Childhood Education

(College of Education)

MAJORS DEGREES

Education ..................................................... M.S., Ph.D.

Susan Benner, Leader

Professors:

Benner, Susan M., Ed.D.......................... Columbus
Blank, Kermit J., Ph.D. ......................... Ohio State
Coleman, Laurence J., Ph.D. ................. Kent State
Hatch, J. Amos, Ph.D. ......................... Florida

Associate Professor:

Cagle, Lynn C., Ed.D. ......................... Georgia

Assistant Professor:

Judge, Sharon L., Ph.D. ......................... California (Santa Barbara)

The Inclusive Early Childhood Education unit participates in graduate programs leading to degrees, majors, and concentrations in:

Master of Science

Education

Track 1-special education: early childhood
Track 1-elementary education
Track 2-special education: early childhood
Track 2-elementary teaching

Doctor of Philosophy

Early childhood special education

See Education under Fields of Instruction for full description of all degree requirements. Early childhood licensure and degree programs are also available through the College of Human Ecology.

The unit is focused on the preparation of teachers for the education of all young children with and without disabilities in inclusive settings. All young children are defined as children from birth to age eight, including children of poverty, those of color, with disabilities, with advanced development and "mainstreamed" children.

GRADUATE COURSES

445 Early Childhood Education: Program Development and Teaching in Kindergarten (3) Curriculum planning, classroom organization and management practices for teaching young children; relationship of kindergarten to total elementary school. Prereq: Admission to teacher education. E

464 Education of the Gifted and Talented Children (3) Orientation to psychometric and behavioral studies of giftedness. Analysis of past and present school practices in reference to curriculum and program implementation. Sp

471 Early Childhood Special Education (6) Assessment, curriculum planning and development in teaching approaches used in early childhood special education. Prereq: Admission to teacher education. F

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

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

503 Problems in Lieu of Thesis (2-3) May be repeated. Maximum 8 hrs. S/NC only. E

504 Clinical Experience in Teaching and Supervising of Exceptional Children (3-9) Placement in educational settings. May be repeated. Maximum 18 hrs. S/NC or letter grade. (Same as Rehabilitation and Deathness 504.)

515 Seminar (1-3) Curriculum, instructional technology, elementary education, secondary education, or social foundations as related to goals of students' programs. May be repeated. Maximum 6 hrs. S/NC only. E

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

550 Action Research and Practical Inquiry in Education (3) Principles of action research and practical inquiry for practitioners in early childhood and school settings and methods for conducting such inquiries in professional role. Prereq: Admission to graduate program.

554 Assessment in Early Childhood Special Education (3) Development of knowledge and skills in appropriate formal and informal assessments of handicapped infants and young children: screening, identification, diagnosis, placement, and programming assessment issues. Prereq: 553 or consent of instructor.

558 Neuromuscular and Health Disorders: Educational Implications (3) Neurological impairments, physical disabilities and special health conditions, autism, investigation of instructional techniques and adaptations.

564 Psychosocial Development of Gifted and Talented Children (3) Phenomena of talent development in context of home, school, and society. Implications of maturation, education, and promoting social and emotional development. Prereq: 451 and 452 or equivalent or consent of instructor.

565 Instructional Systems for the Gifted and Talented (3) Instructional methods and systems evaluated in terms of effectiveness in various educational environments. Prereq or coreq: 554 or consent of instructor.

566 Curriculum for Early Childhood Education (K-3) (3) Theoretical foundations and current research in terms of effectiveness of various educational environments. Prereq or coreq: 554 or consent of instructor.

576 Creative Problem-Solving Strategies for Special Educators (3) Techniques for solving problems encountered by special educators in any setting.

579 Special Topics (1-3) Prereq: Admission to graduate program. May be repeated. Maximum 6 hrs. S/NC or letter grade.


585 Special Topics (1-3) May be repeated. S/NC or letter grade. E

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

604 Seminar in Curriculum and Instruction (1) Required 2 consecutive semesters. S/NC only. E

610 Internship in College Teaching and Supervision (3-9) Supervised practice in college teaching and supervision. Prereq: Admission to doctoral program or consent of instructor. May be repeated. Maximum 9 hrs. S/NC only.

620 Internship in Research in Special Education and Rehabilitation (3-9) Placement with professional engaged in research-based work for the development of educational programs for exceptional children in educational settings. Prereq: 9 hrs in statistical and research methods. May be repeated. Maximum 9 hrs. S/NC only.

630 Internship in Institutional Leadership in Special Education and Rehabilitation (3-9) Advanced level field experiences under supervision of practitioners. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/NC only.


650 Advanced Studies in Early Childhood Education (3) Prereq: 2 graduate courses in early childhood education and consent of instructor. May be repeated. Maximum 6 hrs. S/NC only. E

679 Special Topics (1-3) Prereq: Admission to doctoral program. May be repeated. Maximum 9 hrs. S/NC or letter grade.

689 Internship (1-3) Experiences in application of principles and practices of curriculum development and instructional improvement. Prereq: Program prerequisites and consent of instructor. May be repeated. Maximum 9 hrs. S/NC only. E

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

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

695 Special Topics (1-3) May be repeated. S/NC or letter grade. E

Industrial and Organizational Psychology

(College of Business Administration)

MAJOR DEGREES

Psychology .......................................... Ph.D.

Robert T. Ladd (Liaison), Director

Committee:

Fowler, Oscar S., Management
James, Lawrence R., Management
Larsen, John M., Jr. (Emeritus), Management
Rush, Michael C., Management
Russell, Joyce E. A., Management
Schumann, David W., Marketing, Logistics & Transportation

Industri...
The doctoral program is designed to prepare students for personnel, managerial, and organizational research; for university teaching; and for consulting relationships with industry. The program emphasizes a scientific/practitioner model in applying and conducting research based on acceptable theory, organizational behavior, psychology, management, and statistics. The degree program is administered by a committee appointed by the Associate Vice Chancellor and Dean of The Graduate School on recommendations from the Management Department head and the program director.

It is intended that students entering the I/O program will represent widely different undergraduate and graduate backgrounds including psychology, business administration, engineering, science, and liberal arts. The first-year program provides the opportunity to take courses that will assist the students in attaining a reasonable level of sophistication in areas of deficiency.

ADMISSION REQUIREMENTS

Applicants for admission should request information and application forms from both the Office of Graduate Admissions and Records (218 Student Services Building) and the Director, Industrial and Organizational Psychology Program, (408 Stickey Management Center, The University of Tennessee, Knoxville, TN 37996).

Two separate applications must be completed: one application for admission to the Graduate School (apply for major in Industrial and Organizational Psychology) and one application for admission to the Industrial and Organizational Psychology program. Deadline: New students are admitted in fall semester only, and applications must be received by the Graduate Admissions and Records Office by February 1.

The master's degree in Industrial and Organizational Psychology is generally not required of individuals pursuing a doctoral degree.

General Requirements

At least one year of college mathematics and one course in statistics are required. Ordinarily, an undergraduate grade-point average of 3.5 or above is required with no evidence of special weakness in mathematics and physical sciences.

Test scores on each section of the general portion (verbal and quantitative) of the Graduate Record Examination (GRE) are required. Customarily, those students admitted to the program have performed at or above the 60th-75th percentile on the general tests. (This corresponds to a raw score of approximately 500 on each of the tests.)

THE DOCTORAL PROGRAM

The Ph.D. degree with a major in Industrial and Organizational Psychology can be completed with a minimum of 90 semester hours in the major. Students must be in residence full time for one year; must maintain an overall 3.0 grade-point average with no more than one grade below B in the I/O Psychology, General Psychology, and Statistics core; must complete an applied research project prior to beginning dissertation work; must pass a comprehensive examination; and must pass a final oral examination on their dissertation research.

Course Requirements:

<table>
<thead>
<tr>
<th>Course Requirement</th>
<th>Hours</th>
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<tbody>
<tr>
<td>I/O Psychology Core</td>
<td>9</td>
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<tr>
<td>Research Core</td>
<td>12</td>
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<tr>
<td>Statistical Principles (Statistics 537 &amp; 538 or equivalents)</td>
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<tr>
<td>Multivariate Statistics (Statistics 578, 679, or equivalent)</td>
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<tr>
<td>Advanced Research Methods (605 or equivalent)</td>
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<tr>
<td>General Psychology Core</td>
<td>9</td>
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<tr>
<td>One course in each of the following areas: biological bases of behavior, cognitive bases of behavior, history and systems of psychology</td>
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<tr>
<td>I/O Psychology Seminars</td>
<td>9</td>
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<tr>
<td>600 level IOPSY courses, from a program committee approved list</td>
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<tr>
<td>Approved Electives</td>
<td>9</td>
</tr>
<tr>
<td>Courses supporting the student's course of study, supervised practicum, internship, or field training</td>
<td>15</td>
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<tr>
<td>Ethics (635 or equivalent)</td>
<td>3</td>
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<tr>
<td>Dissertation (600)</td>
<td>24</td>
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<tr>
<td>TOTAL</td>
<td>90</td>
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</table>

The Program Committee may require any student in the doctoral program to prepare a master's thesis and complete the master's degree. This policy will be implemented by the committee at such time as a review of the student's record suggests that additional evidence is required regarding the student's qualifications for pursuing a Ph.D. degree.

ACADEMIC COMMON MARKET

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

GRADUATE COURSES

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
<th>Notes</th>
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<tbody>
<tr>
<td>500 Thesis (1-15) P/NP only</td>
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<tr>
<td>562 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is complete. May not be used toward degree requirements. May be repeated. S/NC only</td>
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<tr>
<td>525 Research in Industrial/Organizational Psychology (1-3) Available only to students admitted to program or by prearrangement with program director. May be repeated. Maximum 6 hrs. S/NC or letter grade.</td>
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<tr>
<td>567-68 Proseminar in Industrial/Organizational Psychology (3,3) Basic thought, concepts, and issues required for advanced graduate study in industrial and organizational psychology. Must be taken during first year of study in program. Consent of instructor required for non-program students.</td>
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<tr>
<td>569 Applied Measurement for Industrial/Organizational Psychology (3) Basic techniques for collection and evaluation of individual and organizational data using both classical and modern psychometric techniques. Relevant statistical models: reliability analysis, exploratory and confirmatory factor analyses.</td>
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<tr>
<td>600 Doctoral Research and Dissertation (3-15) P/NC only</td>
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<tr>
<td>605 Advanced Research Methods in Psychology (3) Critical analysis of new and evolving techniques for psychological research; new statistical and psychometric methods.</td>
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<td>610 Individuals in Organizations Seminar (3) Bridging principles and processes which link individual attributes with macro organization concerns: culture, climate, and group decision-making.</td>
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<tr>
<td>611 Seminar in Organizational Leadership (3) Current theories, concepts, and issues associated with psychology of organizational leadership. Prereq: 567-68 or consent of instructor.</td>
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<tr>
<td>612 Seminar in Work Motivation (3) Current theories, concepts, and issues associated with psychology of work motivation. Prereq: 567-68 or consent of instructor.</td>
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<tr>
<td>613 Seminar in Performance Appraisal (3) Current issues, problems, and research in performance appraisal and criterion development; applications in compensation. Prereq: 567-68 or consent of instructor.</td>
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<tr>
<td>614 Seminar in Employee Selection (3) Current issues, concerns, and methods used in employee selection. Prereq: 567-68 or consent of instructor.</td>
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<tr>
<td>615 Seminar in Organizational Training and Development (3) Current issues, problems, and research in training and development. Prereq: 567-68 or consent of instructor.</td>
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<tr>
<td>625 Topics in Organizational Psychology (3) Topics vary.</td>
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<tr>
<td>626 Topics in Industrial Psychology (3) Topics vary.</td>
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<tr>
<td>627 Structural Equation Models in Organizational Research (3) Issues related to analysis of organizational data using structural equation and related techniques.</td>
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<tr>
<td>628 Personality Assessment (3) Review of key domains of social cognition: measurement systems which use individual differences in socio-cognitive bases as basis for measuring personality.</td>
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<tr>
<td>635 Ethical and Professional Issues in Industrial/Organizational Psychology (3) Issues involved with ethical practice in research, academic, organizational, and consulting situations.</td>
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<tr>
<td>690 Supervised Practicum, Internship or Field Training in Industrial/Organizational Psychology (1-15) One credit hour per 30 hours of practice. S/NC or letter grade.</td>
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Industrial Engineering

(College of Engineering)

MAJOR

Industrial Engineering ............... M.S., M.S.-MBA

C. H. Aikens, Head

Professors:

Bontadeh, J. A., Ph.D. .......... Ohio State
Claycombe, W. W., Ph.D. .......... VPI
Devine, Michael D., Ph.D. .. ....... Texas
Garrison, G. W. (UTSI), Ph.D. .... NC State
Lusk, Howard L. (Emeritus), PE, M.S. .......................................... NC State
Schmitt, H. W., Ph.D. .......... Texas

Associate Professors:

Aikens, C. H. (Liaison), Ph.D. ......... Tennessee
Hailey, M. L. (UTSI), Ph.D. ........ Texas Tech
Hungerford, J. C., Ph.D. ............ Ohio State
Jackson, D. F., Ph.D. .............. Tennessee
Kirby, K. E., Ph.D. ................. Tennessee

Assistant Professors:

Coleman, G. D. (UTSI) PE, Ph.D. ........ VPI
The Department of Industrial Engineering offers a graduate program leading to the Master of Science degree with a major in Industrial Engineering, concentrations in traditional industrial engineering, engineering management, and manufacturing systems. The Ph.D. with a major in Engineering Science is available through the Department of Mechanical and Aerospace Engineering and Engineering Science with a concentration in industrial engineering.

THE MASTER’S PROGRAM

Students who enroll in the Master of Science degree may select a concentration in industrial engineering, engineering management, or manufacturing systems engineering. Admission is open to graduates of ABET-accredited undergraduate curricula in engineering, or to graduates of other technical curricula who satisfy prerequisites depending on their academic backgrounds. Policies concerning prerequisite requirements will be determined by the Industrial Engineering faculty.

Industrial Engineering

Under the industrial engineering concentration, students may select either the thesis or non-thesis option. The thesis option requires 27 hours of coursework and 6 hours of thesis. The non-thesis option requires 30 hours of coursework plus a 3-hour design project. Depending upon a student's background and career objectives, graduate work in industrial engineering enables the student to select an area of specialization from operations research, human factors engineering, information systems engineering, management and reliability engineering, or general industrial engineering.

Engineering Management

The engineering management concentration has an additional admission requirement of two years' U.S. industrial experience as a practicing engineer or scientist, or current full-time employment in an appropriate engineering or applied science position. The program is non-thesis and requires 33 hours of coursework plus a 3-hour capstone project. This concentration is fully supported off-campus utilizing electronic media for video taping and interactive distance teaching methods.

Manufacturing Systems Engineering

Under the manufacturing systems engineering concentration, students may select either the thesis or non-thesis option when taking the M.S. degree program, or the non-thesis option only when taking the dual M.S.-MBA program. The thesis option requires 27 hours of coursework and 6 hours of thesis. The non-thesis option requires 33 hours of coursework (33 hours in the dual M.S.-MBA program) plus a 3-hour design or industrial problem project.

DUAL M.S.-MBA PROGRAM

The College of Engineering and the College of Business Administration offer a coordinated program leading to the conferral of the Master of Science degree with a major in Industrial Engineering (concentration in manufacturing systems engineering) and the Master of Business Administration degree (concentration in manufacturing management). The dual program saves the student one or two semesters over the time that would be required to earn both degrees independently.

The establishment of the dual program addresses the critical need for personnel trained in both engineering and management who can integrate this increasingly complex body of knowledge in achieving the efficient operation of manufacturing and production firms. The program is designed to accommodate the interests of students who desire a career leading to a leadership position in a manufacturing organization.

Admission Requirements

Applications are accepted for full semester only. Applicants for the M.S.-MBA program must make separate application to, and be competitively and independently accepted by, The Graduate School for the Master of Business Administration degree program and the Master of Science degree program with a major in Industrial Engineering, and by the Dual Program Committee. Students will initially apply for the MBA program, indicating on that application the intent to pursue the dual M.S.-MBA program in manufacturing (refer to the MBA program for separate instructions). Students accepted for both degree programs will be assigned by the Dual Program Committee advisors who will be responsible for supervision of the student's progress through the dual program.

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

Curriculum

The curriculum in the first academic year of the dual M.S.-MBA program is the two-semester core of the MBA program (two 15-hour courses, one each semester). A 1-hour seminar course each semester in manufacturing will also be taken concurrently during the first two semesters (not for graduate credit). A 3-hour design or industrial problem project will be accomplished in the summer term of the first year. This will be part of a summer internship in industry, and the project will be academically supervised by a faculty member associated with the dual program.

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

The dual degree candidate must satisfy the curriculum and graduation requirements of the Department of Industrial Engineering and the College of Business Administration. Dual degree students withdrawing from the dual program before completion of both degrees will not receive credit toward graduation in either degree program for courses 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.

Approved Dual Credit

A maximum of 6 semester hours of approved graduate-level courses completed in the College of Business Administration may be counted toward the M.S. degree program with a major in Industrial Engineering. A maximum of 15 semester hours of approved graduate-level courses completed in the Department of Industrial Engineering may be counted toward the MBA degree program. The approval of courses is the responsibility of the Dual Program Committee and the student's assigned advisor.

Note: Any 400-level course required in the Bachelor of Science in Industrial Engineering program at UT Knoxville may not be used for graduate credit in the M.S. degree program.

Industrial Engineering

GRADUATE COURSES

401 Integrated Manufacturing Systems (3) NC and CNC machine tools, robotics and related materials handling systems, human factors, alternative integrated manufacturing systems, and manufacturing information control systems. Prereq: 400.

402 Production System Planning and Control (3) Theory and application of forecasting systems, regression and time series models, independent demand inventory models, development of safety stock. Coverage of all modules of Manufacturing Resource Planning (MRP) Systems: master production scheduling, resource requirements planning, bill of material and inventory file structures, material requirements planning, capacity planning, shop floor and purchasing control. Overview of just-in-time inventory concepts and MRPII's role in manufacturing automation. Prereq: 301.

403 Production Facilities Design and Material Handling (3) Design of production facilities: plant layout, analysis and planning for overall moving, packaging and storage of materials. Office layout and service areas. Design of facilities for such diverse groups as hospitals, banking, industry. Prereq: 302, 401.


412 Quantitative Methods in Project Management (2) Project planning, scheduling, and control based on networking and precedence diagramming methods. Resource allocation and time-cost trade off. Systems: Pert, Cpm, multi-project control, computer applications, and PERT methods of handling uncertainty in activity time estimates.

421 Information Systems Analysis and Design (3) Systems analysis approach to design, development, and implementation of systems of information. Prerequisites: Informational requirements of industrial engineering systems and control of information in business environment. Analysis and presentation. Prereq: 402, 403, and 405.

422 Senior Industrial Engineering Problems Analysis (3) Application of industrial engineering to field assignments in local companies. Problem identification, analysis and presentation. Prereq: Senior standing.

440 Process Improvement Through Planned Experimentation (3) Fundamentals of continuous improvement, advanced statistical process control techniques, and strategies for short production runs. Use of experimental design techniques to improve processes: single and multiple-factor designs, blocking and confounding, and fractional factorial designs compared to fractional designs to balance experimental efficiency with loss of information. Lab component utilizes statistical and simulation software to improve experience. Prerequisites: Engineering Data Analysis and Process Improvement, Simulation, Probability and Statistics for Scientists and Engineers or consent of instructor.

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

501 Design Project (1-3) Enrollment limited to industrial engineering students in non-thesis program. Prerequisites: May be repeated. Maximum 6 hrs. S/N only. E

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

513 Facilities Planning and Design (3) Modern materials handling techniques, computer-aided layout techniques, application of operation research models, and use of these to design manufacturing facilities. Prerequisites: Facilities Design and Material Handling or consent of instructor.

514 Advanced Information Systems Analysis and Design (3) Systems analysis and systems control concepts applied to management of IE in office and factory of the future. Management support systems, decision support systems, and integrated support systems. Prerequisites: Consent of instructor.

515 Advanced Production and Inventory Systems (3) Advanced topics in production planning and inventory systems. Material requirements planning; production planning and master scheduling; just-in-time concepts; distribution requirements for inventory; and other selected topics. Prerequisites: 402 or consent of instructor.

516 Statistical Methods in Industrial Engineering (3) Application of classical statistical techniques to industrial engineering problems. Statistics and statistical thinking in managerial context of organizational improvement; descriptive statistics and distribution theory; relationship between statistical process control techniques and classical statistical methods; tested and non-tested hypotheses; goodness-of-fit testing; linearity; linear regression and correlation; analysis of variance; single and multiple factor experimental design. Prerequisites: Probability and Statistics for Scientists and Engineers, or equivalent.

517 Reliability Engineering (3) Continuous time random processes with applications to availability of equipment and manufacturing systems. Failure densities and failure data analysis; reliability and availability models; multiattribute-based statistical models for product acceptance. Prerequisites: Consent of instructor.

518 Advanced Engineering Economic Analysis (3) Application of engineering economic analysis in complex decision situations. Inflation and price changes; uncertainties in evaluation; sensitivity analysis; probability analysis; capital financing and project allocation; evaluations involving equipment replacement, investor-owned utilities, and public works projects; probabilistic risk analysis including computer simulation and decision trees; multi-attribute decision analysis; and other advanced topics. Prerequisites: 403 and Probability and Statistics for Scientists and Engineers, or equivalent.

519 Human Factors Engineering and Ergonomics (3) Application of human factors engineering and ergonomic concepts and principles to design and analysis of man-machine systems and products. Human as biomechanical system; human information processing; minimization of human error; anthropometry; anatomy and physiology; physical and mental workload; effects of environmental factors: temperature, lighting, noise; and vibration on humans; manual materials handling and back injuries; design of workstations and office ergonomics; design of displays and controls; human tool design; and cumulative trauma injuries. Prerequisites: Consent of instructor.

520 Human Factors and Product Safety Engineering (3) Role of human factors and safety engineering, legal implications on product design, product liability, system safety, and system failure analysis; reliability, and system safety analysis techniques. Case histories of accident investigations, reconstitution, causality, and product liability litigation. Prerequisite: Consent of instructor.

521 Advanced Human Factors Engineering Methodology (3) Advanced methods for human factors engineering. Observational methods; function/task analysis; computer simulation of human factors design methods; human reliability and error prediction; evaluation of human-machine interfaces; modeling techniques; and interaction design. Prerequisites: Consent of instructor.

522 Optimization Methods in Industrial Engineering (3) Classical optimization applied to constrained and unconstrained, non-linear, static, and dynamic programming techniques; decision making under uncertainty; game theory; and dynamic programming. Prerequisites: Consent of instructor.

523 Mathematical Programming (3) Same as Management Science 531.


526 Systems Modeling and Simulation (3) Modeling of discrete, continuous, and combinded systems using current simulation software. Input distributions, output data analysis, model validation, variance reduction techniques, and design of simulation experiments. Prerequisites: Consent of instructor.

527 Lean Production Systems (3) Characteristics and performance of mass and lean production systems. Lean production concepts and principles. Planning, designing and implementing lean production systems: line balancing, time reduction, cost management, maintenance support and other selected topics. Application at enterprise level to achieve strategic competitive goals. Prerequisites: Consent of instructor.

528 Special Topics in Industrial Engineering (1-3, 3-1, 3-3) Individual and group research projects. Prerequisites: Consent of instructor. May be repeated.

530 Operations Research Models in Engineering Economy (3) Mathematical programming techniques applied to capital budgeting; advanced topics in multiple attribute decision analysis; optimization analysis; and industrial decision making; artificial intelligence in complex decision analyses. Prerequisites: Consent of instructor.

532 Productivity and Quality Engineering (3) Management responsibility for productivity and quality improvement. Application of productivity and quality improvement methods to manufacturing and service enterprises. Prerequisites: Consent of instructor.

533 Theory and Practice of Engineering Management (3) Managerial responsibility for productivity and quality improvement. Application of productivity and quality improvement methods to manufacturing and service enterprises. Prerequisites: Consent of instructor.


535 Management of Technology (3) Creativity and innovation; incorporation of advanced technology equipment; application of systems thinking; new methods in business and management of organizations; justifying technology; assimilating and managing innovation; financing management roles; and impacts of new technologies. Prerequisites: Consent of instructor.

536 Project Management (3) Development and management of projects. Prerequisites: Project proposal preparation; resource and cost estimating; and project planning, organizing, and controlling. Prerequisites: Consent of instructor. May be repeated.

537 Analytical Methods for Engineering Managers (3) Survey of management analysis and control systems through IDE techniques. Qualitative and quantitative systems: methods analysis, work measurement, incentive systems, financial analysis, and productivity evaluation. Prerequisites: Consent of instructor.

538 New Venture Formations (3) Factors other than mechanical or chemical which enter into successful establishment of manufacturing or service enterprises. Prerequisites: Consent of instructor. May be repeated.

539 Strategic Management in Technical Organizations (3) Strategic planning process and strategic man-
agement in practice; corporate vision and mission; product, market, organizational, and financial strategies; external factors; commercialization of new technologies; and competition and beyond. Prereq: 533 and Industrial Engineering 516 or consent of instructor.


541 Total Quality Management and Beyond (3) Continuous improvement in capabilities, competitiveness, and productivity of organizations. Principles of total quality management; systems theory and analysis; performance measurement; and application of statistical techniques in continuous improvement. Team building and leadership issues, and case studies. Prereq: 516.


Information Sciences

(Office of the Vice Chancellor for Academic Affairs)

MAJOR

Information Sciences ................................... M.S.

C. W. Minkel, Interim Director

Professors:

Penniman, W., David, Ph.D. .................. Ohio State
Tencorp, Carol, Ph.D. ...................... Illinois
Wilson, P., Emeritus, Ph.D. ............... Michigan

Associate Professors:

Fisher, Patricia, Ph.D. .................. Florida State
Pemberton, J., Michael, Ph.D. .......... Tennessee
Pollard, Richard, Ph.D. ............... Brunei (UK)
Robinson, William, Ph.D. ................ Illinois
Sinkankas, George, M., Ph.D. ........... Pittsburgh

Assistant Professors:

Bilal, Dania, Ph.D. .................. Florida State
Raber, Douglas, Ph.D. .................... Indiana
Wang, Peiling, Ph.D. ..................... Maryland
Watson, Jinx, Ed.D. .................... Vanderbilt
Whitney, Gretchen, Ph.D. ............... Michigan

The School of Information Sciences provides a program leading to the preparation of librarians and information professionals for work in all types of libraries and information centers. The program of study includes a graduate curriculum leading to the Master of Science degree. The program is accredited by the American Library Association. A Ph.D. degree program may also be pursued with a major in Communications, concentration in information sciences.

The mission of the school is to educate people to live, work and flourish in an information society through excellence in teaching, research, and public service in Information Sciences. The goals and objectives of the school are:

A. To prepare students to understand the nature of information and the role of the library and other information agencies in the management of information resources, and the facilitation of information transfer. Students will demonstrate:

1. Knowledge of the generation, production, management, dissemination and uses of information.

2. Knowledge of the roles of various organizations/institutions in promoting the flow of information.

3. An understanding of the role of the information professional as mediator between information resources and their users.

4. An understanding of the roles of various tools and technologies in facilitating access to information.

5. An understanding of the structure and content of information resources in various formats and subjects.

6. Knowledge of theoretical and practical evolution of information sciences and technologies and their relationship with other disciplines.

7. Competence in creating, managing and accessing information in a variety of formats.

B. To provide services to the state, region, and nation in association, consulting and continuing education activities which will promote the development and improvement of information systems and services such that the school's contributions reach beyond its immediate academic programs. The school will provide:

1. Continuing education for information professionals and, on a selective basis, to persons outside the information field.

2. Advisory services to information organizations.

3. Leadership for professional associations.

4. To conduct basic and applied research which promotes the generation of new knowledge, services and technology. The school will encourage:

1. Research which strengthens its instructional and public service programs.

2. The use of a variety of research methods.

3. Sharing the results of its research.

4. Increased research quality and productivity.

ADMISSION REQUIREMENTS

Applicants to the Information Sciences program must have a minimum undergraduate grade-point average of 3.0 or a satisfactory graduate degree grade-point average for admission as a potential candidate for the MS degree.

The verbal, quantitative and analytical aptitude portions of the Graduate Record Examination (GRE) are required of all applicants unless a graduate degree has been completed prior to application for admission. Applicants should take the GRE at least one semester in advance of application for admission and are expected to score 1500 points or better.

A personal data sheet and three recommendations (obtained from the School of Information Sciences) should be returned to the admissions office of the school. Foreign applicants are required to take the Test of English as a Foreign Language.

THE MASTER'S DEGREE

The program leading to the Master of Science involves a total of 43 semester hours of graduate courses, 16 hours of which form a core curriculum required of all students. Either a thesis or a non-thesis option is available, with 6 hours required for thesis credit. At least 37 hours must be taken in the School of Information Sciences, allowing up to 6 hours outside the school with a maximum of 6 from outside the University.

Core Curriculum

The core curriculum is a 18 semester hour sequence of six courses required of all students: 490, 520, 530, 567, 580. These courses address the evolving information environment, foundational information sciences and technologies, information resource selection, acquisition and evaluation; information access representation; information access and retrieval. The core curriculum includes a one-hour electronic information and communications laboratory experience required of students during the first semester: 504.

The 16 hour core is prerequisite to all elective courses for students enrolled in the MS degree program. Elective courses may begin in the final semester of core course work with permission of the advisor and the instructor of each elective course selected.

Individualized Curriculum Approach

Students, in consultation with an advisor, may wish to pursue a curricular focus to develop an individualized program of study. Graduates of the school have prepared themselves for a variety of careers, including positions as: corporate information specialist, public librarian, records manager/archivist, web designer, indexer/abstractor, online information retrieval specialist, medical or law librarian, reference librarian, youth services specialist, and many others. Once the core courses have been completed, students are encouraged to take advantage of the individualized curricular approach.

Whatever individualized curriculum is chosen, all students who complete the program receive an M.S. degree accredited by the American Library Association (ALA).

For those pursuing Tennessee Department of Education licensure as a school library information specialist, stipulated requirements apply. See following section.

Tennessee State Department of Education School Library Information Specialist Requirements

The requirements for the Tennessee State Department of Education School Library Information Specialist Initial Endorsement include the 16-hour core plus 551, 567, 571, 572, 585, 593 (0 hours), and 573. IS 595 and 573 must be taken concurrently in the student's final semester. Students pursuing the endorsement must follow the non-thesis option.

The Tennessee State Department of Education School Library Information Specialist Initial Endorsement is also available to candidates who have earned an ALA-accredited Master's degree. Students are required to take 24 hours consisting of 551, 571, 572, 567 or 593 (upon approval of the faculty advisor), 595 (9 hours), and 573. IS 595 and 573 must be taken concurrently in the student's final semester.

Additional Program Requirements

Thesis Option: Students electing the thesis option will write a master's thesis under
History of the Book (3) History of writing and
obtained from the Admissions Specialist in the
Virginia. Additional information may be
Sharing graduate programs allows legal
residents of some states to enroll in certain
students. The writing of the master's thesis
serves as the culminating experience.

Non-Thesis Option: Upon completion of the
program, all students who elect the non-
thesis option must take and pass a written
comprehensive examination. A culminating experience is also required which must be
completed in one of the student's last two
terms with a grade of B or better (except as noted) selected from the following and
approved by the student's advisor: 587 System Design Project, 590 Problems in Information Sciences, 591 Supervised Readings in Information Sciences, 197 Seminar in Information Sciences, 593 Independent Study, 594 Graduate Research Participation (S/N/C only), 595 Student Teaching in School Library Information Center (S/N/C only), 599 Practicum.

FINANCIAL ASSISTANCE OPPORTUNITIES

Employment with the University of Tennes-
see Libraries may provide a work-study
opportunity for selected students who wish to
obtain experience in academic librarianship
while pursuing the degree. Such students usually
work at least 20 hours each week and thus
may extend the period required for the
degree. Similar opportunities exist with other
libraries and information agencies in the
Knoxville area.

Work opportunities in a scientific-technical
environment are available through subcon-
tracts with Oak Ridge National Laboratory and the
Department of Energy.

A limited number of graduate teaching
assistantships are available through the school.
Assistantships of this type carry a
waiver of tuition and fees as well as a stipend and
require that recipients work 10 hours per
week in the school.

For application forms and information about
financial aid and other information about the
M.S. in Information Sciences, write to Admis-
sions, School of Information Sciences,
University of Tennessee, 804 Volunteer Blvd.,
Knoxville, TN 37996-4330.

ACADEMIC COMMON MARKET

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

GRADUATE COURSES

420 History of the Book (3) History of writing and
various methods of bookmarking.

450 Writing About Science, Technology and Medi-
cine (3) (Same as Journalism 450.)

475 Utilization of Instructional Media (3) (Same as
Education in the Sciences, Mathematics, Research and Technology 475.)

485 Electronic Communications and Information
Resources on Internet (3) Exploration of worlds of
information and communication resources including e-
mail, gopher, Archie, Veronica, WAIS, WWW, and
newsgroups.

490 Information Environment (4) Generation, produc-
tion, management, dissemination, and use of informa-
tion. Roles of information in society, information seeking and
user behavior, information economy, economics of information
products and services, technological and
organizational change, information professions, and issues.
F, Sp, Su, A

500 Thesis (1-15) PNP only. E

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

504 Electronic Information and Communications
Laboratory (1) Methods for creating and managing
information in electronic form. Communication of
information in networked environment. Location
and use of electronic information resources. For
students who need to take the course after the
GSUS graduate students only, missing, vocabulary
satisfaction can be determined in first semester. SNC only. F, Sp

520 Information Content Representation (3) Prin-
ciples of distinguishing, describing, and indexing intellec-
tual works; current approaches; citation systems, des-
dcriptive cataloging, non-subject indexing, pre- and post-
subject indexing, classification and categori-
ation; authority control of index terms; standards.
F, Sp, Su, A

521 Cataloging and Classification (3) Basic library-
oriented cataloging and classification techniques, tools,
and supporting operations. Descriptive cataloging, choice
and form of non-subject entries, subject heading work,
genera classification, authority control, bibliographic
utility, online library catalogs. F, Sp

522 Advanced Cataloging and Classification (3) Catalog-
ing and classification of more difficult materials,
use of larger classification systems and subject heading systems.
Library of Congress Subject Headings, and introduction to Medical
Subject Headings. PreReq: 521. Sp

523 Abstracting and Indexing (3) Philosophies, stan-
dards, and procedures. Manual and automatic docu-
ment indexing, back-of-the-book indexing, thesaurus
construction, and abstracting.

530 Information Access and Retrieval (3) Media for
information storage, logical and physical information
structures, query languages, search strategies and
heuristics, user interfaces, evaluation of retrieval
system performance. Search techniques for various
types of databases including multi-media, full-text,
numeric, bibliographic. F, Sp, Su

531 Sources and Services for the Social Sciences (3)
Information sources in political science, sociology, psy-
chology, geography, history, anthropology, business,
and education.

532 Sources and Services for Science and Engineer-
ing (3) Information sources in engineering, physical
and life sciences.

533 Sources and Services for the Humanities (3)
Information sources in philosophy, religion, fine arts,
performing arts, literature and languages, organization and
management of regional collections.

534 Government Information Sources (3) Selection,
aquisition, organization, and utilization of government
information in variety of formats from legislative, judicial
and executive branches of federal, state, local, and
international government and intergovernmental agen-
cies.

535 Advanced Information Retrieval (3) Bibliographic,
non-bibliographic, full-text databases, e.g., non-biblio-
graphic formula and structure databases, contents-page
full-text databases, product, document delivery alterna-
tives, evaluation, and testing.

537 Information Industry (3) Issues and trends
concerning information industry: products and services.

540 Corporate Information Services (3) Development
and present status, scope and objectives. Information
resources external to organization.

541 Library Management and Administration (3) Devel-
opment, roles, roles, fiscal management, services, marketing,
and performance evaluation.

542 Information Resources Selection, Acquisition,
and Evaluation (3) Principles of development and
management of collections in information agencies,
computer analysis; users and users, policies and
procedures; evaluation of items and collections; select-
ing items to meet particular needs.

543 Information Resources Management (3) Principles
and practice in providing instructional and technol-
ogy for end-users of information and information sys-
tems. Includes practical experience.

544 Information Resources Selection, Acquisition,
and Evaluation (3) Principles of development and
management of collections in information agencies,
computer analysis; users and users, policies and
procedures; evaluation of items and collections; select-
ing items to meet particular needs.

545 Information Resources Management (3) Principles
and practice in providing instructional and technol-
ogy for end-users of information and information sys-
tems. Includes practical experience.

546 Information Resources Management (3) Principles
and practice in providing instructional and technol-
ogy for end-users of information and information sys-
tems. Includes practical experience.

547 Information Networks (3) Information network.

548 Public Library Management and Administration (3)
Development, roles, roles, fiscal management, services, marketing,
and performance evaluation.

549 Information Network (3) Information network.

550 Computer Information Management (3) Principles
and practice in providing instructional and technol-
ogy for end-users of information and information sys-
tems. Includes practical experience.

551 Library Management and Administration (3) Devel-
opment, roles, roles, fiscal management, services, marketing,
and performance evaluation.

552 Information Resources Selection, Acquisition,
and Evaluation (3) Principles of development and
management of collections in information agencies,
computer analysis; users and users, policies and
procedures; evaluation of items and collections; select-
ing items to meet particular needs.

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and practice in providing instructional and technol-
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tems. Includes practical experience.

563 Information Resources Management (3) Principles
and practice in providing instructional and technol-
ogy for end-users of information and information sys-
tems. Includes practical experience.
569 Advanced Production of Audiovisual Software (3) (Same as Education in the Sciences, Mathematics, Research and Technology 568). F,Sp.


572 Resources for Young Adults (3) Critical survey of books and related materials for young adults; personal, vocational, and recreational needs and interests. Evaluation, selection, and utilization for school and public libraries. Su.

573 Programming for Children and Young Adults (3) Philosophy and objectives of public and school library services for children and young adults. Reading, listening, and viewing guidance for individuals and groups. Program planning, implementation, and evaluation. Prereq.: 571 or 572.

574 Adult Materials and Services (3) Popular informational and recreational materials and services to meet adult interests in variety of formats. Development of specialized collections.

580 Foundations of Information Sciences and Technologies (3) Definitions of information, information sciences, and information technology; theories of information, information representation, retrieval, and transfer; standards and technologies for information processing and distribution; research front: bibliometrics and informetrics; relationships with other disciplines. F,Sp,Su.

581 Seminar in Radio and Television (3) (Same as Broadcasting 580.)

582 Library Automation (3) Computer-based applications and systems for libraries including MARC, bibliographic utilities, retrospective conversion, circulation systems, online catalogs, computer-based reference services, acquisitions and serials control, systems planning and implementation.

583 Information Systems (3) Systems concept, defining system, analysis and design of information systems. Selecting and using information systems to support various activities. User involvement in the development process. F,Sp.

584 Database Management Systems (3) Defining data needs, data structures, role of operating systems in data management, file organization, database management systems, logical data models, internal data models, database administration and evaluation. Design and implementation of application using database management system. Sp.

585 Information Technologies (3) Evolution, trends, capabilities, and limitations of technologies applied to information capture, storage, preservation, access, and distribution. F,Sp.

586 Information Retrieval Systems (3) Historical perspective on information retrieval research; statistical and probabilistic retrieval techniques; cognitive user modeling; expert intermediary systems; organizations, relations and hyperlinks.

587 Information System Design Project (3) Supervised and structured experience in design and development of computer-based information systems. Prereq.: 583, 584 or 586, 588, and 589. F,Sp.

588 Psychology of Human-Computer Interaction (3) Survey of human-computer interaction and introduction to psychological and other behavioral science knowledge and techniques useful in design of computing systems for human use. Basic psychological phenomena of human cognition, memory, problem solving, and language and how these processes relate to and condition interaction between humans and interactive computing systems.


590 Problems in Information Sciences (3-4) Prereq.: Consent of instructor. May be repeated. Maximum 6 hrs.


592 Seminar in Information Sciences (3-4) Prereq.: Consent of instructor. May be repeated with consent of advisor. Maximum 6 hrs.

593 Independent Study (3-6) Prerequisite: Consent of advisor. Maximum 6 hrs. F,Sp.

594 Graduate Research Participation (3) Advanced research techniques under supervision of staff research director whose area coincides with interests of student. Prereq.: Consent of advisor and research director. S/N only. F,Sp.

595 Student Teaching in School Library Information Center (3) Planned professional semester: full day school library work and classroom observation activities. S/N only.

599 Practicum (3-6) Opportunity to translate theory into practice under guidance of qualified information professionals. Prereq.: Completion of core and pertinent advanced courses relevant to student's practicum design. Minimum 3.0 cumulative GPA. Written consent of advisor and approval of practicum coordinator. May be repeated. Maximum 8 hours. E.

601 Advanced Seminar in Information Sciences (3) Theories, research, and traditional practices of information representation, organization, and access and retrieval. Research opportunities and methods. Relationship to and interaction with other disciplines.

602 Seminar in Radio and Television (3) (Same as Broadcasting 602.)

603 Library Automation (3) Computer-based applications and systems for libraries including MARC, bibliographic utilities, retrospective conversion, circulation systems, online catalogs, computer-based reference services, acquisitions and serials control, systems planning and implementation.

American Studies

GRADUATE COURSES

510 Special Topics (3) May be repeated. Maximum 6 hrs.

511 Special Topics (3) May be repeated. Maximum 6 hrs.

512 Special Topics (3) May be repeated. Maximum 6 hrs.

513 Special Topics (3) May be repeated. Maximum 6 hrs.

Ancient Mediterranean Civilizations

GRADUATE COURSES

510 Special Topics (3) May be repeated. Maximum 6 hrs.

Asian Studies

GRADUATE COURSES

471 Selected Topics in Asian Studies (3) Content varies. May be repeated. Maximum 9 hrs.

510 Special Topics (3) May be repeated. Maximum 6 hrs.

Cinema Studies

GRADUATE COURSES

400 Special Topics (3) May be repeated. Maximum 6 hrs.

420 French Cinema (3) (Same as French 420.)

421 Topics in Italian Literature and Cinema (3) (Same as Italian 421.)

433 Modern Art and Film (3) (Same as Art Media' Photography 433.)

489 Special Topics in Film (3) (Same as English 489.)

510 Special Topics (3) May be repeated. Maximum 6 hrs.

Comparative Literature

GRADUATE COURSES

401-02 Special Topics in Comparative Literature (3,3) Content varies. May be repeated. Maximum 9 hrs.

402 Latin American Studies Seminar (3) Selected topics. May be repeated. Maximum 6 hrs.

510 Special Topics (3) May be repeated. Maximum 6 hrs.

Judaic Studies

405 Modern Jewish Thought (3) (Same as Religious Studies 405.)

425 Early Christian and Byzantine Art, to 1350 (3) (Same as Art History 425.)

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

Latin American Studies

GRADUATE COURSES

510 Special Topics (3) May be repeated. Maximum 6 hrs.
Linguistics

GRADUATE COURSES

400 Topics in Linguistics (3) Content varies. May be repeated. Maximum 6 hrs.

411 Linguistic Anthropology (3) (Same as Anthropology 411.)

423 The Development of Diachronic and Synchronic Linguistics (3) Development of Western linguistic thought from Hebrews and Greeks through modern times. Readings from Boas, Sapir, Bloomfield, and others. Prereq: 9 hrs of courses required for Linguistics major (300-level or above) or consent of instructor.

425 Introduction to Descriptive Linguistics (3) (Same as French 425, German 425, Russian 425, and Spanish 425.)

426 Methods of Historical Linguistics (3) (Same as French 426, Russian 426, and Spanish 426.)

429 Romance Linguistics (3) (Same as French 429 and Spanish 429.)

434 Structure of the German Language (3) (Same as German 434.)

475 History of the German Language (3) (Same as German 475.)

476 Rhetoric of the Woman's Rights Movement to 434.)

490 Language and Law (3) (Same as English 490.)

476 Rhetoric of the Contemporary Feminist Movement (3) (Same as Speech Communication 476.)

483 African-American Women in American Society (3) (Same as African and African-American Studies 483.)

510 Special Topics (3) May be repeated. Maximum 6 hrs.

Journalism

(College of Communications)

MAJOR

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

James A. Crook, Director

Profiles:

Adamson, June N. (Emeritus), M.S. Tennessee
Ashdown, Paul G., Ph.D. ............ Bowling Green
Bowles, Dorothy, Ph.D. ............. Wisconsin
Cade, Dozier C. (Emeritus), Ph.D. ........... Iowa
Caudill, C. Edward, Ph.D. ........... North Carolina
Crook, James A., Ph.D. .......... Iowa State
Everett, George A. (Emeritus), Ph.D. ............ Iowa
Haskins, Jack B. (Emeritus), Ph.D. ............ Iowa
Leiter, B. Kelly (Emeritus), Ph.D. ............ Southern Illinois
Littmann, Mark (Chair of Excellence), Ph.D.

Miller, M. Mark, Ph.D. ............ Michigan State
Sexton, Michael w., Ph.D. ....... Southern Illinois
Teeter, Dwight L., Jr., Ph.D. ........... Wisconsin
Tucker, Willis C. (Emeritus), M.S. ............ Kentucky

Associate Professors:

Dimmick, Susan L., Ph.D. ............ Northwestern
Heller, Robert B., M.A. ............ Syracuse
Morrow, Jerry L., Ph.D. .......... Toledo

Assistant Professors:

Foley, Daniel, M.S.J. .................. Northwestern
White, Candace L., Ph.D. ............ Georgia

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

Graduate Courses

403 International Communications (3) (Same as African and African-American Studies 403.)

404 Environmental Communications (3) (Same as Public Relations 404.)

410 Historical Environment Communications (3) (Same as Public Relations 410.)

411 Theory of Mass Communication (3) (Same as Public Relations 411.)

412 Opinion Writing (3) Analysis of editorial positions, practices, and pages. Writing of editorials and columns for newspapers, magazines, and company publications: study and use of rhetorical devices and logic. Prereq: Writing for Mass Communication or consent of instructor.

414 Magazine Article Writing (3) Techniques of writing in-depth articles of mass circulation and specialized magazines. Organizing and presenting material, problems in specialized areas: business, science, agriculture, humanities. Prereq: Writing for Mass Communication or consent of instructor.

416 Issues in Journalism (3) Topics vary. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

420 Print Media Management (3) Current business practices among print media for newspapers, magazines, and company publications: study and use of rhetorical devices and logic. Prereq: Writing for Mass Communication or consent of instructor. May be repeated. Maximum 6 hrs.}

430 Public Affairs Reporting (3) Reporting and writing about courts, governments, and public agencies. Event and issue-oriented journalism of politics and public affairs. Prereq: Reporting, E.


444 Journalism as Literature (3) Study of writers from 17th century to modern era whose works have endured as both journalism and literature. Emerging genre called literary journalism: means of cultural reporting with personal narrative style. Prereq: Consent of instructor.

450 Writing About Science, Technology, and Medicine (3) (Same as Public Relations 450.)

451 Environmental Reporting (3) Writing for news media on such environmental issues as strip-mining, water pollution, air pollution, allergens, nuclear power, fossil fuel power, and solid wastes. Presentations from and interviews of experts in environmental and science reporting. Example popular literature in environmental reporting. Prereq: Editing majors; consent of instructor for non-majors.

455 Issues in Science Communications (3) Topics vary. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

456 Science Writing as Literature (3) Survey of important science writing for general public across spectrum of science, engineering, and medicine. Works by authors such as Arthur C. Clarke, Stephen J. Gould, and Richard Selzer. Analysis of literary qualities in quest to understand why some science writing succeeds. Prereq: Consent of instructor.


490 Advanced Photojournalism (3) Advanced principles and methods of black-and-white photography. Introduction to color photography. News and feature photography and photo essays. Prereq: Photojournalism or consent of instructor.


525 Public Opinion (3) Role of press in developing and influencing public consensus. Social theories of public opinion and analysis of mass media's role. (Same as Public Relations 525.)

535 Publications Management (3) (Same as Public Relations 535.)

550 Writing and Editing Projects (3) Specialized writing or editing interests: agriculture, politics, labor, finance, science; technical, general publications. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

580 Seminar in Visual Communication (3) Behavioral aspects of communication with images. Theories of psychological effect in color, shape, texture, and other design elements. Prereq: Editing or Advertising Creative Strategy or Electronic Field Production or equivalent.

590 Communications and International Development (3) Relationship between mass communications and development of nations. Role of communications media of developed nations in "Third World" regions of global communications as facilitator of international cooperation.
MAJORS

Communication, Literature and Media

The Language, Communication, and Humanities Education unit participates in graduate programs leading to degrees, majors, and concentrations in:

Master of Science Education
Track 1-Secondary teaching

Education Specialist

Education English education
Foreign language/ESL education

Doctor of Education

Education English/foreign language/ESL education

Doctor of Philosophy

Education English/foreign language/ESL education

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

The unit's mission is the preparation of teachers for instruction in art, foreign language, ESL, English, and secondary reading. The emphasis is on how these disciplines are taught in context of different cultures.

Art Education

GRADUATE COURSES

510 History and Philosophy of Art Education (3) United States from 1800's to present. Prereq: Consent of instructor.

520 Studies in Art Education (3) Issues and topics current to the field of art education. Prereq: Consent of instructor.

530 Production and Critical Analysis of Art (3) Relationship of production and critical analysis of works of art to discipline-based art education.

540 Instructional Materials and Production Related to the Teaching of Art (3) Development and use of instructional aids concerned with all aspects of teaching art: videotapes, audiocassettes, slides, charts, and learning pace.

590 Special Topics in Art Education (3-6) May be repeated. S/NC only.

597 Independent Study (3-6) May be repeated. Maximum 6 hrs.

598 Internship (3-6) Professional work in public relations supervised by communications manager with faculty approval. No retroactive credit for previous work experience. Prereq: Completion of core curriculum.

Public Relations

GRADUATE COURSES

412 Opinion Writing (3) (Same as Journalism 412.)

416 Issues in Public Relations (3) Topics vary. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

470 Public Relations Campaigns (3) Research, planning and implementation of public relations campaigns. Oral and written presentation of public relations projects from inception to completion. Extensive out-of-class work. Prereq: Public Relations Principles or equivalent. F,Sp

518 Seminar in Public Relations Issues (3) Topics vary. May be repeated. Maximum of 6 hrs.

520 Press-Government Relations (3) (Same as Journalism 520.)

525 Public Opinion (3) (Same as Journalism 525.)

571 Public Relations Management (3) Analysis and management of problems in communication between institutions and organizations and their publics. Measurement and evaluation of effectiveness of communication programs. Prereq: 470 or consent of instructor.

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

598 Internship (3) Professional work in public relations supervised by communications manager with faculty approval. No retroactive credit for previous work experience. Prereq: Completion of core curriculum.

Language, Communication, and Humanities Education

(College of Education)

MAJORS

DEGREES

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

Patricia Davis-Wiley, Leader

Professors:

Christensen, Mark A. (Emeritus), Ph.D., Kansas
Davis-Wiley, Patricia, Ed.D. ............... Houston
Hull, H. N., Ed.S. ............... Peabody
Watkins, J. Paul (Emeritus), M.S. .......... Tennessee

Associate Professor:

Hodge, R. L., Ph.D. ......................... Texas

The Language, Communication, and Humanities Education unit participates in graduate programs leading to degrees, majors, and concentrations in:

Master of Science Education
Track 2-Secondary teaching

Education Specialist

Education English education

Foreign language/ESL education

Doctor of Education

Education English/foreign language/ESL education

Doctor of Philosophy

Education English/foreign language/ESL education

See Education under Fields of Instruction for full description of all degree requirements.
The College of Law offers the Doctor of Jurisprudence degree program; a dual degree program with the College of Business Administration leading to the J.D. and the Master of Business Administration degree; and a dual degree program with the Department of Political Science, College of Arts and Sciences, leading to the J.D. and Master of Public Administration. In addition graduate students may be eligible to take a limited number of law courses to count toward a graduate degree.

Current information regarding admission, financial aid, course requirements, academic policies, extracurricular activities, and student services is available from the Admissions Office, The University of Tennessee, College of Law, 1505 W. Cumberland Ave., Knoxville, Tennessee 37996-1810. Completed application should be received before February 1 of the year of requested admission.

DEGREE OF DOCTOR OF JURISPRUDENCE

The degree of Doctor of Jurisprudence will be conferred upon candidates who complete, with the required average, six semesters of resident law study and who have 89 semester hours of credit, including all required courses. The required average is 2.0 and that average must be maintained on the work of all six semesters and also for the combined work of the grading periods in which the last 28 credit hours taken in residence were earned. Averages are computed on weighted grades.

Students interested in a concentration in advocacy and dispute resolution must take two courses in the following areas:

- Advocacy
- Mediation
- Arbitration
- Negotiation
- Simulation courses

Waivers may also be granted to students who have acquired the requisite business knowledge through other coursework or through practical experience.

Concentration in Advocacy and Dispute Resolution

Students interested in a concentration in advocacy and dispute resolution must complete all of the following courses:

813 Evidence
815 Introduction to Advocacy and Professional Responsibility
905 Advocacy Clinic
920 Trial Practice
921 Pretrial Litigation
922 Advanced Trial Advocacy
928 Case Development and Resolution

Students electing a concentration in advocacy and dispute resolution may not take any of the above courses on an S/NC basis.

DUAL J.D.-MBA DEGREE PROGRAM

The College of Law and the College of Business Administration offer a coordinated dual degree program leading to the conferral of both the Doctor of Jurisprudence and the Master of Business Administration degrees. A student pursuing the dual program is required to take fewer hours of coursework than would be required if the two degrees were to be earned separately.

Admissions

Applicants for the J.D.-MBA program must make application jointly, and be competitively and independently accepted by, the College of Law for the J.D. degree and The Graduate School and College of Business Administration for the MBA degree, and by the Dual Degree Committee. Students who have been accepted by both colleges may commence studies in the dual program at the beginning of any term subsequent to matriculation in both colleges provided, however, that dual program studies must be started prior to entry into the last 28 hours required for the J.D. degree and the last 16 hours required for the MBA degree.

Curriculum

A dual degree candidate must meet the graduation requirements of each college. Dual degree students withdrawing from the dual degree program before completion of both degrees will not receive credit toward graduation from either college for courses in the other college, except as such courses qualify for credit without regard to the dual degree program. For students continuing in the dual degree program, the J.D. and MBA degrees will be awarded upon completion of requirements of the dual degree program.

The College of Law will award a maximum of nine (9) semester hours toward the J.D. degree for acceptable performance in approved graduate-level courses offered by...
the College of Business Administration. Three of the 9 semester hours must be earned in Accounting 501, 503, or a more advanced accounting course.

The College of Business Administration will award credit toward the MBA for acceptable performance in a maximum of 9 semester hours of approved courses offered by the College of Law.

Except while completing the first year courses in the College of Law, students are encouraged to maximize the integrative facets of the dual program by taking courses in both colleges each year.

Awarding of Grades

For grade recording purposes in the College of Law for graduate business courses and in the College of Business Administration for law school courses, grades awarded will be converted to either Satisfactory or No Credit and will not be included in the computation of the student's grade average or class standing in the college where such grades are so converted.

The College of Law will award a grade of Satisfactory for a graduate business course in which the student has earned a B or higher and a No Credit for any lower grade. The College of Business Administration will award a grade of Satisfactory for a College of Law course in which the student has earned a C- or higher and a No Credit for any lower grade. Grades earned in courses of either college may be used on a regular graded basis for any appropriate purpose in the college offering the course.

Non-Law Elective Course Credit

Students enrolled in the J.D.-M.B.A degree program may not receive credit towards the J.D. degree for courses taken in other departments of the University except for those taken in conjunction with the dual program.

Note: Students are advised to consult the Graduate School's degree requirements as stated in the front section of this catalog as well as the requirements for this college.

DUAL J.D.-M.P.A. PROGRAM

The College of Law and the Department of Political Science in the College of Arts and Sciences offer a coordinated dual degree program leading to the conferred degree of both the Doctor of Jurisprudence and Master of Public Administration degrees. In this program, a student may earn the M.P.A. and J.D. degrees in about four years rather than the five years that otherwise would be required. Students pursuing the dual degree program should plan to be enrolled in coursework or an internship for one summer term in addition to taking normal course loads for four academic years.

Admission

Applicants for the J.D.-M.P.A program must make separate application to, and be independently accepted by, the College of Law for the J.D. degree and the Department of Political Science and The Graduate School for the M.P.A. degree. Applicants must also be accepted by the Dual Degree Committee. All applicants must submit a Law School Admissions Test (LSAT) score. An applicant's LSAT score may be substituted for the Graduate Record Examination (GRE) score, which is normally required for admission to the M.P.A. program. Applicants may be required to oral after matriculation in either the J.D. or the M.P.A. program, but application to the dual program must be made prior to entry into the last 29 semester hours required for the J.D. degree and prior to entry into the last 15 hours required for the M.P.A. degree.

Curriculum

A dual degree candidate must satisfy the requirements for both the J.D. and the M.P.A. degrees, as well as the requirements for the dual program. The College of Law will award a maximum of 9 semester hours of credit toward the J.D. degree for successful completion of approved advanced level courses (500 or 600 level) offered in the Department of Political Science. The M.P.A. program will award a maximum of 9 semester hours of credit toward the M.P.A. degree for successful completion of approved courses offered in the College of Law. All courses for which such cross-credit is awarded must be approved by the J.D.-M.P.A. coordinators in the College of Law and the Department of Political Science. All candidates for the M.P.A degree must successfully complete Administrative Law (Law 821) and are encouraged to take Local Government (Law 824). An internship is strongly recommended for students in the dual degree program, as it is for all M.P.A. candidates, but an internship is not required.

During the first two years in the dual program, students will spend one academic year completing the required first year of the College of Law curriculum and one academic year taking courses solely in the M.P.A. program. During those first two years, students may not take courses in the opposite area without the approval of the J.D.-M.P.A. coordinators in both academic units. In the third and fourth years, students are strongly encouraged to take both law and political science courses each semester. Dual degree students who withdraw from the program prior to completion of the requirements for either degree will not receive credit toward either the J.D. or the M.P.A. degree for courses taken in the other program except as such courses qualify for credit within regard to the dual program.

Awarding of Grades

For grade recording purposes in the College of Law and the Department of Political Science, grades awarded in courses in the other unit will be converted to either Satisfactory or No Credit and will not be computed in determining a student's GPA or class standing. The College of Law will award a grade of Satisfactory for an approved M.P.A. course in which the student earns a grade of B or higher and a grade of No Credit for any lower grade. The Political Science Department will award a grade of Satisfactory for an approved law course in which the student earns a grade of C or higher and a grade of No Credit for any lower grade. The official academic record of the student maintained by the Registrar of the University shall show the actual grade assigned by the instructor without conversion.

POLICY FOR GRADUATE STUDENTS TAKING LAW COURSES

Students pursuing a graduate degree in another college may, upon approval of the College of Law and the major chairperson, take up to 6 semester hours of law courses and receive credit toward the graduate degree. The graduate student must register for the law course during regular registration at the College of Law requesting an S/NC grade only. If a C or above is earned in a law course, an S will be recorded on the transcript. If a student earns below a C, an NC will be recorded, and the course cannot be used toward meeting degree requirements. Grades for law courses will not be reflected in the cumulative average. Law courses may be taken for credit only by students enrolled in a graduate degree program.

Different rules apply to the student enrolled in the Dual J.D.-M.B.A or J.D.-M.P.A. Programs. Grades must be earned according to the grading system of the respective college, e.g., numerical grades for law courses, letter grades for graduate courses. Refer to section on Grades for the grading scale acceptable toward meeting degree requirements.

Cumulative GPA of a law-only degree will only be carried until graduation, at which time both the graduate and the law cumulative will be shown on the permanent record.

PROFESSIONAL COURSES

801 Civil Procedure I (3) Binding effect of judgments; selecting proper court (jurisdiction and venue); ascertaining applicable law, and federal and state practice.


803 Contracts I (3) Basic agreement process and legal protections afforded contracts; offer and acceptance, consideration and other bases for enforcing promises; the Statute of Frauds, unconscionability and other controls of promissory liability. Introduction to relevant portions of Article 2 of the Uniform Commercial Code.

804 Contracts II (3) Continuation of Contracts I. Issues arising from contracts: formation, estoppel, breach, good faith; conditions, impracticability and frustration of purpose; remedies; third party beneficiaries; assignment and delegation. Consideration and coverage of Article 2 of the Uniform Commercial Code with respect to remedies, anticipatory repudiation, impracticability and good faith.

805 Legal Process I (3) Lawyer-like use of cases and statutes in prediction and persuasion. Analysis and synthesis of common-law decisions; statutory interpretation; fundamentals of expository legal writing and legal research.

806 Legal Process II (3) Continuation of Legal Process I. Formal legal writing, appellate procedure, and oral advocacy.

807 Torts I (3) Intentional torts; defenses and privileges related to intentional torts; negligence: standard of care, professional malpractice, and liability of owners and occupiers of land; defenses based on plaintiff's conduct; contributory and comparative negligence, assumption of risk, failure to take precautions, and avoidable consequences; causation, proximate cause; duty rules; and questions of liability and several or several liability.

808 Torts II (3) Vicarious liability and related concepts; strict liability for dangerous activities and abnormally dangerous activities; products liability; nuisance, defamation and invasion of privacy; economic torts: misrepresentations and intentional interference with economic opportunity; immunities: those of government, governmental employees, charities and family members, and damages.

809 Criminal Law (3) Substantive aspects of criminal law; general principles applicable to all criminal conduct; specific analysis of particular crimes; defenses to crimes.
The Leadership Studies in Education unit participates in graduate programs leading to degrees, masters, and concentrations in: Master of Science

Leadership Studies in Education
Educational administration and supervision

College Student Personnel
Specialist in Education

Education
Educational administration and supervision

Doctor of Education
Education
Leadership studies (educational administration and supervision; higher education)

Doctor of Philosophy
Education
Educational administration and supervision/higher education

See Education under Fields of Instruction for full description of all degree requirements. The Leadership Studies unit focuses on the preparation and development of administrative and instructional leaders who will serve in diverse settings of schools and colleges, community and human service agencies, adult and continuing education organizations, and educational units of government and corporate organizations.

The unit offers an alternative approach to residence for the Doctor of Education degree program. This alternative residence involves, among other requirements, a two-year, on-campus, continuous enrollment in Leadership Studies 606, Leadership Forum. Interested students should contact the unit for further information.

The annual admission deadline is March 15 for the Ed.S. and doctoral programs, and November 1 and March 15 for the master's program.

ADMISSION REQUIREMENTS

General test of the Graduate Record Examination; writing sample if GRE verbal is below 50th percentile; leadership potential judged by activities in organizations; and rating forms or letters of recommendation. The Ed.D. applicant must also interview with all faculty members on campus or elsewhere.

Educational Administration and Supervision

GRADUATE COURSES

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

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

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

529 Politics of Education and Educational Environments (3) School/community relations in political context of modern, mass society. Concepts and supervisory competencies: political, social, ethnic, cultural, and regional environments in which schools operate. Prereq: M.S. introductory core or consent of instructor. F, Su

535 Administrative Applications of Micro Computers (3) DOS, word processing, data management, spreadsheet 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 legal management tasks and procedures in individual school setting. Prereq: M.S. introductory core or consent of instructor. F, Su

547 Educational Facility Planning (3) Concepts and skills for development, evaluation, construction, renovation, maintenance, and operations of educational environments and facilities. Prereq: M.S. introductory core or consent of instructor. F, Su

554 Introductory Supervision and Personnel (3) Basic supervisory and personnel concepts and related competencies; building human relations (or micro-organizational) level: interviewing, personnel planning, recruiting, and organizing employee information, supervision of instructional and non-instructional personnel, staff evaluation, and staff development. Prereq: Introductory M.S. core or consent of instructor. Sp, Su

553 Strategies of Educational Planning (3) Processes for improving decision-making function through use of both quantitative and qualitative planning techniques. Policy analysis, CPM,PERT, Delphi. Prereq: Introductory M.S. core or consent of instructor. F, Su

554 School Law (3) Legal arrangement of case and statutory materials for public school administrators and teachers; problems of law and public education. Prereq: M.S. introductory core or consent of instructor. F

580 Internship in Educational Administration (3) Field experience in appropriate educational setting working directly with administrator. Art of planned program of study. Placement by department assignment. Some on-campus classes in conjunction with 583 or 582. Prereq: 21 hrs in educational administration and supervision or consent of instructor. F

582 Educational Leadership and District-Level (3) Roles of central administrative team; relationships, behaviors, concepts and competencies for developing and maintaining effective school organization. Prereq: planned program of study. Prereq: 21 hrs in educational administration and supervision or consent of instructor. F, Su

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

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

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

595 Elementary Principals Seminar (1-3) For in-service training of elementary school administrators. Development of problems, programs, and trends of elementary schools and management skills of elementary school administrators. Prereq: Presently elementary school administrator or consent of instructor. May be repeated. SNC or letter grade. F, Sp

596 Middle School Principals Seminar (1-3) For in-service training of middle school administrators. Development of problems, programs, and trends of middle schools and management skills of middle school administrators. Prereq: Presently middle school administrator or consent of instructor. May be repeated. SNC or letter grade. F, Sp

604 Seminar in Educational Administration and Supervision (1) Current educational issues, problems and research. Required two consecutive semesters during doctoral residency. May be repeated. SNC only. E

605 Advanced Seminar in Administrative Theory (3) Interdisciplinary seminar. Readings selected by faculty for research and scholarly value from current classic and contemporary educational studies and periodical literature in administrative and organizational theory. Required of Ph.D. students in education. Prereq: Doctoral student in education.

610 Internship in Educational Administration (3) Opportunity for doctoral students and advanced graduate students to gain experience in performance of critical tasks of educational administration under supervision of practitioner and university representative. May be repeated at discretion of student's committee. Maximum 12 hrs. SNC only. E

614 Statistical Methods for School Administrators (3) Descriptive and experimental research methods, parametric and non-parametric statistical techniques used in research in educational settings. F

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

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

629 Seminar in Political Leadership in Education (3) Political theories and practices as they affect the operation of public school systems and higher educational institutions. Interdisciplinary discussions of community power structures, special interest groups, based on literature and research from education, sociology, and political science. Field inquiry. Prereq: 529, 516 or equivalent or consent of instructor. F

644 Educational Finance and Business Management (3) Contemporary financial policies and their influence upon education, nation and citizens. Superintendent team concept, management of school logistical services. Prereq: 544 or consent of instructor. F, Su

646 School Personnel Administration (3) Personnel administration functions for professionals and supporting staff in educational organizations. Recruitment, selection, placement, personnel policies, employee wage and salary administration, fringe benefits, collective negotiations, human relations, staff development, and staff evaluation. Prereq: 546 or consent of instructor. F, Su

655 State-Federal Relations in Education (3) Interrelations of federal, state, and local responsibilities and organizations for education by analysis of traditional, fiscal, and functional aspects of educational partnerships. Funding partnerships; discussion of funding proposal development processes. Prereq: 516. Sp

656 Legal Foundations of Public Education (3) School law; constitutional foundations as they relate to public education at state and local levels. F, Su

658 Conflict Management (3) Social conflict and its management. Causes of interpersonal, intergroup, and organizational conflict, and strategies and skills used to manage conflict, conflict management models associated with different sectors of human activity, and current organizational practices for managing destructive conflict. F

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

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

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

Higher Education

GRADUATE COURSES

530 Special Topics (1-3) May be repeated. E
Leadership Studies

GRADUATE COURSES

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

502 Registration for Use of Facilities (2-15) 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


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

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

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

606 Leadership Forum (2) Development of research, evaluation, policy analysis skills and critical analysis and evaluation of philosophical principles underlying American education. Continuous enrollment for 2 years, on-campus, for students in Ed.D. alternative residence program. May be repeated. Maximum 12 hrs. S/NC only. E

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

Life Sciences

(College of Arts and Sciences)

MAJOR

W.F. Harris, Chair

Coordinating Council:

Schwarz, O.J., Plant Physiology and Genetics
Harris, W.F., Biotechnology.

The programs leading to the M.S. and Ph.D. degrees in Life Sciences are interdepartmental and intercollegiate and are designed to augment offerings of individual departments in the following concentrations: biotechnology, M.S. only, and plant physiology and genetics. Students interested in these areas should contact either the Life Sciences chairperson or the director of the area of interest. Each program is overseen by a committee and may have unique admission requirements.

ADMISSION REQUIREMENTS

1. A Bachelor's degree with a major in a biological, environmental, or physical science.
2. GRE (general) scores.
3. Three letters of recommendation.
4. Coursework including a year of calculus (differential and integral), one year of chemistry, and a year of physics. Specific course deficiencies may be corrected during the first year.

DEGREE REQUIREMENTS

The master's degree requires a minimum of 30 semester hours of study approved by the student's committee, a thesis, and an oral examination. Within the biotechnology program only, a non-thesis M.S. option is available. Students choosing this option are expected to complete: (1) two summers' co-op experience in an appropriate industry. An evaluation by supervisor and a written report are required (529, Biotechnology Practicum Cooperative Experience, maximum 4 hrs.). (2) A written report in the form of a scientific paper in an area of specialization chosen by the student and advisor. The minimum requirements for the doctoral degree include at least 6 hours above the 600 level, 24 semester hours of course 600, a pattern of courses approved by the student's committee, a comprehensive examination, a doctoral dissertation, and a defense of dissertation. Individual programs may have additional requirements.

CONCENTRATIONS

Biotechnology (M.S. only)
The biotechnology program will prepare students to participate in the wide variety of opportunities presented by the use of living cells and their components for the production of useful materials. This will be achieved at the M.S. level by a prescribed course of study of the biology and biochemistry of cells and molecules; by formal study of cells and of engineering aspects of biotechnology; and by the development of special expertise in areas such as animal embryo manipulation, automated chemical synthesis of macromolecules, bioprocess engineering, bioprocessing and biotransformations, liposomes, microscopy and image processing, monoclonal antibodies and hybridoma technology, plant tissue culture, recombinant DNA technology and risk assessment and modeling. The production of a research thesis or examination of the student's coursework plus an area of specialization will also be an important part of the training experience.

Required courses are Life Sciences 509, 511, 512, 531, 532; Biochemistry and Cellular and Molecular Biology 511; Microbiology 410, Botany 451; Chemical Engineering 475; and Ecology and Evolutionary Biology 507.

Plant Physiology and Genetics
This program provides the opportunity for intensive training and research experience in areas transcending the usual boundaries of botany, biochemistry, and agricultural plant sciences. It devotes itself to seeking solutions of problems concerning the interactions of physiology and genetics in applied and fundamental aspects of plant science.

Required courses are Life Sciences 510; Botany 521, 522; Biochemistry and Cellular and Molecular Biology 511, 512; Plant and Soil Science 471 or Ecology and Evolutionary Biology 560; Plant and Soil Science 552; Microbiology 410.

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

509 Biotechnology Seminar (1-2) Topics of importance to biotechnology. May be repeated. Maximum 6 hrs.

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

511 Advanced Cellular Biology (3) Cell structures and functions at molecular and supramolecular level. Membrane structure, function, and biogenesis; cellular communication; receptors and membrane flow; growth regulation and oncogenesis; plant cell structure and function; cell motility and morphology; mitosis and meiosis; blood and immune cells.

512 Advanced Molecular Biology (4) (Same as Biochemistry and Cellular and Molecular Biology 512.)
Logistics

See Marketing, Logistics and Transportation

Management

(College of Business Administration)

MAJOR DEGREES

Business Administration .............. MBA, Ph.D.

Oscar Fowler, Head

Professors:

Boiling, Ronald W. (Emeritus), Ph.D. .......... Stanford

Dewhurst, H. Dudley, Ph.D. .................. Texas

Gilbert, Kenneth C., Ph.D. ................. Tennessee

Hake, David A., Ph.D. ....................... Tennessee

James, Lawrence R. (Pilot Chair of Excellence), Ph.D. .... Utah

Keally, A. H. (Emeritus), MBA, MBA .... Pennsylvania

Ladd, Robert T., Ph.D. ...................... Georgia

Larsen, John M., Jr., (Emeritus), Ph.D. .... Purdue

Miller, Alex (W. B. Stokely Prof.), Ph.D. ... Washington

Niel, C. Warren, Ph.D. ....................... Alabama

Reese, Don (Emeritus), Ph.D. ............... Iowa

Russ, Michael C., Ph.D. ..................... Akron

Russell, Joyce E. A., Ph.D. ................. Akron

Srinivasan, M. M., Ph.D. ................... Northwestern

Stahl, Michael J., Ph.D. ..................... Pennsylvania

Vance, S. C. (Emeritus) (W.B. Stokely Prof.), Ph.D. .... Pennsylvania

Wagoner, George A. (Emeritus), M.S. .... Indiana

White, F. G. H. (Emeritus) (Distinguished Prof.), Ph.D. ...... Tennessee

Associate Professors:

Bowers, Melissa R., Ph.D. ................. Clemson

Dean, Thomas J., Ph.D. ..................... Colorado

Edirisinghe, Chanaka P., Ph.D. .......... British Columbia

Fowler, Oscar S., Ph.D. ..................... Georgia

Fryxell, Gerald E., Ph.D. .................... Indiana

Judge, William Q., Ph.D. ................. North Carolina

Maddox, Robert C., Ph.D. ................. Texas

Noon, Charles E., Ph.D. ..................... Michigan

Assistant Professors:

Clelland, Ian J., Ph.D. ................. Southern California

BUSINESS ADMINISTRATION

CONCENTRATIONS

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


Minimum course requirements for management—Three courses from the following: 511, 521, 522, 541, 542, 551, 571, 581, 593.

Business Administration 510, 599. Selection must be approved by the Management Department MBA advisor. For forest industries management—511; Forestry 580, 585. For environmental management—581 plus two approved courses from the following list: Chemical Engineering 581; Economics 677, 678; Agricultural Economics 570; Sociology 560, 665; Law 686, 867; Geography 577. For manufacturing management—541, 542.

Management Science 526, and an Industrial Engineering/Management Science course approved by designated faculty. Industrial Engineering 524 or Management Science 541 are recommended.

Additional courses may be accepted subject to approval by the Management Department Chairperson or designated faculty.

Ph.D. Concentration: Management

Minimum course requirements are: For operations management—541 and 542; two semesters of 640 (may be repeated for credit); one additional semester of approved doctoral seminar work. For strategic management—610, 611, 612, 613.

MINOR IN ENVIRONMENTAL POLICY

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

GRADUATE COURSES

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

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

511 Organizational Theory: Integrated Structure and Behavior (3) Cases, group projects, discussion, organizational theories, organizational effectiveness; contextual factors of organizations; environment, size, technological, organizational structure, design; sources of organizational effectiveness; motivation, leadership, group behavior, intergroup relations, organization change and development.

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

531 Management of Technology-Based Organizations (3) Role of technology and innovation in formulation and implementation of strategy. Management of research and development function and coordination with other functions. Management of scientists and engineers.

541 Operations Management I (3) Techniques applicable to design of systems in operations function.

542 Operations Management II (3) Operations planning and control function. Application of models to real-world systems.

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

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

581 Environmental Management (3) Management frameworks for addressing environmental issues. Most pressing environmental challenges; options compatible with sustained business performances. Cases, field projects, research papers.

593 Directed Independent Study (1-3) Topic of mutual interest. Available only by prearrangement with supervising faculty member. May be repeated. Maximum 6 hrs. S/N/C or letter grade.

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

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

601 Research Methods (3) Seminar covering broad range of issues; research process as applied to study of strategic management. Literature and examples of research. Research proposal.

610 Seminar in Advanced Organization Theory (3) Analysis of functioning of complex organizations. Classical and open systems models, organization growth and change, organizational effectiveness and design of complex organizations.

611 Seminar in Strategic Management I (3) Analysis of concepts and research in strategic management.

612 Seminar in Strategic Management II (3) Analysis of concepts and research in strategic management.

613 Seminar in Strategic Management III (3) Review and analysis of important books and monographs in strategic management. Understanding evolution of thought and emergence of distinct paradigms.

Management Science

(College of Business Administration)

MAJORS DEGREES

Management Science .......... M.S., Ph.D.

M. M. Srinivasan, Chairperson

Committee Members:

Bowers, Melissa R., Management; Bozdogan, Hamparsum, Statistics; Edirisinghe, Chanaka F., Management; Fowler, Oscar S., Management; Gilbert, Kenneth C., Management; Leithaker, Mary G., Statistics; Noon, Charles E., Management; Pasierb, Bruce A., Geography; Srinivasan, M. M., Management.

THE MASTER'S PROGRAM

The M.S. program in Management Science is designed as preparation for a career in the application of quantitative techniques for the solution of complex problems. The program's flexibility also makes it appropriate as preparation for doctoral study in Management Science.

Management Science coursework will expose students to both the theoretical development of quantitative techniques and their application to managerial decision making. In addition to the development of sufficient mathematical maturity for creative use of
quantitative skills, the program requires concentrated study in a supporting area.

Supporting areas are available in other departments of the College of Business Administration as well as in computer science, public administration, geography, health, and other areas, subject to approval by the Management Science Committee.

Admission Requirements

The master's program requires three applicant recommendation forms and the GRE or GMAT. Applications are encouraged from all majors, but a mathematics background is equivalent to the completion of at least two years of college calculus and proficiency in a computer language is required. The program is designed to be completed by four semesters by full-time students. However, students may start the program in any semester and may pursue an M.S. degree program in Management Science on a part-time basis.

Course Requirements

Hours

Core Requirements

Management Science 531, 532, 533, 534, and 691 or 692
Statistics 563
Applied specialization area (approved by advisor)

Technical elective:

Statistics (500 level or above as approved by advisor)
Mathematics (400 level or above as approved by advisor)
Industrial Engineering (400 level or above as approved by advisor)
Other elective (as approved by advisor)

Electives selected from mathematics, statistics, computer science, business, management science, industrial engineering, or other approved area

Total

40

A thesis option is available to qualified students. The Management Science Committee will work closely with the student in tailoring a program to his/hers needs. The committee must approve a tentative overall program during the student's first semester and must approve all courses on a semester-by-semester basis.

Recognizing the diverse backgrounds and needs of Management Science M.S. students, the Management Science Committee is prepared to waive some of the above requirements on an individual basis. The total course load will remain 40 hours for all students.

THE DOCTORAL PROGRAM

The Ph.D. program in Management Science is designed to prepare students for research related to the application of mathematical tools to complex decision making. Three primary objectives of the program are:

1. to provide, through management science coursework, a thorough knowledge of common Management Science/Operations Research mathematical models and their uses
2. to provide an interdisciplinary study in a supporting area to qualify the graduate for a joint faculty position in the supporting area and management science. The candidate may choose from the business functional areas (accounting, finance, marketing, management, and transportation and logistics) or other disciplines, (e.g., computer science, forestry, ecology, and public administration)
3. to develop in the student, through coursework in mathematics, statistics and computer science, a high degree of mathematical maturity to enhance a potential career in management, research, or teaching.

Admission Requirements

The doctoral program requires three applicant recommendation forms and the GRE or GMAT, in addition to The Graduate School's requirements.

Coursework

A minimum of 48 semester hours of coursework taken for graduate credit (exclusive of thesis or dissertation) is required. Some of this may be the coursework from a master's program although a master's is not a prerequisite for the doctorate. The candidate must complete a minimum of 24 semester hours at The University of Tennessee, Knoxville, at least 6 of which must be at the 600 level. Both of these requirements are also exclusive of thesis or dissertation credits. Entering students who have completed graduate studies in applicable fields will be granted course credits for work which is equivalent to required courses in the program.

The program includes approximately 16 to 20 semester hours of coursework in the applied area.

Qualifying Examinations

The student must demonstrate mastery of probability theory and statistical inference, Statistics 563, 564, by passing a written qualifying examination.
Mastery of 12 to 14 semester hours in mathematics coursework must be demonstrated by passing a written qualifying examination. Topics normally include numerical analysis, either Mathematics 471, 472, 453, and 571, or 571-572, and real analysis, Mathematics 445-446. Other options may be approved. In exceptional circumstances, the faculty will consider waiving the mathematics and/or statistics qualifying examinations.

These requirements generally are completed by the end of the first year of the program.

There is no foreign language requirement.

Comprehensive Examination

Prior to admission to candidacy for the degree, and normally after completion of the second year of the program, the student must pass a written comprehensive examination covering the theory of deterministic and stochastic management science models. Topics included in this examination are determined on an individual basis. Students will be expected to demonstrate an integrative ability that goes beyond simple mastery of course content.

Research and Dissertation

The student must complete 24 semester hours of Management Science 600: Doctoral Research and Dissertation, through which he/she is expected to make a significant contribution to the science. A final oral examination is conducted over the dissertation and such other segments of the program that the faculty committee deems appropriate. This effort, which is beyond the minimum 48 hours of coursework, normally is completed in the third year of the program.

ACADEMIC STANDARDS

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

PREREQUISITES FOR MANAGEMENT SCIENCE COURSES

The Management Science Program is interdisciplinary and students in other degree programs are encouraged to enroll in management science courses. Course prerequisites are designed to indicate the level at which courses are taught. Interested students whose prior coursework does not match the prerequisites are encouraged to seek the instructor's guidance and consent to enroll.

GRADUATE COURSES

500 Thesis (1-15) P/NP only. E
502 Registration for Use of Facilities (3-15) 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
526 Systems Modeling and Simulation (3) (Same as Industrial Engineering 526.)
531 Mathematical Programming (3) Linear programming solution procedures, duality, sensitivity, and parametric analysis, linear- fractional, piecewise-linear, separable and integer programming, transportation linear programs. Prereq: Fundamentals of matrix algebra. (Same as Industrial Engineering 523.)
532 Stochastic Models in Management Science (3) Discrete-time Markov chains, Poisson processes, continuous-time Markov chains, renewal theory, and queuing theory. Prereq: Statistics 563 and Mathematical Analysis or consent of instructor. Sp
533 Computational Mathematical Programming (3) Computational aspects of mathematical programming models, in particular for large systems. Prereq: 531 and proficiency in computer language.
534 Management Science Methods in Business (3) Application of methods from 531, 532, and 533 to real world problems in business/industry.
593 Management Science Problems (1-6) Directed study on subject of mutual interest. E
600 Doctoral Research and Dissertation (3-15) P/NP only. E
621 Network Flows (3) Treatment of network optimization algorithms, transportation and transshipment models and primal-dual and primal-based tree methods. Prereq: 531 or equivalent.
631 Integer Programming (3) Theoretical and computational aspects of linear programming with integer variables, branch and bound, cutting plane, and group theoretic algorithms. Prereq: 531 or equivalent.
Marketing, Logistics and Transportation

(College of Business Administration)

MAJOR DEGREES

Business Administration................. MBA, Ph.D.

David W. Schumann, Head

Professors:

Barnaby, D. J., Ph.D.......................... Purdue
Cadotte, E. R., Ph.D.......................... Ohio State
Davis, F. W., Jr., Ph.D......................... Michigan State
Dicer, G. N., DBA............................. Indiana
Frye, J. L. (Emeritus), Ph.D.................. Florida
Hendrix, F. L. (Emeritus), Ph.D............. North Carolina
Holcomb, M. C., Ph.D........................ Georgia State
Langley, C. J. (Dove Prof.), Jr., Ph.D........ Penn State
Mundy, R. A. (Taylor Prof.), Ph.D............ Pennsylvania State
Schumann, D. W., Ph.D....................... Missouri
Woodruff, R. B. (Prollatti's Prof.), DBA... Indiana

Associate Professors:

Dabholkar, P. A. (Liaison), Ph.D.............. Georgia State
Fogg, J. H. (Liaison), Ph.D..................... Indiana
Gardill, S. F., Ph.D........................... Houston
Holcomb, M. C., Ph.D........................ Tennessee
Reitzenstein, R. C., Ph.D...................... Cornell
Rentz, J. O., Ph.D............................. Georgia

Assistant Professor:

Moon, M. A., Ph.D......................... North Carolina

BUSINESS ADMINISTRATION CONCENTRATIONS

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

MBA Concentration: Logistics and Transportation, Marketing.

Minimum course requirements for logistics and transportation—501, 508, and one course from the following: 504, 506, 507, 593, and 599. For marketing—511 and 512.

Ph.D. Concentration: Logistics and Transportation, Marketing.

Minimum course requirements for logistics and transportation—12 hours to include 601, 602, 603, 604, 605, 606. For marketing—12 hours from among the following courses: 601, 602, 603, 604, 605, 606.

Marketing

GRADUATE COURSES

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered for use of facilities during any semester when student is not registered during any semester when student is not permitted to request registration if student is not permitted to request registration. May be repeated. E

503 Business Administration 504 and 505 or consent of instructor.


505 Marketing Research and Information Planning (3) Development of a rigorous marketing study from inception to implementation of results by recognizing key decision points and critically evaluating merit of research project. Prereq: Business Administration 504 and 505 or consent of instructor.

506 Marketing Strategy (3) Integration of concepts and analytical skills from each component area of marketing to formulate cohesive, well-organized marketing programs. Prereq: Business Administration 504 and 505 or consent of instructor.

507 Global Marketing (3) Strategic issues related to international and multi-national marketing operations. Prereq: Business Administration 504 and 505 or consent of instructor.

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

511 MBA Marketing Concentration I (6) Determination of customer value. Principles of consumer behavior, marketing research, and building customer value. Prereq: Business Administration 504 and 505 or consent of instructor.

512 MBA Marketing Concentration II (6) Delivery of marketing research. Communication of customer value, marketing strategy, and providing customer responsive organizations. Prereq: Business Administration 504 and 505 or consent of instructor.

513 Independent Study (3-6) Directed research and study. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

599 Special Topics Seminar in Logistics and Transportation Strategy (3-6) Seminar designed to study specific current problem areas in logistics and transportation strategy. Topic announced prior to offering. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

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

601 Marketing Theory (3) Nature and scope of market- ing, role of theory development and theory testing important to marketing research.

602 Research Methods (3) Research process: problem formulation, research and experimental design, measurement and implementation of results. Development of experimental design, survey research, and measurement.

603 Marketing Thought (3) Marketing literature across number of research areas. Evaluate individual works, develop state of research in each area, and identify areas that merit further study.

604 Seminar in Buyer Behavior Research (3) Behavioral study of people in their roles as buyers and users of goods and services both individual and group processes.

606 Special Topics (3) Topics vary: marketing strategy, advanced consumer behavior, influence and persuasion, theory and strategy, pricing issues, international marketing issues, and nonprofit organization marketing issues.

Logistics and Transportation

GRADUATE COURSES

501 Survey of Logistics and Transportation (3) U.S. logistics and transportation: physical, economic, social, and political environment; financing, managing, maintaining, and enhancing U.S. transport infrastructure.

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student is not permitted to request registration. May be repeated. E

504 Freight Carrier Systems and Management (3) Analysis of freight carrier management's efforts to provide services demanded by consumers in logistics and transportation marketplace.

506 Logistics Systems Management (3) Development of strategy for management of logistics systems, Executive level integration of logistics operations with marketing, production, and other decision areas. Practical applications through case approach and simulation game.

507 International Logistics and Transportation (3) Logistics strategy in the multi-national firm: materials management, international sources and distribution, and international logistics. Issues: international carrier management and operations and comparative national transport systems analysis.

508 Executive-In-Residence Seminar in Logistics and Transportation Strategy (3) Capstone, integrative case course in logistics and transportation strategy. Participation in Executive-In-Residence program that provides student interaction with top-level logistics and transportation executives.

593 Independent Study (3-6) Directed research and study. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

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

601 Seminar in Logistics and Transportation Models (3) Analysis of contemporary models and methodologies in logistics and transportation research, topical coverage at discretion of instructor.

602 Seminar in Evolution of Logistics Thought (3) Traces evolution of logistics and transportation thought: dynamic development of principles and tools developed as organizational missions and environmental change. Economic and policy issues particular to transportation and other service organizations.

603 Research Methodology in Logistics and Transportation (3) Various research methods used in logistics and transportation research, topical coverage at discretion of instructor.

Materials Science and Engineering

(College of Engineering)

MAJORS DEGREES

Metallurgical Engineering ............... M.S., Ph.D.
Polymer Engineering ..................... M.S., Ph.D.

Joseph E. Sproull, Head

Professors:

Brooks, C. R., Ph.D....................... Tennessee
Non-Thesis Option

Under certain conditions, a candidate may apply for a non-thesis option. To be eligible, the 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. A departmental faculty meeting will consider each application individually. Upon acceptance, a supervisory committee of three will be appointed, at least two being from the Department of Materials Science and Engineering. The requirements for completion of the non-thesis option are as follows:

1. A total of at least 35 hours in graduate courses in metallurgical engineering, polymer engineering and related areas. The minimum requirements are 21 hours in the Department of Materials Science and Engineering and up to 12 hours in other engineering or science courses. The candidate's degree program must be approved by the faculty committee.

2. Satisfactory completion of a critical review of the literature in an area related to metallurgical, polymer or materials engineering (580).

3. Satisfactory performance in an oral examination to be conducted by the faculty committee and covering the review paper and other areas of metallurgical or polymer engineering.

THE DOCTORAL PROGRAM

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

Department requirements consist of the satisfactory completion of:

1. Graduate courses in materials science and engineering amounting to approximately 24 semester hours, at least 6 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, usually given in two parts, and covering such topics as materials science and engineering, metallurgical or polymer engineering operations and processes, thermodynamics, technology, mathematics, physics, and engineering.

4. Active participation in graduate seminars conducted by the department. Resident students must register for the appropriate 503 or 504 every semester offered.

ACADEMIC COMMON MARKET

An agreement among southern states for shared graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The Ph.D. program in Metallurgical Engineering is available to residents of the state of Virginia. The M.S. and Ph.D. programs in Polymer Engineering are available to residents of Kentucky, Virginia, and West Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.
561 Inorganic Glass Forming Systems (3) Physical and chemical nature of inorganic glasses, structural theories of glass formation; major glass forming systems: silic, other oxide glasses, nitrate glasses, water glasses, and chalcoxenide glasses. Prereq: 360, Chemistry 371.

562 Experimental Mechanics of Composite Materials (3) (Same as Engineering Science 582.)

571 Electron Microscopy (3) Operation of electron microscope; kinematical and dynamical diffraction theories; structure determination; analysis of lattice defects. Prereq: 405 or equivalent.

572 X-Ray Diffraction (3) Symmetry of crystals, space group theory, reciprocal lattice and application to definition of structures; powder and single crystal x-ray techniques; introduction to crystal structure determination; characterization of orientation; application to inorganic, metallic and polymer structures.

574 Formability of Materials (3) Modeling and analysis of finite plastic strain with application to primary and secondary forming operations; multiaxial and nonlinear materials; flow localization, instability, predictive testing. Prereq: Consent of instructor.

576 Special Topics in Materials Science and Engineering (3) Topics of current significance and interest. Prereq: Consent of instructor. May be repeated.


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

523 Plastic Deformation of Metals (3) Geometry and mechanisms of single crystal plastic deformation, slip, twinning, and cleavage, work hardening, effect of temperature, leading to dislocations; effect of ordering; solid solution alloys; polycrystalline behavior in terms of single crystal deformation mechanisms; texture formation. Prereq: 301, 320 or consent of instructor.

524 Metallurgical Thermodynamics (3) Applications of chemical thermodynamic principles: refining, oxidation, surface treatments, alloy systems. Prereq: 570 or equivalent.

525-26 Welding Metallurgy (3,3) Welding processes: physical metallurgy of welding; phase transformations; heat flow; residual stresses; theories of cracking and porosity formation; applications to process utilization.

528 Ceramic Matrix Composites: Material and Mechanics (3) (Same as Engineering Science 528.)

529 Diffusion in Solids (3) Phenomenon and atomic mechanisms of diffusion in solids. Solution and applications of diffusion equations; random walk problems and mechanisms of diffusion; diffusion in dilute and concentrated alloys; Kirkendall effect; high diffusion paths.

530 Phase Transformations in Metallurgical Materials (3) Thermodynamics of phase equilibrium; theory of nucleation in solids; kinetics and morphology of diffusion controlled growth; kinetics of interface controlled phase transformations, solidification, polycrystal and single crystal transformations.

531 Advanced Corrosion (3) Analyses of corrosion processes in terms of polarization measurements and Pourbaix diagram. Influence of environmental and mechanical factors contributing to pitting, crevice, fretting, wear, fatigue and stress corrosion. Prereq: 470 or consent of instructor.


540 Basic Polymer Chemistry (3) Synthesis, reactions and degradation of polymers. Molecular characterization: solution methods and spectroscopy. Prereq: Semester of organic chemistry and thermodynamics or equivalent.

541 Fluid Mechanics and Polymer Processing (3) Navier-Stokes equations and illustrative problems; applications in chemical engineering and polymer engineering: packed and fluidized beds, multiphase systems. Basic concepts in rheology; applications in polymer processing: screw extruder, fiber spinning, injection molding. (Same as Chemical Engineering 541.)

542 Further Topics in Polymer Processing (3) Description and analysis of selected polymer processing operations. Prereq: 541.


544 Polymer Solution Thermodynamics and Characterization (3) Theories of polymer solutions, statistical thermodynamics, chain statistics and behavior of macromolecules: viscosity, light scattering and osmotic pressure. Prereq: Undergraduate physical chemistry.

546 Mechanical Properties of Solid Polymers (3) Types of mechanical behavior: Hookian and rubber elasticity, plastic deformation; fracture; linear and nonlinear behavior; dynamic mechanical behavior and testing; loss tangent; experimental methods. Introduction to mechanical properties of polymeric composites.

549-50 Laboratory Methods in Polymer Engineering (1,2) Basic experimental techniques and instrumentation associated with characterization, x-ray and light scattering, calorimetry, rheometry, mechanical properties of solid polymers and rubber processing operations. Coreq: 540 or consent of instructor. 549-SNC only.

560 Principles of Ceramic Processing (3) Treatment of ceramic processing; raw material preparation and characterization; powder consolidation; drying, firing, sintering techniques, mechanisms and kinetics. Prereq: 360 or equivalent.

Mathematics

MAJOR

Mathematics ........................................ M.M., M.S., Ph.D.

642 Advanced Topics in Polymer Processing (3) Application of theories of rheological behavior and structural development to analysis of polymer processing operations. Prereq: 541. (Same as Chemical Engineering 642.)

643 Phase Transformations in Polymers (3) Glass transition and glassy state; annealing of polymeric glasses; crystallization of polymers; nucleation, growth and morphology; secondary nucleation theory; solidification of copolymers; crystallization under stress. Prereq: 543.

671 Quantitative Microscopy (3) Principal acoustic, optical, x-ray, neutron, electron and field-ion techniques for examination of microstructures of materials. Prereq: 405.

676 Advanced Topics in Materials Science and Engineering (3) Latest developments and/or advanced special topics. Prereq: Consent of Instructor. May be repeated.

678 Seminar in Recent Advances in Materials Science and Engineering (3) Directed and independent study of advanced topics. Prereq: Consent of Instructor. May be repeated.
least 6 hours of resident graduate credit in courses numbered above 400 and approved by both the major department and the Department of Mathematics.

For additional information, please visit the graduate website on the Department of Mathematics’ homepage at www.math.utk.edu.

THE MASTER OF MATHEMATICS PROGRAM

Before admission to the Master of Mathematics program, the applicant must have either (a) certification for teaching secondary mathematics in at least one state, or (b) three years of elementary school, secondary school, or community college teaching experience. Applicants must have successfully completed one year of calculus (141-142 or equivalent) and a course in matrix algebra (251 or equivalent).

The following requirements must be met:
1. Complete 30 hours of coursework of which 21 must be at the 500 level. The coursework must include 504, 505, 506, 507, and 6 hours in Group I. At most, 6 hours may be taken outside the Department of Mathematics (selected in consultation with the advisor).
2. Pass a final examination upon completion of all coursework.

In exceptional circumstances, part of admission requirement (b) might be satisfied concurrently with coursework. Normally Master of Mathematics degree students will start the program by taking 504 during the summer.

THE MASTER OF SCIENCE PROGRAM

The department offers two options for the Master of Science degree. The first option requires a thesis for which 6 hours must be earned along with 24 additional hours of work in acceptable courses numbered above 400. Of the additional hours, 6 may be in an area outside the department and 15 must be in courses in mathematics numbered above 500.

After one semester of graduate study, a student whose advisory committee gives its approval may choose the non-thesis option. Normally Master of Mathematics degree students will start the program by taking 504 during the summer.

Concentration in Applied Mathematics

For this concentration, available under the thesis or the non-thesis option, the student must complete the following:
2. One hour of Seminar in Applied Mathematics 519 or Seminar in Mathematical Ecology 589.

THE DOCTORAL PROGRAM

For the Ph.D. program in Mathematics, the student must meet the following requirements in addition to those of The Graduate School:
1. Satisfy either the standard program or the interdisciplinary mathematical ecology concentration. A student intending to work in mathematical ecology may complete the interdisciplinary mathematical ecology concentration. A student may elect to switch from one to the other provided the constraints of the latter option have not been violated. A student’s status after electing such transfer is determined by the complete history of the student’s earlier examinations from the standard program and the interdisciplinary mathematical ecology concentration. Descriptions of both programs are given below.
2. Demonstrate proficiency in one foreign language, normally French, German or Russian. This requirement may be met prior to the examination in the area of specialization. A student’s doctoral committee may require the student to pass a second language examination.
3. Pass an examination in the field of specialization. After the requirements in 1. and 2. have been met, this examination will be given by a committee appointed by the department head. A student may take this examination only twice.
4. Pass a one-year, 600-level sequence in mathematics outside the student’s area of specialization. The sequences selected to fulfill this requirement must be approved by the department head and the student’s doctoral committee. (Such approval may occur after completion of the sequence.)

Requirements 1-4 must be completed no later than the start of a student’s seventh year (as a mathematics graduate student at UT Knoxville).

Standard Program

Demonstrate knowledge in five subjects selected from the groups listed below by passing written examinations in three subjects and by earning grades of B+ or better each semester in the courses associated with two additional subjects. The three subjects selected for written examinations must be from Groups I, II, or III. At least one group must be represented in the three written examinations. At least three groups must be represented in the five subjects.


A student’s five subjects may not include both Real Analysis and Applied Linear Analysis or both Mathematical Principles of Fluid Mechanics and Mathematical Principles of Continuum Mechanics. A student may not count examinations in both Ordinary Differential Equations and Partial Differential Equations, but both may be included in a student’s five subjects.

A student may take as many written examinations as desired at any time the examinations are given, subject to the following conditions:

a. The examinations to be taken must be approved in advance by the student’s advisory committee.

b. At any one time a student may take at most only the number of examinations necessary to complete the requirements.

c. A student may take a collection of written examinations a maximum of 3 times, but no one failing 4 examinations, counting possible repetitions, will be permitted to take another examination. An exception is that a student who does not have a master’s degree in mathematics and who has been enrolled in a UTK graduate program in mathematics no longer than one year may take written examinations at one time during that year without having that sitting for the examinations or any incurred failure(s) count toward the limits imposed above.

d. At least two examinations must be taken and at least one must be passed before the start of a student’s fourth year. Three examinations must be passed before the start of a student’s fifth year.

In lieu of earning a grade of B+ or better each semester in a sequence from Group I, II or III, a student may demonstrate proficiency in that subject by passing the associated written examination. For this purpose, only one examination is permitted for each of up to two subjects, and this use of a written examination must be declared before the examinations are taken so that the sitting for the examination and any failure(s) are not counted toward the limits in condition c.

Mathematical Ecology Concentration

The student must pass written examinations in three subjects:


2. A subject from Groups I, II, and III of the standard program.

3. A subject represented by a year-long graduate-level sequence from outside the Department of Mathematics. The sequence must be approved in advance by the mathematical ecology faculty and by the department's Graduate Committee. At least one member of the mathematical ecology faculty must be involved in the grading of the examination. The examination in this subject may be taken only twice.
The student also must earn grades of B+ or better each semester in the courses associated with two additional subjects from the groups listed in the standard program. This requirement may not be satisfied with courses from outside the department. At least one of the subjects used to meet this requirement or the written examination subject in 2. must be from Group I and II.

Except for the privilege of utilizing as a Group IV course a course from outside the department, this concentration is subject to the constraints and privileges specified in the standard program, including the restrictions on related subjects and courses. A. through D. placed on the taking of written examinations, and the option to pass a written examination in lieu of earning a grade of B+ or better each semester in a sequence from Group I, II or III.

GRADUATE COURSES

400 History of Mathematics (3) Development of major ideas in mathematics from ancient to modern times and influence of ideas in science, technology, philosophy, art, and other areas. Writing emphasis course: at least one in-class essay examination and 3000 words of writing outside of class. Prereq: Calculus I or Matrix Algebra I and Introduction to Abstract Mathematics.

401 Mathematics and Microcomputers (3) Primarily for students seeking certification as mathematics teachers at secondary level. Use of microcomputers to study concepts and problems in mathematics. Does not satisfy the major requirements for a B.S. or M.S. in mathematics. Prereq: Calculus I or Matrix Algebra I.

404 Applied Vector Calculus (3) Topics from multivariable and vector calculus, line and surface integrals, divergence theorem and theorems of Gauss and Stokes. Prereq: Calculus III.

405 Models in Biology (3) Difference and differential equation models of biological systems. May not be counted toward graduate degree. Prereq: Calculus II or Biocculus II.


421 Combinatorics (3) Introduction to problems of construction and counting in discrete mathematics, such as sequences, partitions, graphs, finite fields and geometries, or experimental designs. Prereq: Probability and Statistics or consent of instructor.

423 Probability I (3) Axiomatic probability, multivariate distributions, expectations, moments, density and distribution functions, geometric, uniform, hypergeometric, binomial and Poisson distributions. Prereq: Calculus I.

424 Probability II (3) Elements of stochastic processes: Random walk, Markov chains and Poisson processes. Other topics as selected by instructor. Prereq: 423.

425 Statistics (3) Derivation of statistical distributions: t, F and χ2: independence of sample mean and variance; basic limit theorems; point and interval estimation. Basic statistical software: Minitab, Neyman-Pearson theorem; likelihood ratio and other parametric and non-parametric tests; sufficient statistics; Probability II or consent of instructor.


443 Complex Variables I (3) Theory of functions of complex variable: residue theory and contour integrals. Prereq: Calculus III. Recommended prereq: 300- or 400-level mathematics course.

444 Complex Variables II (3) Applications of complex variables to statics, heat, electricity, electromechanics, and fluid flow. Prereq: 443.

445-46 Advanced Calculus II, (3,3) Theory of sequences, series, differentiation, and integration of functions of one or more variables. Prereq: Calculus III and Introduction to Abstract Mathematics, or consent of instructor.


453 Matrix Algebra II (3) Matrix theory including Jordan canonical form. Prereq: Matrix Algebra I.


460 Geometry (3) Axiomatic and historical development of non-Euclidean, projective, and hyperbolic geometry stressing proof technique and critical reasoning. Prereq: Introduction to Abstract Mathematics, or consent of instructor.

461 Topology (3) Topological spaces, separation properties, homeomorphisms, and continuity and topological invariants. Prereq: Calculus III and Introduction to Abstract Mathematics, or consent of instructor.

471 Numerical Analysis (3) Computation, instabilities, and rounding. Interpolation and approximation by polynomials and piecewise polynomials. Quadrature and numerical solution of initial and boundary value problems of ordinary differential equations, stiff systems. Prereq: Numerical Algorithms I or consent of instructor. (Same as Computer Science 471.)


475 Industrial Mathematics (3) Modeling, analysis, and computation applied to scientific/technical/industrial problems. Prereq: Differential Equations I and either Computer Literacy for Mathematicians or Numerical Algorithms, or consent of instructor.

490 Readings in Mathematics (1-3) Open to superior students with consent of department head. Independent study with faculty guidance. Prereq: Consent of faculty mentor to supervise independent work. May be repeated. Minimum 9 hrs.

499 Seminar in Mathematics (1-3) Topics vary. Requires out-of-class projects and in-class presentations by students. Credit hours announced for each seminar. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

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

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May be repeated. 300-level probability or consent of instructor.

503 Seminar for Teachers (3) For students in Master of Mathematics program and for students in graduate programs in College of Education. May not apply toward M.S. degree in mathematics, Prereq: 1 yr calculus or equivalent.

505 Seminar for Teachers (3) For students in Master of Mathematics program and for students in graduate programs in College of Education. May not apply toward M.S. degree in mathematics, Prereq: 1 yr calculus or equivalent.


515-16 Analytical Applied Mathematics (3,3) Analysis of advanced techniques in modern context for applied problems, dimensional analysis and scaling, perturbation theory, variational approaches, transform theory, wave phenomena and conservation laws, stability and bifurcation, distribution methods, partial differential equations. Prereq: 446 or 448, 453, and either 511-12 or both 431 and 435.

517-18 Mathematical Methods in Physics (3,3) (Same as Physics 517-52.)

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

521-22 Enumerative Combinatorics (3,3) Stee ste methods, recursion, generating functions, and permutation groups applied to enumerative problems. Weakly ordered and partially ordered sets, incidence algebras and combinatorics of partially ordered sets.

523-24 Probability (3,3) Pertinent facts from measure theory, definition of abstract probability spaces; independence, existence theorem, series of independent random variables and laws of large numbers; general theory of distributions of random vectors and their characteristics; the central limit theorem; weak compactness and Levy's continuity theorem in Euclidean spaces; infinitely divisible distributions and moment generating functions; weak convergence, conditional expectation, martingales, Doob's martingale and optional sampling theorems. Prereq: 445-46. Recommended prereq: 426.

525-26 Statistics (3,3) Pertinent facts from probability theory; formulation of statistical models; sufficiency, Neyman-Pearson factorization theorem, exponential families, Bayesian models; methods of estimation and asymptotic theory; inference for minimum variance unbiased estimators, asymptotic efficiency and optimality; the confidence procedures and hypothesis testing; optimal tests and confidence intervals, the Neyman-Pearson lemma, the minimax principle and independence of variables, the weak compactness and Levy's continuity theorem in Euclidean spaces; infinitely divisible distributions and moment generating functions; weak convergence, conditional expectation, martingales, Doob's martingale and optional sampling theorems. Prereq: 445-46. Recommended prereq: 426.

527 Stochastic Modeling (3) Models in probability applied to real-world situations, queueing theory, branching processes, Monte Carlo simulation. Prereq: 446-48 or consent of instructor.


535-36 Partial Differential Equations (3,3) First order equations, classification of equations, canonical forms, elliptic, hyperbolic, and parabolic equations in several variables. Prereq: 445-46 and 231 or consent of instructor.

537-38 Mathematical Principles of Continuum Mechanics (3,3) Conservation principles, equations of motion and fluid for fluids and elastic solids, constitutive relations and stress, convexity properties, bifurcation phenomena, sequences, existence theory. Prereq: 431, 435, 446 or 448, or consent of instructor.

539 Seminar in Differential Equations (1-3) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.


549 Seminar in Analysis (1-3) May be repeated. Maximum 12 hrs.

551-52 Modern Algebra (3,3) Groups, rings, modules and linear algebra, fields and Galois theory. Must be taken in sequence. Prereq: 455-56 or consent of instructor.

553 Linear Programming (3) Theory and applications. Prereq: Consent of instructor or 453 and programming ability.


555-56 Number Theory (3,3) Introduction to algebraic number theory. Prereq: 455-56 or consent of instructor.

559 Seminar in Algebra (1-3) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

561-62 Topology (3,3) Topological spaces; metrization; homeomorphic invariants of point sets. Mappings and homotopies. Covering spaces and fundamental group.

567-68 Differential Geometry (3,3) Classical differential geometry in two and higher dimensions; curves and surfaces in Euclidean space. Gauss, Geodesics; Gauss-Bonnet theorem, hyperbolic geometry, Manifolds and Riemannian metrics; connections, geodesics, Jacobi fields, sectional curvature. Differential forms and moving frames. Prereq: 445-46 or consent of instructor.

569 Seminar in Topology (1-3) May be repeated. Maximum 12 hrs.


574 Finite Element Methods (3) Finite element techniques for solution of boundary and initial boundary value problems, Variational formulation. Finite dimensional subspaces and their approximating properties; rates of convergence, Computer implementation. Prereq: 435, 471, and either 453 or 472. Recommended prereq: 445-46, 573. (Same as Computer Science 574.)

575 Matrix Theory and Techniques in Numerical Analysis (3) Advanced topics in study of iterative and direct methods for large systems of linear equations; sparse matrix analysis, relationship to modern computer architecture. Prereq: 453, 471-72, or consent of instructor. May be repeated. Maximum 8 hrs. (Same as Computer Science 575.)

577 Optimization (3) Major topics in optimization with problems developed from real-world applications including constrained and unconstrained optimization with analysis of major algorithms and utilization of appropriate software. Prereq: Numerical Algorithms, 453, 445-46.

578 Numerical Methods for Partial Differential Equations (3) Numerical approximation of solutions of partial differential equations, including conservation laws and hyperbolic, parabolic, and elliptic problems. Derivation, physical meaning, and implementation of schemes. Prereq: 435 or 512 or 453, or consent of instructor.

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

581-82 Mathematical Ecology (3,3) Deterministic and stochastic models of populations, communities, and ecosystems. Prereq: 431, 453 or consent of instructor. (Same as Ecology and Evolutionary Biology 581-82.)

583 Mathematical Evolutionary Theory (3) Population genetics and evolutionary ecology. Prereq: 431, 453 or consent of instructor.

584 Mathematical Systems Theory (3) Analytic approach to discrete and continuous dynamical control systems; optimal control. Applications to ecology. Prereq: 431, 453, 445-46 or consent of instructor.

585 Optimal Control Theory (3) Deterministic optimal control. Examples involving calculus of variations, optimal trajectories, and engineering control problems. Introduction to stochastic control. Prereq: 445-46 or consent of instructor.

586 Seminar in Mathematical Ecology (1-3) May be repeated. Maximum 12 hrs.

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

599 Graduate Reading in Mathematics (1-3) Independent study with faculty guidance. Prereq: Graduate standing and consent of instructor. May be repeated. Maximum 6 hrs.

600 Doctoral Research and Dissertation (3-15) Plan of work, subject to approval of Dean. May be repeated. (Same as Engineering 600.)

608-88 Advanced Differential Geometry (3,3) Selected topics from Riemannian geometry and analysis on manifolds: Lie groups, metrized geometry, spectrum of Laplacian, Hodge Theory, variational problems, curvature and topology of manifolds. Prereq: 587-88 or consent of instructor. May be repeated with consent of department. Maximum 12 hrs.

609 Seminar in Topology (3) May be repeated with consent of department. Maximum 12 hrs.


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

623-24 Advanced Probability (3,3) Selected topics in modern theory of probability and stochastic processes. Ito's calculus and stochastic differential equations, integration prediction theory, ergodic theory, probability on algebraic structures, limit theorems, geometry and probability in Banach spaces, probability methods in analysis. Prereq: 523-24 or consent of instructor. May be repeated with consent of department. Maximum 12 hrs.

629 Seminar in Combinatorics (1-3) May be repeated with consent of department. Maximum 12 hrs.

631-32 Advanced Ordinary Differential Equations (3,3) Theory of ordinary differential equations from advanced viewpoint. Topics from current literature. Subject matter varies according to interests and qualifications of students. Prereq: 531-32 or consent of instructor. May be repeated with consent of department. Maximum 12 hrs.

635-36 Advanced Partial Differential Equations (3,3) Selected topics in classical and modern theoretical partial differential equations. Prereq: 541-42 or 547-48 or consent of instructor. May be repeated with consent of department. Maximum 12 hrs.


643 Seminar in Analysis (1-3) May be repeated with consent of department. Maximum 12 hrs.

651-52 Advanced Modern Algebra (3,3) Selected topics in modern algebra or number theory. Prereq: 551-52 or consent of instructor. May be repeated with consent of department. Maximum 12 hrs.

659 Seminar in Algebra (1-3) Prereq: Consent of instructor. May be repeated with consent of department. Maximum 12 hrs.


663-64 Algebraic Topology (3,3) Homology, cohomology, and homotopy theories; duality theorems and Hurewicz isomorphism theorem. Prereq: 561-62 and 1 yr of abstract algebra, 455-56 or 551-52. May be repeated with consent of department. Maximum 12 hrs.

667-88 Advanced Differential Geometry (3,3) Selected topics from Riemannian geometry and analysis on manifolds: Lie groups, metrized geometry, spectrum of Laplacian, Hodge Theory, variational problems, curvature and topology of manifolds. Prereq: 587-88 or consent of instructor. May be repeated with consent of department. Maximum 12 hrs.

669 Seminar in Topology (3) May be repeated with consent of department. Maximum 12 hrs.


679 Seminar in Numerical Mathematics (1-3) May be repeated with consent of department. Maximum 12 hrs.

681-82 Advanced Mathematical Ecology (3,3) Selected topics in theoretical and applied mathematical ecology: population, community, ecosystem and applied topics such as demography, ecotoxicology, epidemiology, environmental change, and resource management. Prereq: 587-88. May be repeated. (Same as Ecology and Evolutionary Biology 681-682.)
Graduate programs leading to the degrees of Master of Science and Doctor of Philosophy are available with majors in Mechanical Engineering, Aerospace Engineering, and Engineering Science. Changes in the curricula of these programs to another are subject to departmental approval. Each applicant is advised as to any prerequisite courses before entering a program.

In Mechanical Engineering, program concentrations include energy conversion and utilization; propulsion; heat transfer and fluid mechanics; thermodynamics; space engineering; gas dynamics; machine design; dynamics, control, and robotics; power generation; and stress analysis. In Aerospace Engineering, program concentrations include energy conversion and utilization; propulsion; heat transfer and fluid mechanics; thermodynamics; space engineering; aerodynamics and performance; gas dynamics; flight and aerospace mechanics; aeronautics; and stress analysis.

In Engineering Science, program concentrations include solid mechanics, fluid mechanics, computational mechanics, mechanics of composite materials, biomedical engineering, industrial engineering, and optical engineering (UTSI only). In each of these concentrations, interdisciplinary programs are arranged to meet individual needs or interests. The flexibility and interdisciplinary aspect of the program concentrations are intended to be of particular interest to prospective students currently employed in research, development, or design activities and whose interests in continuing education (either full-time or part-time) lie at one of the interfaces between science and engineering or can be met by interdisciplinary study in engineering. The program's course offerings and curricular options are also intended to meet the needs of students who seek preparation for employment in engineering areas requiring specialization in mechanics or in related interdisciplinary studies such as biomechanics.

In Mechanical Engineering or Aerospace Engineering, entrance into the Master of Science program is available to qualified graduates of recognized undergraduate curricula in mechanical or aerospace engineering and to qualified graduates of other curricula who satisfy the necessary prerequisites. A program application is required in addition to the Graduate School application. Admission into the doctoral program will be based on those applicants who have demonstrated superior achievement in their engineering backgrounds. The GRE is required of all international applicants for admission.

In Engineering Science, entrance into the graduate program is available to graduates of recognized curricula in engineering, mathematics, or one of the physical or biological sciences. A program application is required in addition to the Graduate School application. The names and addresses of four references must be included with the program application. The GRE is required of all international applicants for admission.

Each student must satisfactorily complete a program of study that has been approved by his/her advisory committee and complies with the requirements of the Graduate School. In Engineering Science, the student's major professor may be selected from a department other than the Department of Mechanical and Aerospace Engineering and Engineering Science; however, at least one member of the student's graduate advisory committee must be on the faculty of the Department of Mechanical and Aerospace Engineering and Engineering Science.

**THE MASTER'S PROGRAM**

In both Mechanical Engineering and Aerospace Engineering, three M.S. options are offered. Option I requires a thesis, while options II and III do not. Option I is the normal program for recent graduates. Options I and III provide the graduate students with significant professional work experience and (6) graduate co-op students the opportunity to focus their research in special areas through either greater coursework or selected engineering problems.

Credit requirements for these three options are summarized below.

<table>
<thead>
<tr>
<th>Course Areas</th>
<th>Hours Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option I</td>
<td>1 1 1</td>
</tr>
<tr>
<td>Coursework</td>
<td>24 30 24</td>
</tr>
<tr>
<td>Courses in department (500 level or above) (minimum)</td>
<td>12 18 12</td>
</tr>
<tr>
<td>Mathematics</td>
<td>6 6 6</td>
</tr>
<tr>
<td>Engineering courses below 500 (maximum)</td>
<td>3 3 3</td>
</tr>
<tr>
<td>Thesis credit</td>
<td>6 n/a n/a</td>
</tr>
<tr>
<td>Problems credit (590)</td>
<td>n/a n/a n/a</td>
</tr>
<tr>
<td>Total</td>
<td>30 30 30</td>
</tr>
</tbody>
</table>

All three program options require participation in the departmental graduate seminars program, and a final examination on all work submitted for the degree. Option II final examination will cover all coursework. Option III final examination will cover all the selected engineering problems. The thesis option, Option I, requires submission and defense of a written thesis that demonstrates the ability to conduct and report an independent investigation. The problems option, Option III, requires a formal report to be written for each selected engineering problem.

In Engineering Science, two M.S. options are offered: Option I requires a thesis, while Option II does not. The Option II is restricted to those students who have had significant engineering professional work experience. In Option I, a minimum of 30 semester hours including the thesis is required. In Option II, a minimum of 30 hours is required. Credit requirements for these two options are summarized below.

<table>
<thead>
<tr>
<th>Course Areas</th>
<th>Hours Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option I</td>
<td>1</td>
</tr>
<tr>
<td>Coursework</td>
<td>24 30</td>
</tr>
</tbody>
</table>
Mathematics*  
Engineering courses* (Major concentration may include but is not restricted to courses offered by the Department.)  
Related courses (May include additional courses in mathematics, computer science, or the physical and life sciences as well as engineering courses.)  
The student's advisory committee and approval  
2. A minimum of 24 semester hours in Doctoral Research and Dissertation and a minimum of 48 semester hours in other courses.

In Mechanical Engineering or Aerospace Engineering, the courses must include:

1. A minimum of 12 semester hours of graduate credit in mathematics in courses numbered 400 or above with a minimum of 6 semester hours numbered 500 or above.
2. A minimum of 24 semester hours in the department in courses numbered 500 and above, with at least 12 of these semester hours in the major. A minimum of 9 semester hours of courses is required at the 600 level. These are exclusive of thesis, problems, or dissertation credit. The student's advisory committee can approve a student's petition to replace one 500-level course with one or more 600-level courses if they determined that the student is more appropriately prepared.

In Engineering Science, the courses must include:

1. A minimum of 24 semester hours in engineering graduate courses, exclusive of thesis and dissertation credit. These courses will normally be numbered 500 and above, with at least 9 semester hours of 600-level courses, which constitute one or two areas of concentration selected by the student. The number of courses in this group to be taken will depend on the program selected by the student and the approval of his/her advisory committee.
2. A minimum of 12 semester hours in mathematics or computer science in courses numbered 400 and above, exclusive of a first course in ordinary differential equations.

Additional requirements for all students include:

1. Participation in the departmental seminar program.
2. Meet all departmental examination requirements, which include passing a written and oral comprehensive examination.
3. Presentation of a dissertation proposal to the student's advisory committee and approval of that proposal by that committee.

ACADEMIC COMMON MARKET
An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The Ph.D. program in Aerospace Engineering is available to residents of the states of Arkansas or Kentucky. The M.S. in Aerospace Engineering is available to residents of Kentucky. The Ph.D. program in Engineering Science is available to residents of the states of Florida (concentration in biomedical engineering only). Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE CREDIT FOR UNDERGRADUATE COURSES

Students majoring in Mechanical Engineering or Aerospace Engineering may not normally use more than one 400-level engineering course to meet their advanced degree requirements. For students majoring in Engineering Science, four hundred-level courses in engineering may be used for graduate credit at the discretion of the advising committee. However, at least two-thirds of the credits for the Ph.D. program must be at or above the 500 level. With the approval of the student's major department, a student whose major is outside the Department of Mechanical and Aerospace Engineering and Engineering Science may take senior (400-level) courses in a master's program for graduate credit. Such students should consult with instructors regarding prerequisites for undergraduate courses.

Aerospace Engineering

NOTE: Not all the courses listed below are available at both the UT Knoxville and the UT System campuses.

GRADUATE COURSES

422 Aerodynamics (3) Theory and design of aero- 
423 Viscous Flow (3) Boundary layer flow; laminar and 
424 Astronautics (3) Propulsion, trajectories, guidance, 
425 Propulsion (3) Principles of propulsion devices; turbo-

515 Experimental Methods in Fluid Mechanics (3) Experimental techniques and apparatus, including: representative experiments; hot wire anemometry and turbulence measurements, flow visualization, wind tunnel tests, water table tests, supersonic flow experiments, boundary layer measurements, laser-optical measurements, Prepr. 423 or Mechanical Engineering 531.

515-16 Air Vehicle Aerodynamics and Performance (3,3) Application of principles to air vehicles to provide estimates of performance, stability, and control characteristics for subsonic to hypersonic speeds. Relations among thrust, drag, lift and attitude; propulsion systems; vehicle performance characteristics; and trajectory optimization. Prepr. 422, 515 for 516.

521-22 Aerodynamics of Compressible Fluids (3,3) One-dimensional internal and external flows; waves; small perturbation theory; slender body theory; similarity methods; characteristics. Prepr. 422 for 521; 521 for 522.

525 Hypersonic Flow (3) slender body flow; similitude; 
527-28 Aerospace Ground Test Facilities (3,3) Atmos-

531 Magnetohydrodynamics (3) Electromagnetic field 
532 Introduction to Turbulence (3) Macrosopic ef-

544 Transonic Flow (3) Nature of flow at transonic 
551 Aerospace Mechanics (3) Principles of mechanics 

555 Aerospace Vehicle Stability and Control (3) Static and dynamic longitudinal directional and lateral stability and control. Coupled modes. Motion with free and fixed flight control surfaces. Automatic control systems. Prepr. 423, 551.

556 Vertical or Short Take Off and Landing Aircraft (3) Performance, stability, control of rotary wing, tilt wing, vectored lift and jet vertical type aircraft. Vertical and transition flight modes. High lift aircraft. Automatic control systems, simulation techniques of flight testing. Prepr. 555.


561 Fundamentals of Aeroacoustics (3) Generation, 
564 Spacecraft Attitude Dynamics and Control (3) 

565 Mechanical and Aerospace Engineering and Engineering Science

518 Mechanical Engineering Laboratory (3) Analysis of 
549 Aerospace Engineering Laboratory (3) Designing, 
459 Selected Topics in Aerospace Science (1-4) Current problems and topics in aerospace science. Prepr. Consent of instructor.

511 Inviscid Flow (3) Kinematics and dynamics of inviscid flows; potential flow about body, conformal mapping. Prepr. 422 or Mechanical Engineering 531. Mathematics 425 or equivalent.

537 Aircraft Performance (3) Performance analysis of rotorcraft and fixed wing airplanes; lift and drag coefficients, performance indices, fuel consumption, takeoff and landing performance.

539 Aircraft Structures (3) Analysis of airplane structures and stability. Linear and nonlinear equations of motion for aircraft. Prepr. 518, 524, 526, 549.
## Mechanical and Aerospace Engineering and Engineering Science

**Graduate Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>421</td>
<td>Materials of Engineering (3) Mechanical properties of engineering materials: selection and processing, mechanical testing, failure analysis, and life prediction. Prereq: 321. Materials Science and Engineering 201, 3 hrs or 2 hrs and 1 lab.</td>
</tr>
<tr>
<td>423</td>
<td>Fracture-Safe Design (3) Critical review of variables controlling fracture toughness; strain gradient; and fracture toughness measurement. Prereq: 321. Materials Science and Engineering 201. 3 hrs or 2 hrs and 1 lab.</td>
</tr>
<tr>
<td>426</td>
<td>Fundamental Principles of Composite Materials (3) Mikromechanics and microstructural design of composites; fabrication techniques; and analysis of fiber-reinforced composites. Prereq: 421. Materials Science and Engineering 201. 3 hrs or 2 hrs and 1 lab.</td>
</tr>
<tr>
<td>429</td>
<td>Introduction to Ceramic Matrix Composites (3)</td>
</tr>
</tbody>
</table>
'585 Industrial Pollution Prevention (3) (Same as Environmental Engineering 581 and Environmental Engineering 581.)

589 Measurement Science II (3) (Same as Nuclear Engineering 589 and Aviation Systems 589.)

624 Viscoelasticity (3) Viscoelastic constitutive relations; isothermal and adiabatic; small strain; large strain; linear and non-linear; uniaxial and biaxial; mechanical and electrical; experimental, analytical, and numerical aspects. Prereq: 523 and 591 or Polymer Engineering 541.

625 Computational Plasticity and Creep (3) Theory and numerical algorithms for plasticity and creep behavior in finite element structural models. Perfect plasticity, kinematic and isotropic hardening. Mroz, mechanical strain hardening, and two-surface models; volumetric plasticity models; traditional creep models and unified creep-plasticity models. Numerical algorithms, including error maps, and plane stress plasticity algorithms. Prereq: 559 or 523. Mechanical and Aerospace Engineering and Engineering Science 553.


641 Advanced Topics in Fluid Mechanics and Convective Heat Transfer (3) Convective momentum, heat and mass transfer; boundary layer analysis, stability, transition, turbulence, closure models; Navier-Stokes equations, closure procedures; time- and ensemble- averaging, large scale structures; high speed flow, reacting, nonreacting, excitation, ionization. Applications in propulsion, lasers, aerodynamics. Prereq: Mechanical and Aerospace Engineering and Engineering Science 542. 1 hr. of lecture, 1 hr. of laboratory. Same as Aerospace Engineering 542.

645 Theory of Turbulence (3) Mathematical descriptions of turbulence; isotropic turbulence, energy spectra, Kolmogoroff's hypothesis, large and small eddy structure for turbulent flows; turbulent diffusion by continuous and discontinuous processes. Prereq: Consent of instructor. 


523 Special Topics in Thermodynamics (3) Application of thermodynamics to topics of greatest interest in mechanical engineering. Prereq: Consent of instructor.

525 Combustion and Chemically Reacting Flows I (3) Fundamentals: thermodynamics, chemical kinetics and conservation equations; phenomenological approach to laminar flows; diffusion and premixed flame theory; single droplet combustion; deflagration and detonation theory; stabilization of combustion waves in laminar streams; shock wave and flame interactions. Prereq: 552, 531, or consent of instructor.

526 Combustion and Chemically Reacting Flows II (3) Advanced topics: phenomenological approaches to turbulent flows; fundamentals of turbulent flow; application of probability density functions to turbulent flames; turbulent reacting flows with premixed and/or non-premixed reactants; spray combustion models; fluidized bed combustion; chemically reacting boundary layer flow; gas turbine and/or rocket motor combustors; furnaces; introduction to supersonic combustion and hypersonic flows. Prereq. 555.


553 Development of Superior Products and Processes (3) Case studies of latest techniques of superior product development and process development in industry. Case study of product or process yielding superior results developed by student. Prereq: B.S. in Engineering or consent of instructor.

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

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

584-85 Turbomachinery Systems I, II, III (3,3,3) Ideal cycle analysis of turbine engines, real cycle analysis, component analysis, analysis of components and systems integration (shafts, nozzles, combustors, compressors, turbines), flowthrough theory, turbine engine component performance, transfer function analysis and rotating stall, engine control systems, structural considerations. Prereq: First year graduate standing and consent of instructor.

586 Mechanics and Control of Robot Manipulators (3) Fundamentals of robot manipulation; kinematics and dynamics of manipulator arms, controller design for industrial robots, trajectory planning, compliant motion control and force control. Prereq: Matrix Computations, undergraduate dynamics and controls.


590 Selected Engineering Problems (2-6) Enrolment limited to students in problems program. Prereq: Consent of advisor. May be repeated. S/N only.

599 Special Topics in Mechanical Engineering (1-3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. Prereq: Consent of instructor.

610 Advanced Topics in Fluid Mechanics and Heat Transfer (3) Advanced theory and application of fluid mechanics and heat transfer; natural convection, multi-phase flows, high speed flow, turbulence and combustion, boundary layer theory, turbulence, combustion, perturbation and variational methods of analysis, heat exchanger design and theory. May be repeated. Maximum 9 hrs. Prereq: Consent of instructor.
adjust smoothly to the research programs of the department, to develop a background of research procedures and concepts, and to facilitate the selection of a research professor. Usually the student selects a research professor toward the end of the laboratory rotation period. The major professor assists in the selection of and carrying out of a suitable research program and in the naming of a thesis or dissertation committee.

THE MASTER'S PROGRAM

The program leading to the M.S. is designed to provide the student with broad basic knowledge, to permit the acquisition of technical competence in the fundamentals of research, and to encourage creative and independent thinking. Two to three calendar years are usually needed for the course of study that has the following requirements: (1) 30 hours including 6 thesis credits; (2) a 3.0 GPA in all courses taken for graduate credit after 12 hours of credit have been earned in courses graded on the A-F system; (3) a 3.0 GPA in courses taken in the department; (4) a complete course sequence in biochemistry or molecular biology; (5) presentation of a research thesis and its oral defense.

THE DOCTORAL PROGRAM

The program leading to the Ph.D. is designed to develop the student's ability to pursue independent and original research in microbiology and allied fields, to teach both oral and written communication of the results of research to the scientific community, and to train effective teachers. Students may enter the program after receiving either a bachelor's or master's degree. Students who enter with a bachelor's degree usually receive the Ph.D. after four or five years; those with a master's degree usually take the Ph.D. after four or five years to complete the degree. Departmental requirements are: (1) a 3.0 GPA in all courses taken for graduate credit after 12 hours of credit have been earned in courses graded on the A-F system; (2) a 3.0 GPA in courses taken in the department; (3) satisfactory performance in at least one semester as a teaching assistant; (4) one semester of physical chemistry; (5) one course in statistics; (6) two semesters of biochemistry or molecular biology; (7) satisfactory performance in a comprehensive examination that must be attempted before the end of the fifth semester in the program and passed before admission to candidacy; and (8) the presentation of a research dissertation and its oral defense.

GRADUATE COURSES

410 Bacterial Physiology (3) Modern concepts of structure and function of bacterial cell. Prereq: Introduction to Microbiology. F
411 Bacterial Genetics (3) Transmission and expression of genetic information by bacteria. Prereq: Introduction to Microbiology. Sp
420 Medical Microbiology (3) Disease-producing microorganisms, including bacteria, viruses, fungi, and protozoa. Prereq: Introduction to Microbiology. Sp
429 Medical Microbiology Laboratory (2) Laboratory exercises in medically important areas of microbiology; microorganisms; pathogenesis and immunology. Prereq: Introduction to Microbiology Lab, 430. Coreq: 420. Sp
430 Immunology (3) Principles of inflammation and immunity; immunoglobulin structure and theories of formation and diversity; complement, hypersensitivity, cell cooperation and recognitions in immune mechanisms; soluble factors. Prereq: General Genetics. F
470 Microbial Ecology (3) Physiological diversity and taxonomy of microorganisms from natural environments. Functional role of microorganisms in natural and simulated ecosystems. Prereq: 310. F
500 Thesis (1-15) P/NP only. E
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered in any seminar during each semester when student uses University facilities and for faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
575 Applied Microbiology and Biotechnology (3) (Same as Chemical Engineering 575, Environmental Engineering 575, and Agriculture Engineering 575.)
591 Foreign Study (1-15) See College of Arts and Sciences.
592 Off-Campus Study (1-15) See College of Arts and Sciences.
593 Independent Study (1-15) See College of Arts and Sciences.
598 Seminar (1-15) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/NC only. E
598 Laboratory Rotation (1) Familiarization with research areas in department through series of rotations in laboratories of individual faculty members. May be repeated. Maximum 18 hrs. S/NC only. E
600 Doctoral Research and Dissertation (3-15) P/NP only. E
601 Journal Club in Microbiological Physiological (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/NC only. E
602 Journal Club in Microbial Pathogenesis (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/NC only. E
603 Journal Club in Immunology (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/NC only. E
604 Journal Club in Virology (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/NC only. E
605 Journal Club in Microbial Genetics (1) Readings and discussions on current literature. May be repeated. Maximum 18 hrs. S/NC only. E
610 Topics in Microbiology (1-3) Prereq: 410 or consent of instructor. May be repeated. Maximum 12 hrs.
620 Topics in Microbial Pathogenesis (1-3) Prereq: 420, 430 or consent of instructor. May be repeated. Maximum 12 hrs.
630 Topics in Immunology (1-3) Prereq: 430 or consent of instructor. May be repeated. Maximum 12 hrs.
640 Topics in Virology (1-3) Prereq: 440 or consent of instructor. May be repeated. Maximum 12 hrs.
650 Topics in Microbial and Molecular Genetics (1-3) Prereq: 411 or consent of instructor. May be repeated. Maximum 12 hrs.
670 Advanced Topics in Environmental Microbiology (1-3) Prereq: 570 or consent of instructor. May be repeated. Maximum 12 hrs.

Microbiology-Veterinary Medicine

See College of Veterinary Medicine and Comparative and Experimental Medicine

Music (College of Arts and Sciences)

MAJOR

Music ......................................................... M.M.

Dolly Davis, Acting Head

Professors:

Ball, Charles H. (Emeritus), Ph.D. Peabody
Blitzes, George C., M.M. Converse
Brock, John P. (Emeritus), M.M. Alabama
Carter, W. J. (Emeritus), D.M.A. Eastman
Coker, J. M., M.A. Sam Houston
Combs, F. M., M.A. Missouri
DeVine, George F. (Emeritus), University of North Carolina, Chapel Hill
Dorn, W. (Emeritus), M.A. Columbia
Fred, Herbert W. (Emeritus), University of North Carolina, Chapel Hill
Hoffman, A. G. (Emeritus), M.M. Northwestern
Jacobs, K. A., M.A. Texas
Julian, W. F. (Emeritus), Ph.D. University of North Carolina, Chapel Hill
McClelland, D. K., M.A. Columbia
MacClung, W. S., M.S. Wisconsin
Meacham, John J. (Emeritus), Michigan
Moore, C., M.A. Michigan
Northington, D. B., D.M.A. Yale
Pederson, D. M., Ph.D. Iowa
Goulet, C. M. (Emeritus), M.A. Ohio State
Starr, W. J. (Emeritus), M.M. University of North Carolina, Chapel Hill
Stuttenberger, D. R., D.M.A. Maryland
Titus, A. W., Ph.D. Michigan

Associate Professors:

Adams, Fay, M.M. Tennessee
Boling, M. L., M.M. Tennessee
Brown, Donald R., H.S.D. Indiana
Brunelli, D. E., D.M. Indiana
Carter, P. S., M.M. Colorado
Davis, W. L. G. (Emeritus), M.A. Yale
Dubery, T. S., D.M.A. Yale
Hough, Don, M.M. Tennessee
Leach, C. F., M.M. New Mexico
Searle, S. M., M.M. Tennessee
Sperl, G. R., M.M. Indiana

Assistant Professors:

Baley, A. L., D.M.A. South Carolina
Binder, S. L., M.M. Virginia Commonwealth
Gay Jr., L. C., Ph.D. Columbia
Hawthorne, W., Ph.D. Cincinnati
Murphy, G. A., Ph.D. Ohio State
Romines, J. J., M.M. Indiana
Schallert, G. T., D.A. Northern California
Smith, C., B.M. SUNY-Fredonia
Wentzel, A. N., M.M. Southern Cal

The Department of Music offers the Master of Music degree with concentrations in accompanying, choral conducting, composition, instrumental conducting, jazz, music education, musicology, performance (organ, piano, strings, voice, winds, and percussion), piano pedagogy and literature, sacred music, string pedagogy, and theory. Applicants must have completed an undergraduate degree approximately equivalent in music requirements to those required in degrees conferred by UT Knoxville, appropriate
GRADUATE COURSES

Music Education

Music History

Music Ensemble

Music General

GRADUATE COURSES

Music Instrumental

GRADUATE COURSES

to the applicant's prospective area of concentration on the master's level.

Applicants who plan to pursue the concentration in performance or music education are required to audition before the appropriate area faculty committee. Applicants for admission to the program in composition must submit scores and tape recordings of representative works. Applicants for the concentration in jazz must audition in jazz improvisation and jazz piano proficiency and interview with members of the faculty in this area. Other applicants are required to have an interview with members of the faculty of the prospective areas of concentration.

All applicants are required to take the Diagnostic Examinations in music theory, ear-training, and music history/literature. These examinations are given by the Department of Music at the beginning of each semester.

THE MASTER'S PROGRAM

A minimum of 30-33 semester hours of coursework is required for the Master of Music degree. These hours are specifically distributed according to the area of concentration. All concentrations require coursework in music history/literature and music theory and allow for elective courses. Specific curricula are available from the department.

The graduate recital is given in lieu of thesis by students with concentrations in performance, pedagogy, jazz, and accompanying. A performance project is given in lieu of thesis by students with concentrations in choral conducting, instrumental conducting, and sacred music. A thesis is required of students in composition, musicology, and theory. All concentrations require a written and oral final examination.

Concentration in Music Education

The concentration in music education is designed for persons who hold a Bachelor's degree in Music or Music Education and certification to teach music in the public schools. Students seeking initial certification should consult the requirements for the Master of Science degree in the College of Education.

The program requires 510 and 525; 9 hours of music education electives at the 500 level; 6 hours of Thesis 500; 6 hours of 500-level courses in music theory or history; 2 hours of applied music at either the 400 or 500 level; 2 hours of music ensemble at the 500 level; and 3 hours of electives at the 500 level.

A three-credit research problem and three extra hours of coursework in Music Education may be substituted for Thesis. If a larger thesis problem is desired, the thesis credit may be increased to 9 hours, and 3 hours of Music Education electives may be dropped. Diagnostic tests in theory, ear training, and music history will be required.

Music Education

GRADUATE COURSES

Music General

GRADUATE COURSES

Music History

GRADUATE COURSES

Music Ensemble

GRADUATE COURSES

Music Instrumental

GRADUATE COURSES

Music General

GRADUATE COURSES

Music History

GRADUATE COURSES

Music Ensemble

GRADUATE COURSES

Music Instrumental

GRADUATE COURSES

Music General

GRADUATE COURSES

Music History

GRADUATE COURSES

Music Ensemble

GRADUATE COURSES

Music Instrumental
Music Jazz

GRADUATE COURSES

410 Advanced Improvisation (3) Further development of individual skills and solving individual problems in jazz improvisation. Prereq: 210 and 220.

420 Jazz Pedagogy (1) Methods and materials relating to teaching of jazz. Designing and administering jazz programs, and rehearsing techniques for jazz ensembles. Prereq: Studio music and jazz major or consent of instructor.

520 Seminar in Jazz (3) Topic varies.

Music Keyboard

GRADUATE COURSES

420-30 Piano Literature Ili (3,3) 420--From 1750 to middle 19th century: 430--Middle 19th century to present.

460-70 The Organ and Its Literature Ili (3,3) Development of organ and organ literature from Middle Ages to present; problems of style and interpretation; pedagogical literature and methods; organ design. Prereq: Or consent of instr. Music History 220 and consent of instructor.

485-95 Suzuki Piano Method Ili (2,2) Psychology, procedures, and literature of Suzuki piano method. Must be taken in sequence. Prereq: Consent of instructor.

520 Piano Literature Seminar (3) Topics vary. May be repeated. Maximum: 6 hrs.

531-41 Recital Project (2,2) Preparation and accompaniment of full recital for accompanying concentrations only; 531--Vocal recital, 541--Instrumental recital. Prereq: Consent of instructor.

540-50 Advanced Piano Pedagogy Ili (2,2) Evaluation and study of methods and materials for teaching piano at all levels. Supervised laboratory teaching. Prereq: 440, 450, or consent of instructor, 550. Introduction and principles of Kodaly, Orff, Suzuki, Dalcroze, and class piano teaching. Prereq: 440, 450 or consent of instructor.

560 Organ Literature Seminar (3) Topics vary. May be repeated. Maximum 6 hrs.

Music Performance

GRADUATE COURSES

All performance courses require an audition and consent of instructor. May be repeated. Maximum 8 hrs toward M.M. degree.

403 Flute (1-4)
405 Oboe (1-4)
410 Bassoon (1-4)
415 Clarinet (1-4)
420 Saxophone (1-4)
425 Horn (1-4)
430 Trumpet (1-4)
435 Trombone (1-4)
440 Baritone (1-4)

445 Tuba (1-4)
450 Percussion (1-4)
455 Voice (1-4)
460 Violin (1-4)
465 Viola (1-4)
470 Cello (1-4)
475 String Bass (1-4)
476 Electric Bass (1-4)
479 Guitar (1-4)
480 Piano (1-4)
485 Harpsichord (1-4)
490 Organ (1-4)
494 Composition (1-3)
495 Composition with Electronic Media (1-3)
496 Composition for Media (2)
499 Improvisation (1-2) May not be used toward applied credit requirement.
503 Flute (1-4)
505 Oboe (1-4)
510 Bassoon (1-4)
515 Clarinet (1-4)
520 Saxophone (1-4)
525 Horn (1-4)
530 Trumpet (1-4)
535 Trombone (1-4)
540 Baritone (1-4)
545 Tuba (1-4)
550 Percussion (1-4)
551 Accompanying and Coaching (1-4)
555 Voice (1-4)
560 Violin (1-4)
565 Viola (1-4)
570 Cello (1-4)
575 String Bass (1-4)
576 Electric Bass (1-4)
579 Guitar (1-4)
580 Piano (1-4)
585 Harpsichord (1-4)
590 Organ (1-4)
594 Composition (1-3)
595 Composition with Electronic Media (1-3)
599 Improvisation (1-4)

Music Theory

GRADUATE COURSES

430-40 Counterpoint Ili (3,3) 430--Study of species counterpoint in modal and tonal styles, works of Palestrina and J.S. Bach. Prereq: 220. 440--Writing of contrapuntal forms of 18th century and fugue, analysis of works from 18th through 20th centuries. Prereq: 430.

430 Choral Arranging (2) Analysis of scores and writing of arrangements for choruses. Prereq: Theory IV or consent of instructor.

510 Musical Styles (3) Elements of design and their role in definition of musical styles. Prereq: Consent of instructor.

520 Analytical Techniques (3) Analytical techniques, contemporary approaches. Tonal and neotonal music. Prereq: Consent of instructor.

530 Music Theory Pedagogy (3) Techniques, methods, and materials involved in college-level theory programs. Prereq: Consent of instructor.

540 Computer Projects (1-3) Programming languages, design and implementation of projects in computer-managed instruction. Prereq: Consent of instructor.

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

Nuclear Engineering

(College of Engineering)

MAJOR DEGREES

Nuclear Engineering .................. M.S., Ph.D.

H. L. Dodds, Head

Professors:

Dodds, H. L., PE, Ph.D. .................. Tennessee

Mihalczko, J. T., Ph.D. .................. Tennessee

Miller, L. F., PE, Ph.D. .................. Texas A&M

Uhrig, R. E., (Distinguished Prof.), PE, Ph.D. .................. Iowa

Upadhyaya, B. R., Ph.D. .................. California
The Department of Nuclear Engineering offers programs leading to the Master of Science and Doctor of Philosophy degrees. Students may elect a traditional nuclear engineering M.S. or Ph.D. program (focusing on fission energy or fusion energy) or a radiological engineering concentration at the master's level. The radiological engineering concentration prepares students for careers in the radiation safety field (health physics). The program is designed for graduates of undergraduate programs in engineering, physics, biology and chemistry.

All entering students must have, as a minimum, competency in mathematics through ordinary differential equations, competency in atomic and nuclear physics, and competency consistent with a course in introductory nuclear engineering. If these competencies do not exist, the student must take appropriate courses for undergraduate credit. The department head is the contact for all interested students, both those with nuclear engineering degrees and those from other disciplines.

THE MASTER'S PROGRAM

A graduate program leading to the Master of Science is available to graduates of recognized undergraduate curricula in engineering and physics. Each applicant will be advised as to the necessary prerequisite courses before he/she enters the program. The student must complete 24 semester hours of coursework approved by the student's advisory committee that includes the following:

1. A major consisting of a minimum of 12 semester hours of graduate courses in nuclear engineering. This must include at least one of the following sequences: 511, 512; 551, 552; 571, 572.
2. A minor of 6 semester hours of elective courses in mathematics, statistics or computer science.
3. Six semester hours in either nuclear engineering or a related field.

The M.S. candidate must also demonstrate research or design capability. This requirement may be satisfied by a thesis project or an engineering practice project as described below.

**Thesis** - The student performs independent research on a topic approved by the graduate committee. He/she submits a thesis on this research. The student then must pass an oral examination on the thesis and all graduate coursework. The student must enroll for six semester hours of NE 500 (Thesis).

**Engineering Practice** - The student performs independent research on two to four separate topics approved by his/her graduate committee. Each project is similar to a thesis project but smaller in scope. He/She submits a report, in thesis format, on each project. The student must then pass an oral examination on his/her engineering practice reports and all graduate coursework. The student must enroll for six semester hours of NE 506 (Nuclear Engineering Practice).

**THE DOCTORAL PROGRAM**

Students in the field of nuclear engineering desiring to study for the Doctor of Philosophy must have a Bachelor of Science or Master of Science from a recognized university, with a major in engineering or physics. All candidates will be required to demonstrate general competence in a comprehensive examination in the areas of engineering science, mathematics, physics, and nuclear engineering.

Specific course requirements for the Ph.D. in Nuclear Engineering include:

1. A minimum of 48 semester hours beyond the Bachelor's degree, exclusive of credit for the M.S. thesis or Nuclear Engineering Practice.
2. A minimum of 24 semester hours in doctoral research, NE 600.
3. A minimum of 30 semester hours in nuclear engineering numbered 500 and above (or the equivalent), with at least 9 semester hours of 600-level courses. These are exclusive of thesis or dissertation credit.
4. A minimum of 12 semester hours in mathematics, computer science, or statistics courses beyond nuclear engineering undergraduate requirements numbered 400 or above.
5. A minimum of 6 semester hours in courses numbered 500 and above from a department other than nuclear engineering. The choice depends on the student's overall program and should explain the student's knowledge in a given field.
6. A reading knowledge of one foreign language may be specified by the student's doctoral committee.

The comprehensive examination is prepared by the nuclear engineering faculty and consists of 12 hours of written examinations. All past examinations are filed in the library, and students are encouraged to review them. Students are invited to take the comprehensive examination after completing approximately 30 semester hours of coursework. A student who fails the written part of the examination must take and pass the examination the next time it is offered to remain in the Ph.D. program. Registration for NE 600 is not permitted until the written examination is passed. The comprehensive examination is completed with a successful oral defense of the dissertation proposal.

**GRADUATE CREDIT FOR UNDERGRADUATE COURSES**

400-level courses in nuclear engineering may be used for graduate credit. However, students must recognize that at least two-thirds of the minimum required hours (30) in a master's degree program must be taken in courses numbered 500 or above.

**GRADUATE COURSES**

403 Nuclear and Radiological Engineering Laboratory II (3) Cross section measurements, diffusion properties of materials, charged particle reactions, alpha and beta spectrometry, radiation fields and dosimetry. Prereq: Nuclear and Radiological Engineering Laboratory I.

404 Nuclear Fuel Cycle (3) Mining, milling, fabrication, in-core management, reprocessing, waste disposal, regulatory and radiation health issues and requirements. Prereq: 470 or equivalent.

405 Reactor Dynamics, Control and Safety (3) Reactor models, transient analysis, safety analysis, control systems and safety systems. Prereq: 470.

406 Radiation Shielding (3) Types of radiation sources, fundamentals of gamma ray and neutron attenuation, biological effects, approximate methods of shield design, discrete ordinates, and Monte Carlo. Prereq: Physics 232.

421 Introduction to Nuclear Criticality Safety (3) Fundamentals of nuclear criticality safety, criticality accidents, safety standards; overview of experiments, computational methods, and applications. Prereq: Introduction to Nuclear Engineering.


432 Radiation Risk Analysis (3) Radiation risk estimates, internal and external radiation, dose-response models, dose rate effects, prediction of radiation risks, radiation safety standards.

463 Introduction to Fusion Energy I (3) (Same as Electrical Engineering 463.)

464 Introduction to Fusion Energy II (3) (Same as Electrical Engineering 464.)

470 Nuclear Reactor Theory I (3) Fundamentals of reactor physics relative to cross sections, kinematics of elastic scattering, reactor kinetics, reactor systems and nuclear data. Analytical and numerical methods applicable to general criticality problems, eigenvalue searches, reactivity measurement, and multiproblem diffusion equations. Prereq: Introduction to Nuclear Engineering.

471 Nuclear Reactor Theory II (3) Thermal spectrum computational methods: heterogeneous effects in fast and thermal spectra; considerations in reactor core design; calculations that relate thermal and neutronic variables; power distribution calculations and reactivity control methods. Prereq: 470.

494 Special Topics in Nuclear Engineering (3) Problems related to recent developments and practice. Prereq: Senior standing and consent of instructor. May be repeated. Maximum of 6 hrs.

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

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

511-12 Transport Processes in Nuclear Engineering (3,3) Rheology of Newtonian and non-Newtonian fluids; integral and system conservation equations for single and multi-component fluids; in-depth development of differential conservation equations for mass, energy, and momentum; exact and approximate solution of equations of motion; boundary layer analysis; numerical analysis of fluid flow and heat transfer.

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


541 Reactor Fuel Management (3) Topics relative to core fuel management. Applicable topics in reactor physics, fuel depletion, isotopic inventory, reactivity control and numerical methods. Prereq: 401.
<table>
<thead>
<tr>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
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</thead>
<tbody>
<tr>
<td>Selected Topics in Nuclear Criticality Safety (3)</td>
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<td>543 Selected Topics in Nuclear Criticality Safety (3) Criticality safety computational and experimental methods for environment, fabrication, storage, reprocessing, and transport applications; overview of safety practices and regulatory requirements. Prereq: 421 or consent of instructor.</td>
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<tr>
<td>Radiation Measurements Laboratory (3)</td>
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<td>550 Radiation Measurements Laboratory (3) Physics and electronics associated with radiation detection and measurement, methods of data analysis. Applicability of particular detector measurements and fundamentals of radiation detection instrumentation operation. Prereq: 551.</td>
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<tr>
<td>Radiological Assessment and Dosimetry (3)</td>
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<td>552 Radiological Assessment and Dosimetry (3) Transport of radioactive elements in the environment, food chain pathways, internal dosimetry and personnel dosimetry. Prereq: 561 or consent of instructor.</td>
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<tr>
<td>Radiation Risk Analysis (3)</td>
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<td>553 Radiation Risk Analysis (3) Methods for radiation risk prediction, survey analysis, parameter estimation, real data analysis, extrapolation techniques. Prereq: 552 or consent of instructor.</td>
</tr>
<tr>
<td>Nuclear System Design (3)</td>
<td></td>
<td>572 Nuclear System Design (3) Design and analysis of a nuclear system, interfaces with non-nuclear aspects of system design: system reliability and economics; class project. Prereq: 573 or consent of instructor.</td>
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<tr>
<td>Experts in Systems in Engineering (3)</td>
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<td>576 Experts in Systems in Engineering (3) Application of expert systems in engineering: logic and rationale, developing expert systems, programming, advanced topics. Prereq: 575 or consent of instructor. (Same as Mechanical and Aerospace Engineering and Engineering Science 575.)</td>
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<tr>
<td>Nuclear Networks in Engineering (3)</td>
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<td>577 Nuclear Networks in Engineering (3) Neuronal network technology for use in intelligent systems; rationale for neural computing, structure of neural computing systems, programming. Prereq: Consent of instructor. (Same as Mechanical and Aerospace Engineering and Engineering Science 577.)</td>
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<tr>
<td>Fuzzy Systems in Engineering (3)</td>
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<td>578 Fuzzy Systems in Engineering (3) Fuzzy numbers, fuzzy environment, uncertainty and randomness, approximate reasoning, fuzzy models and structures, decision process in fuzzy environment, fuzzy computing, fuzzy logic controllers, fuzzy expert systems and other engineering applications. (Same as Engineering Science 578.)</td>
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<tr>
<td>Reactor Shielding (3)</td>
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<td>581 Reactor Shielding (3) Application of analytical/deterministic solutions of Boltzmann transport equation to shield design problems. Spherical harmonics, moments method, discrete ordinates, adjoint calculations, coupled analysis, and fast reactor shield design. Prereq: 401 or equivalent.</td>
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<tr>
<td>Monte Carlo (3)</td>
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<td>582 Monte Carlo (3) Analysis of radiation transport problems in radiation shielding by Monte Carlo method, description of MCORSE code. Random sampling, evaluation of integrals, analog particle transport, techniques of variance reduction, forward and adjoint modes of analysis, importance function biasing, splitting/weight window survival biasing and contribution theory. Prereq: 581.</td>
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<tr>
<td>Process System Reliability and Safety (3)</td>
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<td>585 Process System Reliability and Safety (3) Qualitative and quantitative techniques for assessing and improving process systems reliability and safety. Fault tree analysis and associated dependent failure analysis. (Same as Chemical Engineering 585.)</td>
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<tr>
<td>Special Topics in Nuclear Engineering (3)</td>
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<td>597 Special Topics in Nuclear Engineering (3) Lectures and recitation on recent advances in nuclear engineering. Prereq: Consent of instructor. May be repeated with consent of department.</td>
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<tr>
<td>Nuclear Engineering Practice (3-9)</td>
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<td>598 Nuclear Engineering Practice (3-9) Experience in solving and reporting on engineering problems. Prereq: Approval of department. May be repeated. Enrollment limited to alternate plan students. S/NG only.</td>
</tr>
<tr>
<td>Doctoral Research and Dissertation (3-15) P/NP only. E</td>
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<td>600 Doctoral Research and Dissertation (3-15) P/NP only. E 611-12 Selected Topics in Reactor Theory (3-3) Transport theory, control rod theory, stochastic methods. Selected topics from literature. Prereq: 572.</td>
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<tr>
<td>Selected Topics in Radiation Protection (3)</td>
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<td>621 Selected Topics in Radiation Protection (3) Prereq: 551, 553. May be repeated with consent of department.</td>
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<tr>
<td>Theory of Information Processing (3)</td>
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<td>653 Theory of Information Processing (3) Modern system theoretical methods for evaluating system performance from dynamic measurements. Prereq: 552 or equivalent.</td>
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<tr>
<td>Advanced Topics in Applied Artificial Intelligence (3)</td>
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<td>671 Advanced Topics in Applied Artificial Intelligence (3) Recent advances in engineering applications of artificial intelligence. Prereq: 577. (Same as Mechanical and Aerospace Engineering and Engineering Science 671.)</td>
</tr>
<tr>
<td>Special Topics in Nuclear Engineering (3)</td>
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<td>697 Special Topics in Nuclear Engineering (3) Investigation of new developments. Prereq: Consent of instructor.</td>
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</table>

**Nursing**

(Course Code of Nursing)

**Major**

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<tr>
<th>DEGREE</th>
<th>Nursing</th>
<th>M.S.N., Ph.D.</th>
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<tbody>
<tr>
<td>Professors:</td>
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<tr>
<td>Alligood, Martha R., Ph.D. .......... New York</td>
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<tr>
<td>Creasia, Joan L., Ph.D. .......... Maryland</td>
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<td>Droppelman, Patricia G., Ph.D. ......... Tennessee</td>
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<tr>
<td>Farr, Glen, Pharm.D. .......... Tennessee</td>
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<td>Groser, Maureen, M.L. .......... Brown</td>
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<tr>
<td>Mozingo, Johnnie N., Ph.D. .......... Utah</td>
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<td>Pierce, Joan U., Ph.D. .......... California</td>
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<tr>
<td>Seavor, Carol, Ed.D. .......... Massachusetts</td>
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<tr>
<td>Thomas, Sandra P., Ph.D. .......... Tennessee</td>
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<td>Associate Professors:</td>
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<tr>
<td>Bowen, Sheila, Ph.D. .......... Tennessee</td>
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<tr>
<td>Davis, Mitzi, Ph.D. .......... Tennessee</td>
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<td>Dyer, Theresa, Ed.D. .......... Tennessee</td>
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<tr>
<td>Fenske, Mildred M., Ph.D. .......... Vanderbilt</td>
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<tr>
<td>McGuire, Sandra, Ed.D. .......... Tennessee</td>
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<tr>
<td>Modricin-McCarthy, Mary Anne, Ph.D. .......... Mary</td>
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<tr>
<td>Ph.D. .......... Maryland</td>
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<tr>
<td>Wallace, Debra C., Ph.D. .......... South Carolina</td>
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</table>

**The Master's Program**

The College of Nursing offers the Master of Science in Nursing degree with concentrations in adult health nursing, family nurse practitioner, mental health nursing, nursing administration, and nursing of women and children. The program is accredited by the National League for Nursing Accrediting Commission and is unconditionally approved by the Tennessee Board of Nursing.

The purpose of the Master's program in nursing is to prepare leaders, managers, and practitioners who facilitate clients' achievement of optimal health in the dynamic health care system. The program prepares advanced practice nurses for a career in adult health nursing, nursing of women and children, and mental health nursing as well as role preparation as nurse practitioners, clinical nurse specialists or nursing administrators. Advanced practice nursing involves the delivery of care, management of resources, interdisciplinary collaboration, and application of technology, information systems, knowledge, and critical thinking.

**Admission Requirements**

1. Meet requirements for admission to The Graduate School.
2. Achieve a score of 500 or above on the verbal and on the quantitative portions of the Graduate Record Examination.
3. Achieve a TOEFL score of 550 or above if native language is not English.
4. Hold a Bachelor's degree in Nursing (BSN) from a National League for Nursing accredited program.
5. Have a cumulative undergraduate GPA of 3.0 or higher on a 4-point scale, or a GPA of 3.3 for courses in the undergraduate major.
6. Have completed a health assessment and physiology course within the past five years.
7. Hold a bachelor's degree in a discipline other than nursing (master's entry student or RN) from an accredited college or university.
8. Have a cumulative undergraduate GPA of at least 3.0 on a 4-point scale.
9. Have satisfactorily completed the following prerequisite courses: chemistry (8 hrs); microbiology (including lab); anatomy and physiology (6-8 hrs); nutrition (covering lifespan in health and illness); behavioral sciences (12 hrs in sociology, anthropology, growth, and development, and at least one general psychology course); undergraduate research course or equivalent prior to enrollment in graduate research course.
10. New students normally are admitted to the program only at the beginning of fall semester. However, under special circumstances and on a space available basis, a B.S.N. graduate may be admitted at the beginning of spring or summer terms in a temporary non-degree status. Applications from full-time BSN and master's entry students for fall admission must be received by February 1. Part-time and post-master's applications must be received by October 1.

**Special Requirements**

1. Each student must hold personal professional liability insurance.
2. Registered nurses must be licensed to practice nursing in Tennessee.
3. Each student must present proof of hepatitis B vaccination and rubella and rubella immunization or sufficient titer for immunity; TB status.
4. Each student must present evidence of current 2-person CPR certification.
5. Non-registered nurse students must have completed courses in chemistry, nutrition, microbiology, anatomy, and physiology plus 12 hours of behavioral science courses.
6. Contact student services for more detailed information about the application process: Student Services/MSN Program, UTK College of Nursing, 1200 Volunteer Blvd., Knoxville, TN 37996-4180; phone: 423 974-7606.

Thesis and Non-Thesis Options
The thesis option is available for interested students and is especially encouraged for those who are considering pursuit of doctoral degrees sometime in the future. Students who choose the non-thesis option must register for 500 Nursing Project or 582 Supervised Research.

Program Requirements
All students must complete a minimum of 36 semester hours distributed as follows:

Core (12 credits)
503-04 Advanced Clinical Reasoning I, II 6
510 Theoretical Foundations of Nursing 3
520 Advanced Practice Nursing and Health Delivery Systems 3

Research (9-12 credits)
--- Graduate level statistics course 3
501 Nursing Research: Methods, Design & Analysis 3
500 Thesis 6
OR
580 Nursing Project 3
OR
582 Supervised Research 3

Concentration (12-17 credits)—choose one
530-31 Adult Health Nursing I, II 12
540-41-42 Family Nurse Practitioner I, II, III 17
550-51 Nursing of Women and Children I, II 16
550-61 Mental Health Nursing I, II 12
590-91 Nursing Administration I, II 12

Elective (3 credits)—waived for those who choose thesis option except the family nurse practitioner concentration who take 505 and 515 and for nursing of women and children concentration who are required to take 505 and recommended to take 515.

Students who enter the program as non-RNs must complete the following undergraduate nursing courses in addition to meeting the requirements listed above:
301 Clinical Pharmacology 3
302 Introduction to Professional Nursing 5
304 Nursing Assessment and Health Promotion 4
306 Health Deviation Concepts I 4
316 Health Deviation Concepts II 4
330 Nursing of Adults 6
414 Community Mental Health Nursing 6
415 Family/Community Health Nursing 6
431 Nursing of Children 4

Registered nurses whose bachelor's degrees are not in nursing must have completed courses in chemistry, nutrition, microbiology, anatomy, and physiology plus 12 hours of behavioral science courses. They must also complete 305, 392, 405, and 430 and complete or successfully challenge the following:
301 Clinical Pharmacology 3
304 Nursing Assessment and Health Promotion 4
306 Health Deviation Concepts I 4
316 Health Deviation Concepts II 4
330 Nursing of Adults 6
411 Family Health Nursing 6
415 Psychosocial Long Term Nursing 6
431 Nursing of Children 4

A total of 16-18 credits can be obtained by successful completion of the NLN Nursing Mobility Profile Examination. See undergraduate catalog for other challenge options. RNs who are in the process of completing a BSN at UTK with the intent of enrolling in the MSN program should follow the same plan with the addition of 313.

Final Examination Requirements
All students must successfully complete a final examination as required by The Graduate School. For thesis students, the examination will consist of an oral defense of the thesis as well as other written or oral questions designed to measure student mastery of the entire program of study. For non-thesis students, the written examination will cover the entire program of study and may, at the discretion of the student's committee, be followed by an oral examination.

Special Policies
1. If the clinical performance of any student for any course is found to be unsatisfactory, the student will receive a grade of "F" for the course.
2. If a student achieves a final grade of "D" or "F" for any required undergraduate or graduate nursing course, he or she will not be permitted to repeat the course and will be required to withdraw from the program.
3. If the clinical performance of any student is characterized by unethical, unprofessional or unsafe behavior, or behavior that places the client in jeopardy, the student will be required to withdraw from the program.

Admission Requirements
1. Meet requirements for admission to The Graduate School.
2. Hold a master's degree in nursing from a program accredited by the National League for Nursing. Some outstanding applicants who are prepared at the bachelor's level in nursing may be considered. In such cases, graduate level courses in nursing theory, concentration specialty, and/or research will be integrated into the formal program of doctoral degree requirements.
3. Have a minimum cumulative graduate grade-point average of 3.3 on a 4.0 scale for previous college work.
4. Have a combined score of at least 1000 on the verbal and quantitative sections of the Graduate Record Examination.
5. Have successfully completed a basic statistics course and graduate nursing theory and research courses prior to enrollment in nursing doctoral level courses.
6. Have TOEFL scores of at least 550 if native language is not English.
7. Submit Graduate Program Data Form, College of Nursing.
8. Submit Graduate School Rating Forms from three college level instructors and/or nurses and administrators who have supervised applicant's professional work.
9. Submit a sample of scholarly writing (e.g., thesis, published paper).
10. Submit an essay describing personal and professional aspirations.
11. Submit Graduate Application for Admission, academic transcript(s), Graduate Record Examination scores, and, if required, TOEFL scores to the Graduate School. Submit three Graduate School Rating Forms, sample of scholarly writing, and Graduate Program Data Form with essay to the Director of the PhD program prior to November 1 of the year prior to fall admission.
12. Schedule a personal interview with the College of Nursing PhD Student Admissions Committee prior to March 15 of the year preceding Fall admission. International applicants may be interviewed by telephone or teleconferencing at the discretion of the admissions committee.

Program Requirements
The following courses are required for all students:
620 Directed Research 3
601-02 Theory Analysis & Construction I, II 6
605-06 Nursing Research Seminar 4
607 Qualitative Nursing Research 3
608 Quantitative Nursing Research 3
609 Research Practicum* 4
610 Nursing Science Seminar 2
611 Advanced Nursing Seminar 2
612 Health and Nursing Policy/Planning 3
614 Nursing Preceptorship 3
615 Statistics 6
616 Cognates 6
617 Electives 3
630 Dissertation 24
TOTAL 72

*Note: A minimum of 1 hour per semester must be taken for 4 semesters.
Possible cognate areas include, but are not limited to, anthropology, child and family studies, psychology, education, management, medical ethics, public health, social work, philosophy, and statistics.

Doctoral Committee

Early in the student's program, a nursing faculty advisor will be selected by the student in consultation with the program director. The student's comprehensive examination committee consists of the faculty teaching core courses and one representative from the cognate area. The student then selects the dissertation committee. Five faculty holding the rank of assistant professor or above comprise the committee, three of whom (including the chair) must be approved by the Graduate Council to direct doctoral dissertations. At least two members of the committee must be from an academic unit other than nursing.

Special Policies

1. A maximum of 6 graduate hours taken before acceptance into the doctoral program may be applied toward the degree.
2. Minimum grades of B in all nursing doctoral courses and a 3.0 cumulative GPA are required for continuation in the program.

MINOR IN GERONTOLOGY

Graduate students in the College of Nursing may pursue a specialized minor in gerontology. This interdepartmental/interdisciplinary minor gives the student an opportunity for combining the knowledge about aging in American society with his/her major concentration. Please refer to Human Ecology for specific requirements.

ACADEMIC COMMON MARKET

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

GRADUATE COURSES

500 Thesis (1-15) P/NP only. E
501 Nursing Research: Methods, Design, and Analysis (3) Basic principles of research process in application to clinical questions; critical evaluation of nursing and health-related research. Prereq or coreq: 505; graduate level statistics. F, Sp
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
503 Advanced Clinical Reasoning I (3) Principles of health promotion, education, and innovative strategies for achieving health: health habits and pathophysiological concepts, and other dimensions of whole person as related to risks for lifestyle diseases. F
504 Advanced Clinical Reasoning II (3) Development of advanced clinical reasoning skills for assessment of a client's current health status and wellness; health habits and pathophysiological concepts as dimensions of whole person. Implications for therapeutic nursing interventions. Prereq or coreq: 503. F
505 Advanced Clinical Pharmacology (3) Pharmacological agents utilized to treat common, recurrent health problems; indications, contraindications, side and interactive effects of commonly prescribed drugs. Prereq: 301 or equivalent or consent of instructor. F
510 Theoretical Foundations of Nursing (3) Historical evolution of nursing science; nursing's metadisciplines and selected philosophies, conceptual models and theories as applied to developments in human systems. Sp
520 Advanced Practice Nursing and Health Delivery Systems (3) Nursing's role in dynamic health care system: health policy and organizational, social, ethical, political, economic factors which impact advanced practice nursing and delivery of health care. Prereq: 504. Coreq: First course in concentration. Sp
530 Adult Health Nursing I (6) Advanced nursing practice for health promotion, restoration, and maintenance of young, middle-aged, and older adults. Theories and research and evidence-based practice in health promotion. Prereq or coreq: 501, Coreq: 520. Didactic (2) and practicum (4). Sp
531 Adult Health Nursing II (6) Continuation of 530. Delivery, provision, and management of health care for adults and populations. Prereq: 530. Didactic (2) and practicum (4). F
540 Family Nurse Practitioner I (6) Nursing management and primary care for individuals and families in all developmental life stages; role refinement and exploration of major issues of family nurse practitioner; clinical experience in variety of settings. Prereq: 504. Prereq or coreq: 501, Coreq: 520. Didactic (2) and practicum (4). Sp
541 Family Nurse Practitioner II (6) Continuation of 540. Nursing management of chronic health problems of individuals and families in all developmental life stages; role refinement and exploration of major issues of family nurse practitioner; clinical experience in variety of settings. Prereq: 540. Didactic (2) and practicum (4). F
543 Nurse Practitioner (9) Exploration and application of holistic nursing concepts to nursing management of common and chronic health problems. Role refinement and exploration of major issues in delivery of holistic primary nursing care; role experiences emphasizing on student's intent to pursue certification as family nurse practitioner. Prereq: MSN in clinical concentration, 504, 505, consent of instructor. 3 hours and 8 labs. Su
550 Nursing of Women and Children I (8) Advanced practice nursing for women and children; clinical experience in role of nurse practitioner or clinical specialist in variety of settings. Health promotion and nursing interventions for actual or potential health problems of women, children, and families. Prereq: 504. Prereq or coreq: 501. Coreq: 520. Didactic (3) and practicum (5). Sp
551 Nursing of Women and Children II (8) Continuation of 550. Role refinement of nurse practitioner or clinical specialist in health maintenance and restoration for women, children, and families. Prereq: 504. Prereq or coreq: 501. Coreq: 520. Didactic (3) and practicum (5). Sp
557 Nurse Midwifery Seminar I (1) Exploration of obstetric and midwifery health care delivery; role of midwife in advanced practice. Prereq or coreq: 501, 510. F
558 Nurse Midwifery Seminar II (1) Exploration of obstetric and midwifery health care delivery; role of midwife in advanced practice. Prereq or coreq: 501, 510. F
559 Nurse Midwifery Seminar III (1) Exploration of state of science in nurse midwifery, innovative practice options, and related researchable problems in nurse-midwifery practice. Prereq: 570, 571, Coreq: 500, 560 or 582. F
560 Mental Health Nursing I (6) Theories of advanced practice interventions for clients experiencing clinical or potential mental health problems; advanced practice nursing in specialty of mental health; clinical practice with clients of various ages in acute care and community settings. Prereq: Consent of instructor. Sp
561 Mental Health Nursing II (Continuation of 560. Advanced practice nursing in community settings for families and groups with actual and potential mental health problems. Prereq: 560. Didactic (2) and practicum (4). F
565 Teaching Practicum (1-6) Individualized designed teaching experience in collegiate nursing program or nursing practice setting. Objectives to be developed collaboratively by student and faculty. Prereq or coreq: 504 and consent of instructor. S/NC or letter grade. Sp
566 Educational Principles and Strategies (3) Exploration and analyses of selected education, curriculum, teaching-learning, measurement, and evaluation principles and theories as applicable to the instruction of undergraduate nursing students. Prereq or coreq: 504. F
570 Family Nurse Practitioner I (4) Application of advanced health/physical assessment and diagnostic reasoning skills in primary/nursing management and primary care of individuals and their families with actual and potential acute health problems; clinical experience in role of family nurse practitioner in variety of settings. Prereq: 504, 515. Coreq: 520. Didactic (2) and practicum (2). Sp
571 Family Nurse Practitioner II (6) Continuation of 570. Nursing management and primary care of individuals and their families in all developmental life stages; clinical experience in primary care for women and children; clinicalexperience in variety of settings. Prereq: 570, 515. Coreq: 520. Didactic (2) and practicum (5). Sp
577 Special Topics (1-3) Topic is determined by faculty and student interest. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E
580 Nursing Project (3) Student-initiated scholarly project with faculty supervision. Review and critical evaluation of literature in specified area of advanced practice nursing; culminating in "state of the practice" paper. Prereq: Consent of instructor, first course in concentration. Su,F
582 Supervised Research (3) Supervised research culminating in scholarly paper. Experiential learning of research process. Participation in on-going faculty research project completed with specified portion of project under faculty guidance. Prereq: Consent of instructor, 501, 510. May be repeated. Maximum 6 hrs. E
583 Directed Clinical Practice (1-9) Additional opportunities for advanced practice nurse practice. Objectives to be developed collaboratively by student and faculty. Prereq: Enrollment in completion of graduate level courses in clinical nursing. Maximum 9 hrs. S/NC or letter grade. E
586 Nursing Administration I (6) Exploration, analysis, and application of selected organizational, management, and leadership theories and principles to delivery of nursing services. Prereq: Advanced study in human behavior, consultation, conflict resolution, and organizational development with application to mid-level and top-level nursing administrative positions. Prereq: 550. 2 hrs and 4 labs. Sp
591 Nursing Administration II (Continuation of 580. Leadership and management of innovative, complex, and conflictual health care organizations. Prereq or coreq: 501, 520. 2 hrs and 4 labs. Sp
593 Independent Study (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E
Nutrition

(College of Human Ecology)

MAJORS

Human Ecology ................................................. Ph.D.
Nutrition ......................................................... M.S., M.S.-M.P.H.

Michael B. Zemel, Head

Professors:
Beauchene, Roy E. (Emeritus), Ph.D. ................. Kansas State
Camath, Betty Ruth, Ph.D. .................. Missouri
Namey, T.C., M.D. .................... Washington (St. Louis)
Sachan, Dilip S., Ph.D. ....................... Illinois
Snker, Jean D., Ph.D. ....................... Oregon State
Smith, John T., Emeritus, Ph.D. ................. Missouri
Zemel, Michael (Liaison), Ph.D. ............. Wisconsin

Associate Professors:
Bailey, James W., Ph.D. ................. Iowa State
Brooks, M. D. (Memphis), M.S. ............ Alabama
Haugtht, B., Ed.D. ......................... Columbia
Karlstad, Michael, Ph.D. ................. Loyola
Kihem, J., Ph.D. ....................... Pennsylvania State
Zemel, Paula, Ph.D. ....................... Wayne State

Assistant Professors:
Bittle, Joyce (Memphis), Ph.D. .............. Tennessee
Chencherick, Judith (Memphis), M.S. .... Maryland
Moustaid, Naima, Ph.D. .................... Paris

The Master of Science program is available in Nutrition, with a concentration in nutrition science or public health nutrition.

A graduate degree combined with a Dietetic Internship (D.I.) beyond the baccalaureate degree qualifies the graduate to apply for the Registration Examination to become a Registered Dietitian (R.D.). Students may request more information from the department about the D.I. program. Students may also select an interdisciplinary minor in gerontology.

ADMISSION REQUIREMENTS

A final file for review includes the Graduate School application file, completed departmental application form, Graduate Record Examination (GRE) scores for the general section, and three Graduate School Rating Forms completed by individuals who can attest to the applicant’s potential for graduate education. Forms may be obtained from the Departmental Office, 229 Jessie Harris Building, University of Tennessee, Knoxville, TN 37996-1900. Forms may also be obtained from the Department’s website at nutrition.he.utk.edu.

Admission into the graduate program in Nutrition is dependent on completion of undergraduate courses that give the necessary background for success in the graduate program. Required undergraduate courses include: general and organic chemistry, physiological chemistry/biochemistry, physiology, statistics and advanced nutrition. Admission to the Ph.D. program in Human Ecology with a concentration in Nutrition requires a master's degree. Applicants to all programs with related experience may be given preference.

THE MASTER’S PROGRAM

Students may choose a thesis or non-thesis option in Nutrition. Attendance at Nutrition 540 is required every semester.

Thesis Option: The program consists of a minimum of 33 hours with at least 16 hours of coursework in the department. NTR 511, 512, 540, 541 and 3 hours of graduate level statistics are required. Students in public health nutrition must take 511, 512, 515, 514, 541, 540, and 515 and the minor in public health. Six hours in one area outside the department are required. A minimum of 24 hours at the 500 and 600 level is required.

A written comprehensive examination is required for completion of the program.

DUAL M.S.-M.P.H. PROGRAM

The College of Human Ecology offers a coordinated dual program leading to the conferred of both the Master of Science with a major in Nutrition (public health nutrition concentration) and the Master of Public Health. The dual program allows students to complete both degrees in less than five years. Students are required to earn both degrees independently.

The program is designed to meet the needs of students who are interested in the benefits of majors in both nutrition and public health. Therefore, it accommodates the interests of students who: 1) plan a career in public health nutrition and want to acquire the knowledge and skills of the nutritionist and public health professional; 2) plan a career in nutrition and want to acquire the knowledge and skills and the perspective of the public health professional; or 3) plan a career in nutrition and public health and want to acquire the knowledge, skills and perspective of the nutritionist.

Admission Requirements

Applicants for the M.S.-M.P.H. program must make separate applications, and be competitively and independently accepted by the Department of Nutrition for the M.S., Department of Health and Safety Sciences for the M.P.H., and the Public Health Academic Program Committee.

Students who have been accepted by both departments may apply for approval to pursue the dual program anytime prior to, or after, matriculation in either or both departments. Such approval will be granted, provided that dual program studies be started prior to entry into the fourth semester of the M.S. and M.P.H. programs.

Curriculum

A dual degree candidate must satisfy the requirements for both the M.S. (public health nutrition concentration) and the M.P.H. degrees, as well as the requirements for the dual program. All candidates for the dual degree must successfully complete the M.S. and the M.P.H. degrees independently. Students who have been accepted by both departments may apply for approval to pursue the dual program anytime prior to, or after, matriculation in either or both departments. Such approval will be granted, provided that dual program studies be started prior to entry into the fourth semester of the M.S. and M.P.H. programs.

Nutrition 155
taken in the other program, except as such courses qualify for credit without regard to the dual program.

Approved Dual Credit
M.S. courses to be counted toward the M.P.H. program must include 10 semester hours of Field Study in Community Nutrition (NTR 515) and 1 semester hour of Graduate Seminar in Public Health (NTR 509). M.P.H. courses to be counted toward the M.S. include Public Health Administration (PH 520), Biostatistics (PH 530), and Epidemiology (PH 540).

The Ph.D. Concentration
The nutrition science concentration enables students to study the science of nutrition from the cellular level to the application of nutritional principles by people in a changing environment. The doctoral program emphasizes human nutrition, nutritional epidemiology, experimental nutrition, and intermediary metabolism. Cognate areas may include anthropology, biochemistry, chemistry, communications, education, food technology, human development, physiology, public health, sociology, statistics, and/or toxicology.

Minimum requirements include:
1. Sixteen hours in nutrition including 4 hours at the 600 level (exclusive of dissertation);
2. NTR 511, 512, 541, and 2 hours from either 542-544;
3. Four hours of NTR 540, attendance required every semester;
4. Six hours of statistics;
5. Six hours in a cognate area;
6. Nine hours at the 600 level;
7. Students without college teaching experience are required to take the full semester teaching seminar for GTAs and NTR 548 comprising a faculty-supervised problem in college teaching.

Academic Common Market
An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S. program in Nutrition is available to residents of Arkansas. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records. For the Ph.D., see Human Ecology.

Graduate Courses

414 Nutrient-Drug Interactions (2) Nutrient effects on efficacy and toxicity of drugs; drug effects on absorption and metabolism of nutrients. Prereq: Fundamentals of Nutrition or equivalent. Sp,A

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

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

508 Culture, Food, and Nutrition (3) Food-related behavior of individuals and groups in United States. Socio-cultural, economic, and technological influences. Nutrition and food surveys, public policy. Prereq: Nutrition for Educators or Advanced Nutrition or consent of Instructor. F,A

509 Graduate Seminar in Public Health (1) (Same as Public Health 509, Exercise Science 509, Nursing 509 and Social Work 509.)

511 Advanced Physiological Chemistry (4) Bioenergetics, flux control and hormonal interrelationships. Prereq: Advanced Nutrition or equivalent. F


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

514 Community Nutrition II (3) Planning, implementation, evaluation of public health nutrition programs. Concurrent field experiences. Prereq: 513 or consent of instructor. Sp

515 Field Study in Community Nutrition (1-12) Personal participation in and analysis of state or regional community nutrition program. Location of in-depth study to be selected in consultation with instructor. Prereq: 513, 514 and consent of instructor. S/N only. Su

516 Maternal and Child Nutrition (3) Nutrition principles related to growth and development during pregnancy, infancy, and childhood to age 5. Risk factors. Prereq: Advanced Nutrition or consent of instructor. Sp,A

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

518 Nutrition and Aging (3) Nutritional problems of older adults; nutrient requirements, dietary intake levels, effects of nutrition on biological aging. Prereq: Advanced Nutrition or consent of instructor. Su

520 Nutritional Ecology (2) Examination of issues in natural, political, physical, and social environments that impact availability of food and nutrients in U.S. food supply. F,A

521 Physiological Basis for Diet and Disease (2) Altered nutrient needs as result of metabolic changes that occur in selected disease states. Prereq: Nutrition in Disease or consent of instructor. Sp

522 Nutrition Counseling (2) Individual eating habits and disorders, evaluation strategies for effectiveness of helping process. Prereq: Nutrition in Disease or consent of instructor. F,A

524 Nutrition Education: Principles, Implementation, and Evaluation (3) Conceptual models, principles, applications, and evaluation models in nutrition education research. Prereq: 508 or consent of instructor. Su,A

540 Seminar in Nutrition (1) May be repeated. S/N only. E

541 Research Methods (1) Basic principles of planning, conducting, and interpreting nutrition and foodservice systems administration research. Pre req: 6 graduate hrs in nutrition and food service administration and statistics. Sp,A

542 Advanced Experimental Nutrition (2) Application of research principles to individual project using experimental animals. Prereq or coreq: 541. Sp

544 Nutrition and Hospitality Survey Methods (2) Application of survey research methods to nutrition and/or hospitality projects: assessment of food consumption, nutrient intake, nutritional status, sociocultural-economic parameters, food production and service, and human resource management issues. Prereq or coreq: 541. Sp

547 Field Experience (3-9) Experience in food-related industry or agency under supervision of faculty member. Prereq: Consent of instructor. S/N only. F

548 Directed Study in Nutrition (1-3) Advanced study in nutrition. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

549 Special Topics (1-3) Recent advances in nutrition or food systems administration. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

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

602 Advanced Topics in Nutrition Science (1-3) Comprehensive individual study and group discussion of topics related to current problems in nutrition. Prereq: 512 or consent of instructor. May be repeated. F

603 Current Trends in Food and Sociocultural Change (2) Critical evaluation of research. Prereq: 508 or consent of instructor. F,A

Ornamental Horticulture and Landscape Design
(College of Agricultural Sciences and Natural Resources)

Major Degree
Ornamental Horticulture and Landscape Design............................................. M.S.

Mary L. Albrecht, Head

Professors:

Albrecht, M. L., Ph.D...................... Ohio State
Callahan, L. M., Ph.D..................... Rutgers
Carter, G. Douglas, Ph.D.............. Ohio State
Graham, E. T. (Emeritus), Ph.D........ Penn State
Gresshoff, Peter M. (Racheff Chair of Excellence), Ph.D......................... Australian National
McDaniel, G. L., Ph.D.................... Iowa State
Trigiano, R., Ph.D.......................... NC State
Williams, D. B., Ph.D.................... Penn State

Associate Professors:

Augé, R. M. (Liaison), Ph.D........... Washington State
Day, J. W., Ph.D.......................... Mississippi State
Rogers, S. M., M.L.A...................... Georgia
Starman, T. W., Ph.D.................... Texas A&M
Witte, W. T. (Liaison), Ph.D......... Maryland

Assistant Professor:

Hamilton, S. L., Ed.D.................... Tennessee
Menendez, G. L., M.S.................... Tennessee

The Department of Ornamental Horticulture and Landscape Design offers the Master of Science degree with concentrations in floriculture, science and technology, nursery science and technology, or turfgrass science and technology. Various interests may be emphasized in any of these commodity areas, including micropagation, innovative production and management systems, computer-aided management systems, and the molecular biology, genetics, histology and stress physiology of ornamentals.

For admission, the student must have a B.S. in ornamental horticulture, horticulture, plant science, or a related agricultural or basic science discipline. Undergraduate transcripts must be evaluated by the department for prerequisite requirements, if any. Graduate research assistantships are available on a competitive basis. For further information, contact the department head.

The Master's Program

Thesis Option

1. A thesis is required. A master's committee of no fewer than 3 faculty members will be selected. Prior to research for the thesis, a proposal must be approved by the master's
committee. Registration for 6 hours of Thesis 500 is required.
2. In addition to the thesis requirement, a minimum of 24 hours of graduate credit is required. Not more than 10 hours of the minimum 30 hours can be below the 500 level. The academic program must be approved by the master's committee which may require additional course work if the student's progress or background indicates such need.
3. All students are required to include 2 hours of Seminar 590 in their program and are expected to attend this course and participate in discussions each semester enrolled.
4. Twelve hours of coursework in the major must be at the graduate level, exclusive of Thesis 500. Six of these hours may be satisfied by Botany 412, 521, 522, Plant and Soil Science 471, or Animal Science 571.
5. An oral examination covering the thesis and coursework is required.

Non-Thesis Option
1. A master's committee of no fewer than 3 faculty members will be selected.
2. Thirty-four hours of graduate coursework are required of which 22 hours must be at the 500 level or above.
3. All students are required to include 2 hours of Seminar 590 in their program and are expected to attend this course and participate in discussions each semester enrolled.
4. Twelve hours of coursework in the major must be at the graduate level. Six of these hours may be satisfied by Botany 412, 521, 522, Plant and Soil Science 471, or Animal Science 571.
5. Final comprehensive written and oral examinations shall be taken upon completion of no fewer than 32 hours of approved graduate work.

GRADUATE COURSES
410 Nursery Management and Production (3) Modern management methods as applied to retail and wholesale nurseries and landscape contracting firms. Methods of producing liners, container-grown woody ornamental plants. Prereq: 220, 330, and Plant and Soil Sciences 210, or consent of instructor. 2 hrs and 1 lab. Sp
420 Advanced Turfgrass Management (4) Principles and scientific basis of turfgrass culture: adaptation, ecology, physiology, nutrition and disease resistance, disease influences on grass culture, physiology of clipping and water management; design, construction, and management of golf courses; and physiological influences of pest infestation and control measures. Prereq: 340 or consent of instructor. 3 hrs and 1 lab, Sp
451 Plant Tissue Culture (3) Same as Botany 451.
460 Professional Practices in Landscape Construction and Management (2) Professionalism, salesmanship, proposals, bidding, estimating, specification, and contract management in landscape services industry. Interaction with industry representatives through special presentations. Prereq: 350 or consent of instructor. F
480 Advanced Landscape Design (3) Comprehensive application of landscape design skills to variety of project experiences: landscape planning and analysis, planting design, and materials estimating. Prereq: Fundamentals of Landscape Design, Basic Landscape Construction, and Supplemental Landscape Design Graphics. 2-3 hrs labs. Sp
485 Computer Aided Landscape Design (3) Computer Aided Design (CAD) related to landscape design and construction. Site planning and construction of related landscape plan view and 2-D drawings. Operating system, use of AutoCAD and LANDCAD software. Prereq: Fundamentals of Landscape Design, Microcomputer Applications to Problem Solving or consent of instructor. 2-3 hrs labs. F,Sp
500 Thesis (1-15) F,N only. E

Pathology
See College of Veterinary Medicine and Comparative and Experimental Medicine

Philosophy
(College of Arts and Sciences)

MAJOR
Philosophy

DEGREES
M.A., Ph.D.

Kathleen Bohstedt, Head

Professors:
Aquila, Richard E., Ph.D. ............. Northwestern
Brenkert, George G., Ph.D. ............. Michigan
Cebik, L. B., Ph.D. .................. Nebraska
Cohen, Sheldon M., Ph.D. ............. Northwestern
Davis, John W. (Emeritus), Ph.D. ........ Emory
Edwards, Rem B. (Emeritus), Ph.D. ........ Emory
Grauer, Glenn C., Ph.D. ............. Michigan
Nelson, James L., Ph.D. ........ SUNY (Buffalo)
Posner, Betsy C., Ph.D. ............. Yale
Van de Vate, Dwight, Jr., Ph.D. ........ Yale

Associate Professors:
Bennett, James O., Ph.D. ............. Tulane
Bohstedt, Kathleen Emmett (Liaison), Ph.D. ............... Ohio State
Nolt, John E., Ph.D. ............. Ohio State
Osborne, Martha Lee, Ph.D. ........ Tennessee

Assistant Professor:
Hamlin, H. Phillips, Ph.D. ............. Georgia
Kaplen, Jonathan, Ph.D. ............. Stanford

The Department of Philosophy offers graduate study leading to the Master of Arts and Doctor of Philosophy. The M.A. program includes thesis and non-thesis options and offers a concentration in medical ethics and in religious studies. The Ph.D. program also contains a concentration in medical ethics. Detailed information may be obtained from the Director of Graduate Studies in Philosophy.

THE MASTER'S PROGRAM
The department offers both a thesis and a non-thesis option. The course requirements for an M.A. with thesis are 30 hours, including 6 hours in Philosophy 500. Of non-thesis hours, at least two-thirds must be in courses at or above the 500 level. No philosophy course numbered under 400 may be taken for graduate credit. There are no particular courses that M.A. students are required to take. The nature of the student's coursework should be determined in consultation with the student's faculty committee. The non-thesis M.A. requires 30 hours of coursework of which at least two-thirds must be in courses at or above the 500 level. Students seeking the non-thesis option must also pass a final written examination on all work offered for the degree. An additional oral examination may be required. As a part of the Master's degree, and in addition to a final comprehensive examination, a culminating (capstone) experience is expected. Examples of culminating experiences include presenting a paper at a refereed national or regional philosophy conference, or presenting a paper at a departmental colloquium.

THE DOCTORAL PROGRAM
Students must hold an M.A. with a major in Philosophy or an equivalent degree when entering the Ph.D. program. Twenty-seven hours of coursework beyond the M.A. is required, of which 6 hours will be in courses numbered above 600. See the Philosophy Department Graduate Student Procedures for specific course requirements.

Students must demonstrate a reading knowledge of a foreign language, normally a living language in which there exists a signifi-
Selected thinkers or topics: existentialism, phenomenology, hermeneutics, structuralism, post-structuralism, Pragmatism, 6 hrs of philosophy or consent of instructor. May be repeated when topic varies. Maximum 6 hrs.

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

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

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

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

524 Topics in Twentieth-Century Philosophy (3) Intensive critical work on major philosopher or school. May be repeated. Maximum 9 hrs.

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

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

542 Topics in History of Ethics (3) Dominant movements from antiquity through mid-twentieth century. May be repeated. Maximum 9 hrs.

544 Topics in Applied Ethics (3) Single author, tradition, or topic in ethical theory. Application to issues in health, business, technology, ecology, and other practical fields. Within limits of time or experience. May be repeated. Maximum 9 hrs.

546 Orientation to Medical Ethics (3) Survey of ethical theories in application to issues in medical ethics. May be repeated. Maximum 9 hrs.

547 Ethical Issues in Mental Health (3) Values in "mental health" and "mental illness," informed consent in psychiatry, competence, patient rights, involuntary hospitalization, and treatment, and behavioral control therapies. May be repeated. Maximum 9 hrs.

548 M.A. Clinical Practicum (3) Series of clinical rotations at one or more local health care institutions. Open only to graduate students concentrating in medical ethics. Prereq: 547 and consent of Medical Ethics Committee and the UTMCY Graduate Education Committee.

553 Philosophical Topics in Literature and the Arts (3) Aesthetics, criticism, art and society. May be repeated. Maximum 9 hrs.

575 Topics in Metaphysics and Epistemology (3) May be repeated. Maximum 9 hrs.

577 Topics in Philosophy of Mind (3) Relation of mental to physical and of role of words in discourse for mental activities, thinking and feeling. May be repeated. Maximum 9 hrs.

586 Special Topics (3) May be repeated. Maximum 9 hrs.

587 Advanced Clinical Medical Ethics (3) Critical concepts in medical ethics, relationship of theory to practice, and professional roles and responsibilities for health care ethics consultant. Open only to Ph.D. students concentrating in medical ethics. Prereq: Consent of Medical Ethics Committee.

588 Ph.D. Clinical Practicum (9) Series of clinical rotations at one or more local health care institutions. Open only to Ph.D. students concentrating in medical ethics. Prereq: 587 and consent of Medical Ethics Committee and the UTMCY Graduate Education Committee.

590 Topics in Social and Political Philosophy (3) Philosophical problems concerning social and political life: family, state, freedom, justice, major theoretical responses: anarchism, social contract, Marxism. May be repeated. Maximum 9 hrs.

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

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

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

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

620 Topics in Ancient or Medieval Philosophy (3) May be repeated. Maximum 9 hrs.

622 Topics in Modern Philosophy (3) May be repeated. Maximum 9 hrs.

624 Topics in Contemporary Philosophy (3) May be repeated. Maximum 9 hrs.

640 Topics in Ethics or Value Theory (3) May be repeated. Maximum 9 hrs.

646 Topics in Applied Ethics (3) Prereq: Consent of Medical Ethics Committee. May be repeated. Maximum 9 hrs.

675 Topics in Metaphysics and Epistemology (3) May be repeated. Maximum 9 hrs.

### Physics and Astronomy

MAJOR

DEGREES

Physics ............................................. M.S., Ph.D.

Lee Riedinger, Head

Professors:

Barnes, F. E., Ph.D. ........................................ California
Bingham, C. R., Ph.D. ........................................ Tennessee
Blass, W. E., Ph.D. ........................................ Michigan State
Breinig, M., Ph.D. .......................................... Oregon
Bugg, W. M., Ph.D. ......................................... Tennessee
Burgdoerfer, J. (Distinguished Prof.), Ph.D. ............... Freie Universität Berlin
Callcott, T. A., Ph.D. ........................................ Purdue
Childers, R. W., Ph.D. ....................................... Vanderbilt
Crate, H. W. (UTSI), Ph.D. ................................ Yale
Egliuz, A. G., Ph.D. ......................................... Brown
Elston, S. B., Ph.D. ......................................... Massachusetts
Georgiou, S., Ph.D. ......................................... Manchester
Guidry, M. W., Ph.D. ...................................... Tennessee
Handier, H. Ph.D. ............................................. Rutgers
Hart, E. L., Ph.D. ........................................... Cornell
Lewis, W. J. L. (UTSI), Ph.D. ................................ Mississippi
Maciek, J. (Distinguished Scientist), Ph.D. ..................... Rensselaer
Mahan, G. D. (Distinguished Scientist), Ph.D. ................. California
McGregor, W. K. (UTSI), Ph.D. ............................ Tennessee
Nazarwicz, W., Ph.D. ...................................... Warsaw
Painter, L. R., Ph.D. ........................................ Tennessee
Pegg, D. J., Ph.D. ............................................. New Hampshire
Plummer, E. W. (Distinguished Scientist), Ph.D. ............... Cornell
Quinn, J. J. (Willis Lincol Chair of Excellence), Ph.D. ........ Maryland
Riedinger, L. L., Ph.D. ....................................... Vanderbilt
Sellin, I. A. (Distinguished Prof.), Ph.D. Chicago
Shih, C. C. (Liaison), Ph.D. ........................................ Cornell
Sorensen, S. P., Ph.D. ..................................... Copenhagen
Strayer, M. R., Ph.D. ........................................ MIT
Thompson, J. R., Ph.D. ...................................... Duke
Ward, B. F. L., Ph.D. ......................................... Princeton

Associate Professors:

Canright, G., Ph.D. ........................................ Tennessee
Ferrell, T. L., Ph.D. ........................................... Clemson
Shieh, S. Y., Ph.D. ........................................... Maryland

Assistant Professors:

Daunt, S. J., Ph.D. ........................................... Queens
Dean, D. J., Ph.D. ........................................... Vanderbilt
The department offers an M.S. thesis program with a concentration in geophysics. Program requirements are: 12 hours from Physics 531-32, 541-42, 571-72, a minimum of 12 additional hours in geology, geophysics, and/or physics, as approved by the student’s committee; and the presentation of an acceptable thesis, 6 hours of Physics 500, and the passing of an oral examination on course material and thesis.

Non-Thesis Option

This program is designed primarily for students intending to teach in colleges or universities on the elementary or intermediate level, or for students specifically intending to work toward a Ph.D. Students seeking the non-thesis option must apply to the department’s graduate committee for permission to enroll under this program. The requirements are the satisfactory completion of 30 hours of coursework composed of 18 semester hours from Physics 511-12, 521-22, 531-32, 541-42, and 571-72; 6 semester hours in a minor field; and 6 semester hours from other courses numbered above 400 (preferably of advanced laboratory nature). At least 20 hours must be taken at the 300 level or above. In addition, the candidate must pass the written examination administered by his/her committee.

THE DOCTORAL PROGRAM

All students are expected to take Physics 521-22, 531-32, 541-42, 551, 571-72, and 611. Physics 601-02 are normally required of students specializing in atomic physics; Physics 621-22 of students in nuclear physics; Physics 625-27 of students in elementary particle physics (and for Physics 613-14 for students specializing in theoretical high-energy physics); Physics 671-72 of students in condensed matter and surface physics; and Physics 681-82 of students specializing in molecular spectroscopy. Students specializing in chemical physics may substitute Chemistry 572 for Physics 551, and should complete at least 6 semester hours from Chemistry 580, 670.

The courses Physics 531-32, 571-72, 521-22, 541-42 constitute the core curriculum. They are the usual basis for the departmental comprehensive examination which is normally taken by a well-prepared student after two years of graduate study.

The dissertation topic will be chosen with reference to one of the fields in which research facilities can be made available either at Oak Ridge National Laboratory, Oak Ridge, Tennessee, or at other research facilities used by the University faculty.

Astronomy

GRADUATE COURSES

411 Astrophysics (3) Development of analytical physical models of galactic structure of universe, stellar and interstellar matter, and planetary systems. Topical and interdisciplinary consideration of quantum mechanics, pulsars, black holes, and current developments in field. Acceptable for major credit in physics. Prereq: Physics 232 and consent of instructor.

490 Special Topics in Astronomy (1-3) Topics of current interest in astronomy and astrophysics. Acceptable for graduate credit in physics with consent of department.

Physics

GRADUATE COURSES


421 Modern Optics (4) Transmission of light in uniform, isotropic media, refraction and reflection at interfaces, mathematics of wave motion and interference effects, diffractions of Fourier optics and holography. Prereq: 431, or Introduction to Physics for Physical Science and Mathematics Majors or Honors. Fundamentals of Physics for Physics Majors or Fundamentals of Physics: Wave Motion, Optics, and Modern Physics and consent of instructor.


461-62 Modern Physics Laboratory (3,3) 461 - Introduction to fundamental and modern techniques in experimental physics, and to theory and practice of measurement and data analysis. Selected experiments in nuclear, atomic, and solid state physics, and in modern and quantum optics. Prereq: Electronics Laboratory and either Fundamentals of Physics: Modern Physics or 411 - Advanced experiments and experimental techniques in quantum mechanics; experimental teamwork. Through quantum techniques, interpretation of results and preparation of scientific reports. Prereq: 461, 462: 6 hrs lab per week.

471-72 Health Physics (3,3) Radiation effects, interaction of electromagnetic radiation with matter, radiological quantities and units, point source and extended sources, x-rays and gamma rays, neutron activation, interaction of charged particles with matter, stopping power, range and energy dep-osition, criticality prevention, radiological protection and ecology. Prereq: Consent of instructor.

490 Senior Seminar (1-3) Topic of current interest. May be repeated with consent of department. Maximum 6 hrs.

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

501 Graduate Research Participation (3) Advanced research techniques under supervision of staff research director whose research area coincides with interests of student. Open to all graduate students in good standing. Prereq: Consent of department and research director. May be repeated with consent of department. Maximum 15 hrs. S/N only. E

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

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

565 Experimental Methods (3) Principles, real operational behavior, and hazards of laser types, radiation detection, spectroscopy, collimated beams, interferometric and photometric measurements, image converters, image intensifiers, readout systems, high-vacuum systems, and electronic equipment. May be repeated. S/N only. E

590 Special Problems (1-3) Topics of current interest in particular area. May be repeated with consent of department. Maximum 9 hrs.

GRADUATE PROGRAM

The University of Tennessee Space Institute offers graduate programs leading to the Master of Science and Doctor of Philosophy. The graduate programs leading to the M.S. and Ph.D. are also available at The University of Tennessee Space Institute, Tullahoma, where opportunities for study and research are available in quantum optics and laser physics, atomic and molecular spectroscopy, fluid physics, and theoretical physics. Additional information is available from the department head.

ADMISSION REQUIREMENTS

A student who enrolls in The Graduate School with the intention of attaining an advanced degree in Physics will have completed an undergraduate major in Physics or its equivalent. Physics 311-12, 321, 361, 431-32, and 490 constitute the minimum course prerequisites to graduate study.

A student who intends to present Physics as a graduate minor will have completed an undergraduate minor in Physics or its equivalent. Physics 311 and 431-32 constitute the minimum coursework prerequisite to a minor in Physics.

All first-year graduate students are required, for advising purposes only, to take a qualifying examination in undergraduate physics during the fall semester registration period.

THE MASTER'S PROGRAM

Thesis Option

This program is designed primarily for students intending to go into industrial or governmental laboratories as physicists. The course requirements include 24 semester hours of physics courses, of which at least 12 semester hours are taken from Physics 511-12, 521-22, 531-32, 541-42, or 571-72. Each candidate must present an acceptable thesis, 6 hours of 500, and pass an oral examination on course material and thesis.

Non-Thesis Option

This program is designed primarily for students intending to teach in colleges or universities on the elementary or intermediate level, or for students specifically intending to work toward a Ph.D. Students seeking the non-thesis option must apply to the department’s graduate committee for permission to enroll under this program. The requirements are the satisfactory completion of 30 hours of coursework composed of 18 semester hours from Physics 511-12, 521-22, 531-32, 541-42, and 571-72; 6 semester hours in a minor field; and 6 semester hours from other courses numbered above 400 (preferably of advanced laboratory nature). At least 20 hours must be taken at the 300 level or above. In addition, the candidate must pass the written examination administered by his/her committee.

THE DOCTORAL PROGRAM

All students are expected to take Physics 521-22, 531-32, 541-42, 551, 571-72, and 611. Physics 601-02 are normally required of students specializing in atomic physics; Physics 621-22 of students in nuclear physics; Physics 625-27 of students in elementary particle physics (and for Physics 613-14 for students specializing in theoretical high-energy physics); Physics 671-72 of students in condensed matter and surface physics; and Physics 681-82 of students specializing in molecular spectroscopy. Students specializing in chemical physics may substitute Chemistry 572 for Physics 551, and should complete at least 6 semester hours from Chemistry 580, 670.

The courses Physics 531-32, 571-72, 521-22, 541-42 constitute the core curriculum. They are the usual basis for the departmental comprehensive examination which is normally taken by a well-prepared student after two years of graduate study.

The dissertation topic will be chosen with reference to one of the fields in which research facilities can be made available either at The University of Tennessee laboratories in Knoxville, The University of Tennessee Space Institute at Tullahoma, Tennessee; the Oak Ridge National Laboratory, Oak Ridge, Tennessee; or at other research facilities used by the University faculty.

Astronomy

GRADUATE COURSES

411 Astrophysics (3) Development of analytical physical models of galactic structure of universe, stellar and interstellar matter, and planetary systems. Topical and interdisciplinary consideration of quantum mechanics, pulsars, black holes, and current developments in field. Acceptable for major credit in physics. Prereq: Physics 232 and consent of instructor.

490 Special Topics in Astronomy (1-3) Topics of current interest in astronomy and astrophysics. Acceptable for graduate credit in physics with consent of department.
state, and federal agencies concerned with physical, economic, and administrative planning, in private business and organizations dealing with development problems; and in private consulting.

The Master of Science in Planning program is accredited by the Planning Accreditation Board, a joint undertaking of the American Institute of Certified Planners and the Association of Collegiate Schools of Planning.

THE MASTER'S PROGRAM

Admission Requirements

Applicants are to submit an application for admission to The Graduate School, and two letters of reference from faculty familiar with their academic work and a statement describing personal career objectives directly to the School of Planning. If the applicant has prior work experience in planning, a reference letter should also be provided by the work supervisor. Graduate Record Examination scores are required of all applicants whose undergraduate GPA is below 3.0. Other applicants are encouraged to submit them. Students who have not taken an appropriate undergraduate statistics course will be required to take one as part of their graduate program.

Degree Requirements

The M.S. program requires completion of at least 48 hours of graduate credit, at least 30 of which must be in planning. The following courses are the core curriculum required of all students: 510, 511, 512, 515, 520, 521, 530, 531, 532, 540 and 570.

Students should plan to enter the program in the fall term to take core courses in the proper sequence. Each student is required to develop an area of concentrated competence beyond the core curriculum. After selecting the area of concentration, usually by the end of the second semester, the student takes a minimum number of courses or hours from a prescribed set of courses in the subject area. Further enhancement of the concentration is gained by focusing the thesis or major paper on the subject.

Concentration courses are drawn from the planning curriculum and from other departments in the University. Concentrations are available in land use planning, environmental planning, real estate development planning, and transportation planning.

Students have the latitude to propose an alternate specialization consisting of at least 9 hours of coursework, subject to approval of a faculty committee. Each student is required to demonstrate competence in individual research. This may be done in one of two ways:

Thesis Option—Complete a thesis for 6 hours credit;
Non-Thesis Option—Complete a major study with acceptable documentation. To be eligible for the major study option, the student must have completed at least 12 hours of graduate coursework in planning with at least a 3.5 cumulative grade-point average. The student meeting these criteria may present a proposal to his/her committee for a major study that will include at least 6 hours of subsequent coursework. The proposal shall justify the selection of the topic, describe the approach to the study, and describe the nature of the final product. The topic will normally be expected to reinforce or complement the student's concentration.

Successful completion of a comprehensive final exam is required before graduation. The exam will normally be taken after completion of the core requirements in the second year. Based on the material generally used by the American Institute of Certified Planners (AICP), this requirement provides an additional capstone experience as well as preparation for meeting AICP professional certification requirements.

Student academic progress is monitored by the faculty. A student failing to maintain an acceptable grade-point average may be placed on probation or dismissed from the program.

MINOR IN ENVIRONMENTAL POLICY

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

ACADEMIC COMMON MARKET

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

GRADUATE COURSES

401 The City in the U.S. (3) Development and character of U.S. cities. Contemporary issues and selected case studies. (Same as Urban Studies 401.)
446 Housing (3) Nature and demand for housing in U.S. and abroad, U.S. experience. Private market processes and public influences. Problems of change in housing supply, impact of new technology, and governmental programs to improve supply and quality of housing.
500 Thesis (1-15) P/NP only. E
501 Thesis and Major Paper Proposal Writing (1) Preparation
502 Registration for Use of Facilities (1-15) Required for the student not registered in a degree program who wishes to use University facilities. May not be used toward degree requirements. May be repeated. SNC only. E
510 Fundamentals of Planning (2) History of planning, structure and development of urban areas, operations of contemporary planning, trends and issues.
511 Graphic and Oral Communications in Planning
512 Community Planning Process (1) Planning process, policy processes and development process. Field reconnaissance of study communities and development of approaches for assessing community.
515 Theory of Planning (3) Analysis of nature and objectives of planning process; role of planner and planning function in public decision-making. Prereq: 510 or consent of instructor.
520 Planning Research Methods (3) Overview of research methods in social science research in planning practice; familiarity with structure of planning literature information sources, systematic retrieval techniques, processes and tools, practice in posing research questions relevant to planning.
521 Information Systems and Networking in Planning (3) Use and impact of computer-based information systems and global networks in planning and public management.

523 Statistics for Planners (3) Applications of statistical techniques. Intuitive explanations and practical applications. Use of computers to explore concepts.
525 Planning Information Systems (3) Design, analysis, and use of planning information systems to support decision making in public agencies. Prereq: 515 or consent of instructor.
526 Library Research for Planning (1) Survey of publication of interest to planners, sources and research techniques. Use of libraries and collections of library.
530 Policy and Land Use Analysis (3) Basic methods of policy analysis and planning. Concept and framework for land use planning and development. Prereq: 515 or consent of instructor.
531 Urban and Regional Analysis (3) Past, present and possible future patterns of urban and regional structures, drawing on contemporary theories, models, and empirical research.
532 Planning Methods (4) Preparation of comprehensive plans for urban areas or regions. Development of baseline data and forecasts, formulation of alternative plans and strategies, and development of development programs. Prereq: 515 or consent of instructor.
533 Planning for Economic Development (3) Planning for economic development. Prereq: 515 or consent of instructor.
534 Planning for Historic Preservation (3) Planning for preservation, restoration, and conservation of historic buildings, areas, and sites related to comprehensive planning process. National, state, and local government role in preservation, designation of sites, legal, and technical organizations.
535 Planning and Environmental Policy (3) Principles of environmental and resource management and planning. Prereq: 515 or consent of instructor.
536 Planning and Property Development (2) Process of urban physical growth and change; functioning of private sector real estate development and its relationship to planning. Partnership between public and private sectors in urban development and redevelopment. Prereq: 515 or consent of instructor.
547 Negotiation (1) Methods, strategies, and skills useful to planners in mediation, negotiation, and dispute resolution concerning urban planning and development.
548 Urban and Local Government Planning (3) Principles of urban and local government planning. Prereq: 515 or consent of instructor.
549 Fiscal Planning and Capital Improvements (3) Fiscal planning and capital improvements programs within a geographic region. Tourism planning and implementation. Development of tourism and planning of tourist attractions and services. Application of techniques in selected area.
551 State and Regional Planning (3) Theory and practice of planning at state, sub-state, and metropolitan levels.
Plant and Soil Sciences

(College of Agricultural Sciences and Natural Resources)

MAJOR DEGREES

Plant and Soil Science M.S., Ph.D.

Fred L. Allen, Head

Professors:
Allen, Fred L., Ph.D. ... Minnesota Ammons, J. T., Ph.D. ... West Virginia Ball, Frank F. (Emeritus), Ph.D. ... Iowa State Coffey, D. L., Ph.D. ... Purdue Conger, B. V. (Distinguished Prof.), Ph.D. ... Washington State Dayton, D. E. (Liaison), Ph.D. ... NC State Duck, B. N., Ph.D. ... Auburn Foss, John E. (Emeritus), Ph.D. ... Minnesota Fribourg, Henry A., Ph.D. ... Iowa State Hayes, R. O., Ph.D. ... Illinois Howard, D. F., Ph.D. ... Auburn Lewis, R. J. (Emeritus), Ph.D. ... NC State Miller, R. D., Ph.D. ... Kentucky Mullins, C. A., Ph.D. ... Tennessee Parks, William L. (Emeritus), Ph.D. ... Purdue Reynolds, John H., Ph.D. ... Wisconsin Sams, C. E., Ph.D. ... Michigan State Springer, M. E. (Emeritus), Ph.D. ... California Swingle, H. D. (Emeritus), Ph.D. ... Louisiana State Tyler, D. D., Ph.D. ... Kentucky West, D. R., Ph.D. ... Nebraska

Associate Professors:
Essington, M. E., Ph.D. ... California (Riverside) Gwathmey, C. O., Ph.D. ... California (Davis) Lessman, Gary M., Ph.D. ... Michigan State Logan, Joanne, Ph.D. ... Nebraska Mueller, Thomas C., Ph.D. ... Georgia Mullen, M. D., Ph.D. ... NC State Reich, V. H., Ph.D. ... Iowa State Wyatt, J. E., Ph.D. ... Florida

The Department of Plant and Soil Sciences offers graduate programs leading to the Master of Science and the Doctor of Philosophy. Concentrations for the graduate programs are offered in soil science, plant breeding and genomics, and crop physiology and ecology.

For further information, contact the department head.

THE MASTER'S PROGRAM

Thesis Option
This option requires writing a thesis based on original research. Six hours of 500 Thesis courses are required. Prior to conducting research, the student must develop a detailed written research plan. In addition to the thesis hours, a minimum of 24 hours of graduate coursework is required, of which at least 12 must be taken in courses numbered 501 and above. The student's advisory committee may require additional coursework if the student's progress or background indicates such need. Each student is expected to take 1 hour of 501 and 1 hour of 503, and to present an oral seminar on the thesis research.

The student's advisory committee consists of the major professor, who acts as chairperson of the committee, and a minimum of two other faculty members. The advisory committee approves the student's research problem and coursework and conducts the final oral examination integrating the thesis and coursework.

A student having started on the non-thesis option may transfer to the thesis option upon approval by a potential major professor and the Department Head.

Non-Thesis Option
A student desiring the non-thesis option should declare this intention at the beginning of the first semester of graduate studies and must declare it before the beginning of the second semester. In lieu of the thesis, students are required to complete 3 hours of 593 for satisfactory participation in a single research program for a period of 12 weeks and the writing of an original, creative, and well-written report, both to be conducted by the major professor and approved by the advisory committee. In addition to 3 hours of 593, a minimum of 30 hours of graduate coursework is required, which at least 12 must be taken in courses numbered 501 or above, for a total of 33 hours.

The student's advisory committee may require additional coursework if the student's progress or background indicates such need. Each student is expected to take 1 hour of 501 and 2 hours of 503.

The student's advisory committee consists of the major professor, who acts as chairperson of the committee, and a minimum of two other faculty members. The advisory committee approves the student's coursework and the report on participation in a research program for 593. Students are required to take a written comprehensive examination integrating the coursework.

THE DOCTORAL PROGRAM

A minimum of 72 hours beyond the Bachelor's degree, exclusive of credit for Thesis 500, is required. Of this number, 24 hours must be Doctoral Research and Dissertation 600. A minimum of 26 hours must be completed in courses numbered above 500 exclusive of doctoral research and dissertation, of which 6 must be in courses numbered above 600. A minimum of 9 hours of graduate course work taken during the doctoral program must be outside the department in one or more cognate areas.

The student and the major professor identify a doctoral committee composed of at least four faculty members holding the rank of assistant professor or above, three of whom, including the chair, must be approved by the Graduate Council to direct doctoral research. At least one member must be from outside the department. The committee must approve all coursework applied toward the degree, certify the student's mastery of the major field and any cognate fields, direct the research, and recommend the dissertation for approval and acceptance by The Graduate School.

GRADUATE COURSES

412 Soil Genesis and Classification (3) Soil genesis and formation; observing and describing morphology of agricultural and forest soils; chemical and physical properties, classification. 3 weekend field trips. Prereq: Soil Science 2 and 1 lab. F

413 Soil Chemistry (3) Composition and chemical properties of soils and processes that govern fate and behavior of chemicals in soil environment. Clay mineralogy; soil organic matter; mineral weathering and stability; aqueous speciation; surface chemistry; ion exchange, sorption, and molecular retention; oxidation-reduction, and soil acidity, alkalinity, and salinity. Prereq: Soil Science and Introduction to Organic and Biochemistry or Organic Chemistry or equivalent. F

414 Soil, Land Use, and the Environment (3) Soil as environmental component and soil properties affecting land use. Soil as resource in development planning; consideration of nonsite-specific factors and aspects of soil selection for land use, soil survey and resource data in land use, recognition and prevention of soil pollution. Prereq: 210 or consent of instructor. Sp,A

415 Soil Hydrology (3) Physical relationships among solid, liquid, and gas phases of soil system; relationships of soil properties to processes governing transport of water, and chemicals in soil. Prereq: Soil Science, 2 hours and 1 lab. F,A

431 Physiology and Ecology in Agroecosystems (3) Plant physiology and ecology applied to crop production and management. Plant physiology and ecology principles related to crop production practices from seedling emergence to harvest and handling, interaction of crops with environment and sustainable agroecosystems. Prereq: Crop Science, 2 hours and 12-hour lab. F

432 Bioclimatology (3) Solar energy budget; interactions between global, regional, and local climates and biophysical systems; quantification of macro- and microclimates; microclimates and their modification; automated weather station data collection and analyses; biological responses to climatic stresses; climate variation and change and their effects on biological systems. Prereq: 1 yr physical or biological science, junior standing, F,A

433 Agricultural Pesticides (3) Regulation of pesticide development, manufacture, transportation, marketing and use; structure, use, mode of action, degradation and environmental impact of pesticides used in agriculture, forestry and related areas. Prereq: 1 yr biological sciences and 1 semester chemistry. 2 hours and 1 lab. Sp

434 Fruit and Vegetable Crops (3) Principles of production systems to counter environmental stresses and to increase productivity of warm and cool season vegetable crops, small fruit crops, and deciduous tree fruit crops. Storage of crops after harvest. Prereq: Introduction to

Storage of crops after harvest. Prereq: Introduction to

Storage of crops after harvest. Prereq: Introduction to
Crop Science and World Crops or Crop Science, 2 hrs and 1 2-hr lab. F

435 Field and Forage Crops (3) Agronomic principles of crop production and management. Crop improvement, cropping systems, forage, tillage, pest management, and utilization of major field and forage crops. Prereq: Crop Science and World Crops 2, hrs and 1 lab. Sp, F

437 Principles of Plant Breeding (3) Genetic principles and techniques used in crop improvement. Consideration of breeding methods for various types of plant reproduction systems and application. Discussion of heritability estimation, genetic advances through selection and theory upon which breeding methods are based. Prereq: Biodiversity. Germplasm Conservation and Plant Improvement 471, and General Genetics. 2 hrs and 1 2-hr lab. Sp, A

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

501 Seminar Preparation (1) Application of speaking, writing, and organizational skills in preparation and presentation of scientific material to both scientific and non-scientific audiences. Preparation of abstracts for scientific presentations. Required for all entering graduate students during their first year of graduate study. May be repeated. S/NC only. E

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

503 Seminar (1) Presentations and discussion of current scientific material. May be repeated. Maximum 3 hrs. F, Sp

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

509 Scientific Communication (1) (Same as Agriculture 509, Animal Science 509, and Ornamental Horticulture and Landscape Design 509.) F

511 Advanced Soil Fertility (3) Concepts of soil chemistry as related to nutrient movement and adsorption by plant roots. Fertilizer use efficiency as measured by plant response factors. Prereq: 413. Sp, A

512 Pedology (3) Physical and chemical weathering processes, factors of soil formation, soil forming processes. Prereq: 412 or consent of instructor. 2 hrs and 1 lab. F, A

514 Advanced Soil Physics (3) Theory and mathematical modeling of the movement of water and solute transport in unsaturated soils; analysis of soil physical properties, crop growth processes; statistical analysis of data and interpretation of results. Prereq: 413 or equivalent. 2 hrs and 1 lab. F, A

515 Advanced Plant Physiology (3) Theory and mathematical modeling of the movement of water and solute transport in unsaturated soils; analysis of soil physical properties, crop growth processes; statistical analysis of data and interpretation of results. Prereq: 413 or equivalent. 2 hrs and 1 lab. F, A

518 Integrated Pest Management (3) Concepts of soil biology and chemistry as related to nutrient movement and adsorption by plant roots. Fertilizer use efficiency as measured by plant response factors. Prereq: 413. Sp, A

521 Advanced Crop Ecology (3) General and specific relations among environmental factors, crop organization, and agricultural systems; quantitative methods of analysis of macro- and microclimatic factors. Prereq: 411 or equivalent. F

525 Quantitative Genetics (3) Genetic analysis of continuous variation using genetic variance and heritability; selection theory and prediction of response to selection. Prereq: 471, Biology 220. Sp, A

571 Design and Analysis of Biological Research (3) (Same as Animal Science 571.)
achieved a satisfactory grade in Political Science 596, Workshops in Computer Applications. Exceptions to this requirement will be considered on an individual basis.

The M.P.A. is a non-thesis program requiring 39 hours. Specific requirements include the following:

1. Core Curriculum (24 hours)
   a. General perspectives (9 hours) - 550 Public Administration; 552 Organization Theory; and any one of the following: 539 State and Local Government; 540 Public Law; 546 Law and the Administrative Process; 546 Public Policy Process; 550 The Politics of Administration; or 566 Ethics, Values, and Morality in Public Administration.
   b. Analytical skills (6 hours) - 512 Quantitative Political Analysis; 514 Research and Methodology in Public Administration.
   c. Management skills (9 hours) - 560 Public Budgeting and Finance; and any two of the following: 562 Public Management; 564 Human Resources Management; 556 Policy Analysis.
2. Specialization (9 hours)
   A specialization is designed by the student in consultation with the coordinator of the M.P.A. The possible specializations include general government, public health, budgeting and finance, planning, natural resources, program evaluation, criminal justice, public relations, personnel, and others.
3. Recommended Internship (6 hours)
   Internships are arranged in consultation with the coordinator of the M.P.A. degree program.
4. Final Examination
   A written final examination, which may be followed by an oral examination, is required.

**DUAL J.D.-M.P.A. PROGRAM**

The College of Law and the Department of Political Science in the College of Arts and Sciences offer a coordinated dual degree program leading to the conferral of both the Doctor of Jurisprudence and Master of Public Administration degrees. In this program, a student may earn the M.P.A. and J.D. degrees in about four years rather than the five years that otherwise would be required. Students pursuing the dual program must plan to be enrolled in coursework for an internship for one summer term in addition to taking normal course loads for four academic years.

**Admission**

Applicants for the J.D.-M.P.A. program must make separate application to, and be independently accepted by, the College of Law for the J.D. degree and the Department of Political Science and The Graduate School for the M.P.A. degree. Applicants must also be accepted by the Dual Degree Committee. All applicants must submit the Law School Admission Test (LSAT) score. An applicant's LSAT score may be substituted for the Graduate Record Examination (GRE) score, which is normally required for admission to the M.P.A. program. Application may be made prior to or after matriculation in either the J.D. or the M.P.A. program, but application to the dual program must be made prior to entry into the last 29 semester hours required for the J.D. degree and prior to entry into the last 15 hours required for the M.P.A. degree.

**Curriculum**

A dual degree candidate must satisfy the requirements for both the J.D. and the M.P.A. degrees, as well as the requirements for the dual program. The College of Law will award a maximum of 9 semester hours of credit toward the J.D. degree for successful completion of approved graduate level courses (500 or 600 level) offered in the Department of Political Science. The M.P.A. program will award a maximum of 9 semester hours of credit toward the M.P.A. degree for successful completion of approved courses offered in the College of Law. All courses for which cross-credit is awarded must be approved by the J.D.-M.P.A. coordinators in the College of Law and the Department of Political Science. All candidates for the dual degree must successfully complete Administrative Law (Law 821) and are encouraged to take Local Government (Law 824). An internship is strongly recommended for students in the dual degree program, as it is for all M.P.A. candidates, but an internship is not required.

During the first two years in the dual program, students will spend one academic year completing the required first year of the College of Law curriculum and one academic year taking courses solely in the M.P.A. program. During those first two years, students may not take courses in the opposite area, without the approval of the J.D.-M.P.A. coordinators in both academic units. In the third and fourth years, students are strongly encouraged to take both law and political science courses each semester.

Dual degree students who withdraw from the program before completion of the requirements for both degrees will not receive credit toward either the J.D. or the M.P.A. degree for courses taken in the other program except as such courses qualify for credit without regard to the dual program.

**Awarding of Grades**

For grade recording purposes in the College of Law and the Department of Political Science, grades awarded in courses in the other unit will be converted to either Satisfactory or No Credit and will not be computed in determining a student's GPA or eligibility for graduation. The College of Law will award a grade of Satisfactory for an approved M.P.A. course in which the student earns a grade of B or higher and a grade of No Credit for any lower grade. The Political Science Department will award a grade of Satisfactory for an approved law course in which the student earns a grade of 2.3 or higher and a grade of No Credit for any lower grade. The official academic record of the student maintained by the Registrar of the University shall show the actual grade assigned by the instructor without conversion.

**THE DOCTORAL PROGRAM**

The Ph.D. program prepares students for careers in college teaching, as well as careers in other occupations related to service in the public or private sectors. Applicants for admission to the program should normally have completed a master's degree in political science or a related field with a 3.5 GPA and have earned a composite score of at least 1100 on the verbal and quantitative parts of the Graduate Record Examination. Doctoral students admitted to the program must complete 84 hours beyond the bachelor's degree, including 24 hours of coursework beyond the master's degree, graded A-F, must successfully pass written and oral comprehensive examinations in three broad fields of political science, and must pass a final oral examination on the dissertation.

In addition, students must satisfy a research tool requirement. Usually, students meet this requirement by completing 12 hours of coursework numbered above 500 in empirical theory and research methodology. However, if a student's advisor and program committee certify that competency in a foreign language is a more appropriate research tool, a foreign language can be used instead.

In addition to the total hours required for the degree, the following requirements must also be met:

1. At least 69 hours must be in political science courses.
2. At least 54 hours in political science must be in courses numbered above 500.
3. Completion of Political Science 510, 511, and 512.
4. Completion of at least three courses or seminars at UTK in each of the three broad subfields in which the student takes examinations.
5. Completion of at least one course or seminar in each of six broad subfields available for graduate instruction in the department.
6. At least 6 hours must be earned in political science courses numbered above 600.
7. A total of 24 hours must be earned by writing the dissertation.

**MINOR IN ENVIRONMENTAL POLICY**

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

**GRADUATE COURSES**

430 United States Constitutional Law: Sources of Power and Restraint (3) Analysis of judicial review, constitutional powers of President and Congress, federalism, sources of regulatory authority, and constitutional protection of political and economic rights.

431 U.S. Constitutional Law: Civil Rights and Liberties (3) Analysis of current issues in civil rights and liberties, including: first amendment freedoms, equal protection, privacy and rights of accused.

442 Administrative Law (3) Legal dimensions of administrative power and procedures, and constitutional controls over administrators.

452 Black African Politics (3) Recent evolution and current political environment of Black African nations. (Same as Afro-American Studies 452.)

454 Government and Politics of China and Japan (3) Examination of the political setting, structure and political processes in China and Japan.

459 Government and Politics of the Soviet Union (3) Origins and development of Soviet political system, and study of selected policy areas.

461 Policy Making in Democracies (3) Comparative approach to theory and process of making public policies.

463 Contemporary Middle East Politics (3) Governments and movements in Middle East, their characteristics, bases, and interrelationships.

470 International Law (3) Nature and development of international law and compliance. Function of international law in context of international conflict.

475 Ancient and Medieval Political Thought (3) Survey of major western political thinkers from Socrates to Malthus as well as Marx.

476 Modern Political Thought (3) Survey of major western political thinkers from Machiavelli to Marx.

500 Thesis (1-15) P/NP only. E
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
<th>Repeatable with Instructor's Consent</th>
<th>Maximum Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>502</td>
<td>Registration for Use of Facilities (0-15)</td>
<td>Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated.</td>
<td>E</td>
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<tr>
<td>510</td>
<td>Scope and Methods in Political Science (3)</td>
<td>Procedures of analysis in political science.</td>
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<tr>
<td>511</td>
<td>Research Design (3)</td>
<td>Methods for planning and executing research, from case studies to experimental designs: development of hypotheses and research questions, statistical models, and validity of inferences.</td>
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<tr>
<td>512</td>
<td>Quantitative Political Analysis (3)</td>
<td>Methods and techniques in quantitative political analysis: univariate and bivariate statistical techniques.</td>
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<tr>
<td>513</td>
<td>Quantitative Political Analysis (3)</td>
<td>Methods and techniques in quantitative political analysis: multivariate model building.</td>
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<tr>
<td>514</td>
<td>Research and Methodology in Public Administration (3)</td>
<td>Basic assumptions and techniques of research in public administration; measurement, analysis, and reporting of data.</td>
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<tr>
<td>520</td>
<td>Political Theory (3)</td>
<td>Survey of major ideas, thinkers, and works of Western political theory.</td>
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<tr>
<td>522</td>
<td>American Political Thought (3)</td>
<td>Systematic examination of the normative and empirical theories of leading American political thinkers from the colonial period to the present.</td>
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<tr>
<td>530</td>
<td>American Government and Politics (3)</td>
<td>Survey of literature, approaches to research, critical examination of major works, and overview of research in various subfields. May be repeated with consent of department.</td>
<td>Maximum 9 hrs.</td>
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<tr>
<td>532</td>
<td>Presidency (3)</td>
<td>Systematic examination of the structure, functions, and role of the American presidency as they have evolved from the founding to the present.</td>
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<tr>
<td>533</td>
<td>Congress (3)</td>
<td>Formal, empirical and theoretical approaches to and models of the institutional workings of Congress and the behavior of legislators.</td>
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<tr>
<td>535</td>
<td>Mass Political Behavior (3)</td>
<td>Theoretical and empirical analyses of public opinion, political socialization, political attitudes and behavior, especially voting behavior.</td>
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<tr>
<td>537</td>
<td>Political Parties and Interest Groups (3)</td>
<td>Theoretical and empirical examination of the structure, functions and operations of political parties and interest groups.</td>
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<tr>
<td>539</td>
<td>State and Local Government and Politics (3)</td>
<td>Theoretical and empirical analysis of government, politics, policymaking, and public administration at the state and local levels.</td>
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<tr>
<td>540</td>
<td>Public Law (3)</td>
<td>Selective examination of published research and current approaches in subfields of constitutional law, judicial process, and judicial behavior. May be repeated with consent of department.</td>
<td>Maximum 9 hrs.</td>
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<tr>
<td>546</td>
<td>Law and the Administrative Process (3)</td>
<td>Constitutional position, decisional processes, regulation and management; limitations on governmental action; questions of structure, role, and administrative choice. May be repeated with consent of department.</td>
<td>Maximum 9 hrs.</td>
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<tr>
<td>548</td>
<td>Public Policy Process (3)</td>
<td>Theoretical, formal and empirical analysis of the rules, functions and decision-making processes of public policymakers, including legislatures, executive and judicial actors.</td>
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<tr>
<td>550</td>
<td>Public Administration (3)</td>
<td>Overview of public administration theory and function.</td>
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<td>552</td>
<td>Organization Theory (3)</td>
<td>Appraisal of major theories of organization and their applicability to public sector.</td>
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<tr>
<td>553</td>
<td>Management of Information Systems (3)</td>
<td>Theoretical, formal and empirical analysis of the rules, functions and decision-making processes of information systems in public organizations. Database systems, computer applications, and training for management information technology.</td>
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<td>556</td>
<td>Policy Analysis (3)</td>
<td>Strategies and techniques for identification and analysis of public problems and policy solutions. May be repeated with consent of department. Maximum 9 hrs.</td>
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<tr>
<td>558</td>
<td>The Politics of Administration (3)</td>
<td>Examination of public administration in context of American political system, policy making and political roles of public administrators and agencies. May be repeated with consent of department. Maximum 9 hrs.</td>
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<tr>
<td>560</td>
<td>Public Budgeting and Finance (3)</td>
<td>Technical and political aspects of public budgeting, preparing and adopting government budgets. Management implications of revenue collection, debt management, treasury function, accounting, internal auditing, purchasing management, post-auditing.</td>
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<tr>
<td>562</td>
<td>Public Management (3)</td>
<td>Interpersonal and leadership skills, techniques and methods for planning, decision making, and implementation of management strategies in public sector. May be repeated with consent of department. Maximum 9 hrs.</td>
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<tr>
<td>564</td>
<td>Human Resource Management in Public Organizations (3)</td>
<td>Interactive analysis of contemporary issues, challenges, methods and strategies related to effective management of human resources in public sector.</td>
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<tr>
<td>566</td>
<td>Ethics, Values, and Morality in Public Administration (3)</td>
<td>Ethical and analytical examinations of public opinion, political socialization, political attitudes and behavior, especially voting behavior.</td>
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<tr>
<td>569</td>
<td>Internship in Public Administration (3-9)</td>
<td>Open to students participating in approved internship programs. May be repeated with consent of instructor. Maximum 9 hrs.</td>
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<tr>
<td>570</td>
<td>Comparative Government and Politics (3)</td>
<td>Selected topics in modern governments. May be repeated with consent of department. Maximum 9 hrs.</td>
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<tr>
<td>572</td>
<td>The Politics of Development (3)</td>
<td>Selected topics dealing with political problems of less developed countries. May be repeated with consent of department. Maximum 9 hrs.</td>
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<tr>
<td>574</td>
<td>Area Seminar in Comparative Government and Politics (3)</td>
<td>Selected topics in areas studies: African, Asia, Latin America, Middle East, Soviet Union and Eastern Europe or Western Europe. May be repeated with consent of department. Maximum 9 hrs.</td>
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<tr>
<td>580</td>
<td>International Politics (3)</td>
<td>Survey of literature and major aspects of international politics. May be repeated with consent of department. Maximum 9 hrs.</td>
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<tr>
<td>591</td>
<td>Foreign Study (1-15)</td>
<td>See College of Arts and Sciences.</td>
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<td>592</td>
<td>Off-Campus Study (1-15)</td>
<td>See College of Arts and Sciences.</td>
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<tr>
<td>593</td>
<td>Independent Study (1-15)</td>
<td>See College of Arts and Sciences.</td>
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<tr>
<td>594</td>
<td>College Teaching in Political Science (1)</td>
<td>Instructional effectiveness, techniques, organization, materials for teaching political science at college level. Prereq: Consent of instructor. S/NC only.</td>
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<tr>
<td>595</td>
<td>Readings and Special Problems in Political Science (1-3)</td>
<td>Prereq: Consent of instructor. May be repeated. Maximum 15 hrs.</td>
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<tr>
<td>596</td>
<td>Workshops in Computer Applications (1)</td>
<td>Training in software applications to support research and decision-making tasks in public service. Successful completion certifies proficiency of MPA students in use of software applications for personal computer. S/NC only.</td>
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<tr>
<td>600</td>
<td>Doctoral Research and Dissertation (3)</td>
<td>Special topics in empirical theory and methodology (3) Advanced methods and procedures of analysis in political science. May be repeated with consent of department. Maximum 9 hrs.</td>
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<tr>
<td>610</td>
<td>Special Topics in Empirical Theory and Methodology (3)</td>
<td>Prerequisite: Consent of instructor. May be repeated.</td>
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<tr>
<td>615</td>
<td>Formal Political Analysis (3)</td>
<td>Standards and methods of formal political models, including game theory, rational choice theory, and public choice theory, and mathematical modeling. May be repeated with consent of instructor. Maximum 9 hrs.</td>
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<tr>
<td>628</td>
<td>Topics in Political Theory (3)</td>
<td>Selected topics and problems in normative political theory. Specific content determined by instructor. May be repeated with consent of instructor. Maximum 9 hrs.</td>
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<tr>
<td>630</td>
<td>Special Topics in American Government and Politics (3)</td>
<td>Advanced study of selected topics. May be repeated with consent of instructor. Maximum 9 hrs.</td>
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<tr>
<td>640</td>
<td>Special Topics in U.S. Constitutional Law (3)</td>
<td>Systematic analysis of published research and judicial decision; development of constitutional law as major component of public policy. May be repeated with consent of department. Maximum 9 hrs.</td>
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<tr>
<td>642</td>
<td>The Politics of Criminal Justice (3)</td>
<td>Selective examination of contemporary problems of research and public policy formulation: criminal process; law enforcement administration; criminal court administration; and prison administration. May be repeated with consent of department. Maximum 9 hrs.</td>
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</table>

**Polymer Engineering**

*See Materials Science and Engineering*

**Psychoeducational Studies**

*(College of Education)*

<table>
<thead>
<tr>
<th>MAJORS</th>
<th>DEGREES</th>
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<tbody>
<tr>
<td>Education</td>
<td>Ed.S., Ed.D., Ph.D.</td>
</tr>
<tr>
<td>Educational Psychology</td>
<td>M.S.</td>
</tr>
</tbody>
</table>

R. S. McCallum, Leader

Professors:
- Bellon, Jerry J. (Emeritus), Ed.D., UCB Berkeley
- Brockert, Ralph G., Ph.D., Syracuse University
- Cameron, Walter A., Ph.D., Ohio State University
- Dickinson, Donald J., Ed.D., Oklahoma State University
- George, Thomas W., Ed.D., Tennessee State University
- Greenberg, Katherine H., Ph.D., George Peabody College
- Kaswoski, Carol J., Ed.D., Georgia State University
- McCallum, R. S., Ph.D., George Peabody College
- Peters, John M., Ed.D., NC State University
- Williams, R. L. (Liaison), Ph.D., George Peabody College

Associate Professor:
- Kindall, Luther M., Ed.D., Assistant Professor:
- Whitaker, Dianne, Ph.D., Washington University
The Psychoeducational Studies unit participates in graduate programs leading to degrees, majors, and concentrations in:

**Master of Science**

**Educational Psychology**
- Adult education
- Individual and collaborative learning

**Educational Specialist**
- School psychology
- Doctor of Education

**Education**
- Educational psychology: collaborative learning
- Doctor of Philosophy

**Admission Requirements**

Admission requirements include completion of all items in the unit admissions packet and three letters of recommendation. Up-to-date GRE scores are required for application to all degree programs except the master's program. For all doctoral programs, a writing sample is also required.

**GRADUATE COURSES**

432 The Disadvantaged Student: Psychoeducational Perspectives (3) Theory and research regarding ethnicity, psychosocial behavior and appropriate interventions. Prereq: Consents of instructor. F, Su

460 Self-Management In the Helping Professions (3) Applications of self-management strategies to career, social, emotional, and health domains for helping professionals and their clientele. Prereq: Introductory course in psychology or consent of instructor. S/N or letter grade, F, Su

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

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


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

509 Internship in Adult Education (3) Field experiences in selected settings under supervision of practitioner and departmental representative. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

510 Psychological Theories of Human Development Applied to Education (3) Theory and research on emotional, social, and intellectual development over lifetime with applications to educational and therapeutic settings. F, Su

513 Reflective Practice in Education and Psychology (3) Concepts, theories and processes of reflective practice applied to educational settings. E

514 Individual Study in Adult Education (3) Prereq: Consent of supervisor. Approval form must be completed in office of unit head. May be repeated. Maximum 6 hrs. E

515 Educational Applications of Behavioral Theories of Learning (3) Behavioral theories and research, conditioning, observational and ethological learning as systems for student motivation, discipline and learning. F, Su

516 Educational Applications of Cognitive Learning Theories (3) Cognitive theory and research, social, learning, attribution and information processing as applied to education. Su

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

520 Survey of Adult Education (3) Historical development, philosophies of adult education agencies, associations, programs, issues, and national trends illustrating process of adult education and diversity of continuing education. Prereq: Consent of instructor. F, Su

521 Program Development and Operation in Adult Education (3) Theories and methods from research to practice in planning and operating adult education programs. Prereq: Consent of instructor. F, Su

522 Adult Development (3) Changes in characteristics of adults over life span and implications for adult education. Prereq: Consent of instructor. Sp, Su

523 Post-Secondary Education for Adults (3) History, evolution, philosophy, structure and functions of post-secondary, sub-university institutions, their programs and clientele. Prereq: Consent of instructor.

524 Continuing Professional Education (3) Theories and concepts supporting design and management of educational programs for adults in professions. Prereq: S/N or equivalent. E

525 Characteristics of Adult Learners (3) Key characteristics of adult learners, and applications to teaching and learning contexts. Sp


527 Controversies in Adult Education (3) Controversies confronting field of adult education; development of critical analysis skills for looking at controversies from different perspectives. Sp

528 Psychology of Aging (3) Theory and research of aging and gerontology related issues: psychological and related physiological changes that occur in later stages of human development. Implications for treatment programs and policy. Sp

530 Methods of Collaborative Inquiry (3) Philosophical and theoretical frameworks for designing and conducting collaborative inquiry projects. Practice in conducting research. Sp, Su

540 Seminar in School Psychology (3) Essentials of theory and practice of school psychology as professional specialty. Consideration of history and current issues in school psychology. Sp

541 Psychoeducational Assessment (3) Direct, psychometric and naturalistic assessment methods in learning environments. Prereq: Admission to school psychology program or consent of instructor, and Counselor Education and Counseling Psychology 525 or equivalent. May be repeated. Maximum 6 hrs. F, Sp

542 Practicum in Psychoeducational Assessment (3) Application of assessment skills to clients in learning environments. Coreq: 541 or consent of instructor. May be repeated. Maximum 6 hrs. S/N only. F, Sp

545 Psychoeducational Consultation (3) Use of information gained in consultation and individual support in educational programs. Prereq: 541 or consent of instructor. May be repeated. Maximum 12 hrs. S/N only. E

546 Practicum in Consultation (3) Application of consultation skills in educational settings. Prereq: 545. Sp

549 Internship in School Psychology (1-6) Supervised employment in unit approved school psychology internship site. Prereq: Enrollment in school psychology program and consent of instructor. May be repeated. Maximum 12 hrs. S/N only. E

550 Discipline and Conflict Resolution (3) Application of major models of discipline and conflict resolution strategies in development of constructive atmosphere for classroom learning. Sp

572 Cognitive Education: Models and Approaches (3) Models and approaches in field of cognitive education: research and individual support for program components, critical variables of organizational learning that affect success of implementation. Sp

573 Meeting Needs of Nontraditional and Underachieving Learners (3) Exploration of students' needs at any age and level of functioning who are not progressing up to their fullest potential. Causes of academic and motivational problems, and approaches to overcome them. Learning to learn, cultural alienation, and personal world view and interaction with effective teaching and learning. Su

574 Facilitating Group Change (3) Practical issues of group change. Analyses of group and individual experiences in all types of educational settings in relation to systems theory and collaborative learning theory. Needs of individuals and groups involved in change and roles of inside and outside change agents. F, Su


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

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

602 Directed Research (1-3) Prerequisites: 541; instructor-initiated, research; focus on a university- approved topic. E

603 Special Topics (1-3) Instructor-initiated course which meets at convenience of unit on topics of current interest. Prereq: Enrollment in school psychology program. May be repeated. Maximum 15 hrs. S/N or letter grade. E

609 Advanced Seminar in Curriculum and Learning (3) Team-taught interdisciplinary seminar; studies, themes, and issues in curriculum and learning. Reading and discussions based on significant research and scholarly publications. Sp

620 Seminar in Adult Education (3) Issues in adult education, theories and concepts, philosophical positions, research trends and methodologies. Prereq: 520 or equivalent. F

621 Advanced Seminar in Program Planning (3) Concepts, strategies, and principles related to program planning in adult education. Prereq: 521 or equivalent. Sp

622 Advanced Seminar in Adult Development (3) Adult development research. Designing research for studies of life cycle. Prereq: 522 or equivalent. Sp, Su

630 Doctoral Seminar in Collaborative Learning (3) Issues, theories, concepts and research in collaborative learning. Prereq: Admission to Ed.D. in Education, con-
653 Ethical, Legal, and Professional Issues in Psychology (3) (Same as Psychology 653 and Counselor Education and Counseling Psychology 633.)

649 Advanced Internship in School Psychology (1-9) Supervised experience as a practicing psychologist in an approved internship site for doctoral level students. Prereq: Enrollment in doctoral level school psychology program and approval of instructor. May be repeated. Maximum 9 hrs. SNC or letter grade. E


668 Practicum in Instructional Planning (3) Development and management of course or program of instruction in educational psychology. Prereq: 665, or consent of instructor. E

669 Internship in Educational Psychology (1-6) Supervised employment in an approved educational psychology internship site. May be repeated. Maximum 12 hrs. SNC or letter grade. E

671 Mediated Learning Theory (3) Feuerstein's theory of mediated learning experience and its connections to work of Piaget, Vygotsky and others. Implications for instructional and educational practice. May be repeated. Approved by Department of Psychology.

673 Collaborative Learning (3) Team taught, interactive course on collaborative learning theory related to professional practice. Integration of mediated learning theory with practical pedagogical theory related to instructional practice. Prereq: 167 or equivalent. May be repeated.


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

THE MASTER'S PROGRAM

Graduate study leading to the M.A. degree in psychology is available with a concentration in experimental psychology. This program is appropriate for students who desire a master's degree as part of their preparation toward an advanced degree in another field.

Admission

Any student with a B.A. or B.S. may apply to the Department of Psychology for admission to the master's program. Exceptions are made through the Department of Psychology and the Office of Graduate Admissions.

Major Advisor and Committee

Initially, the Director of Experimental Psychology will advise the student. As soon as possible, the student will select an advisor and obtain his or her approval for registration. The advisor will choose two additional faculty members to comprise the student's master's committee. The final committee approval comes from the Graduate Dean, upon recommendation by the Department of Psychology.

Program Requirements

All students must complete two years of graduate level courses in psychology. These hours must include 504-506 or the equivalent for research in the social sciences.

Clinical Psychology

This program is designed to lay the groundwork for a career as a clinical psychologist capable of working in both academic and applied settings. The program emphasizes the theoretical foundations of psychology as well as supervised experience oriented toward the development of practical skills. The program embodies a model of clinical psychology in which practice and research are integrated.

The Doctoral Program

A student with a B.A. or B.S. may apply to the Department of Psychology for admission to the doctoral program with a concentration in experimental psychology or clinical psychology. The doctoral program with a concentration in experimental psychology is offered through the Life Sciences program. Doctoral study in industrial and organizational psychology is offered through the Interdepartmental Program in Industrial and Organizational Psychology, to which application is made through the Department of Management.

Experimental Psychology

The Ph.D. program in psychology with a concentration in experimental psychology is designed to allow students to select from a variety of specializations oriented toward careers in research, teaching, and application of psychology in academic, institutional, or industrial settings. The program is flexible, individualized, and emphasizes a professional apprenticeship model of training. A full description of the program is given in the Handbook for Students in Experimental Psychology, available from the department.

THE BASIC REQUIREMENTS

1. Twelve semester hours of statistics and research (504-506 or Statistics 531-532 or equivalent and 6 additional hours in research methods or design).
2. Fifteen semester hours of experimental psychology (565 or equivalent and 4 courses outside the Psychology Department).
3. Six semester hours of research practicum (509).
4. Psychology 582 - preparation for college teaching.
5. Two 600-level graduate level courses outside the Psychology Department.
6. Predissertation research project involving the collection of original data or the original analysis of existing data, reported in publishable form and approved by the student's advisory committee.
7. Comprehensive examination, determined and evaluated by the student's doctoral committee. This examination is comprised of an integrative review or theoretical paper and an oral exam or additional questions.
8. Twenty-four hours of dissertation research (600).
9. An original piece of research in the form of a doctoral dissertation, proposed, conducted, and defended.

THE DOCTORAL PROGRAM

A student with a B.A. or B.S. may apply to the Department of Psychology for admission to the doctoral program with a concentration in experimental psychology or clinical psychology. The doctoral program with a concentration in clinical psychology is offered through the Life Sciences program. Doctoral study in industrial and organizational psychology is offered through the Interdepartmental Program in Industrial and Organizational Psychology, to which application is made through the Department of Management.

Experimental Psychology

The Ph.D. program in psychology with a concentration in experimental psychology is designed to allow students to select from a variety of specializations oriented toward careers in research, teaching, and application of psychology in academic, institutional, or industrial settings. The program is flexible, individualized, and emphasizes a professional apprenticeship model of training. A full description of the program is given in the "Handbook for Students in Experimental Psychology," available from the department.

THE BASIC REQUIREMENTS

1. Twelve semester hours of statistics and research (504-506 or Statistics 531-532 or equivalent and 6 additional hours in research methods or design).
2. Fifteen semester hours of experimental psychology (565 or equivalent and 4 courses outside the Psychology Department).
3. Six semester hours of research practicum (509).
4. Psychology 582 - preparation for college teaching.
5. Two 600-level graduate level courses outside the Psychology Department.
6. Predissertation research project involving the collection of original data or the original analysis of existing data, reported in publishable form and approved by the student's advisory committee.
7. Comprehensive examination, determined and evaluated by the student's doctoral committee. This examination is comprised of an integrative review or theoretical paper and an oral exam or additional questions.
8. Twenty-four hours of dissertation research (600).
9. An original piece of research in the form of a doctoral dissertation, proposed, conducted, and defended.

Clinical Psychology

This program is designed to lay the groundwork for a career as a clinical psychologist capable of working in both academic and applied settings. The program emphasizes the theoretical foundations of psychology as well as supervised experience oriented toward the development of practical skills. The program embodies a model of clinical psychology in which practice and research are integrated.

Clinical psychology students must complete a predissertation research project by the end of the second year.

After forming the doctoral committee, students must then pass a comprehensive examination administered and evaluated by the committee. This examination is comprised of two papers, one addressing a topic of the...
student's choice, and the second addressing an understanding of one individual's personality and cognitive functions. All doctoral students must complete a minimum of 78 hours of graduate level courses, including courses required by their program; at least 6 hours in courses outside of psychology; and at least 24 hours of dissertation research (Psychology 600). Finally, students must complete an acceptable doctoral dissertation and conduct a satisfactory oral defense of the dissertation.

Requirements are as follows:

1. Apprenticeship with one faculty member during the first year, two days each week.
2. Preadmission dissertation research completed before forming a doctoral supervisory committee, reported in written form acceptable to two members of the faculty or, if reviewed and accepted for publication or external presentation, by one member of the faculty.
3. Supervised clinical placement two days (16 hours) each week during the second year, and the following option during the third and fourth years:
   a. continued two day clinical placement in the third and fourth years.
   b. teaching assistantship in the department in either the third or fourth year and two day clinical placement in the other year.
4. Satisfactory completion of listed courses (or equivalents) in the following sixteen categories:
   a. Foundations of Psychology: Biological Factors, Perception, Learning, Thinking, Motivation (513);
   b. Interviewing and Observation (558) and Laboratory (559);
   c. Research Practicum (509) (4 hrs.);
   d. Life-Span Development (512) or Developmental Psychology (511);
   e. Personality: Theory and Research I and II (570-71);
   f. History and Systems of Psychology (565);
   g. Research Questions and Design (580);
   h. Psychological Assessment I and II (594-95) and Laboratory (596);
   i. Empirical Methods in Psychology (504) and Research Design (505);
   j. Social Psychology (550);
   k. Field Placement in Clinical Psychology (600) (18 hrs.);
   l. Dynamics of Psychopathology (573);
   m. Psychometrics (555) or Applied Psychological Measurement (557);
   n. Ethical, Legal and Professional Issues in Psychology (585);
   o. Psychodynamic Psychotherapy I and II (570-71) and Laboratory (573) (4 hrs.);
   p. Doctoral Research and Dissertation (600) 24 hrs."
5. Satisfactory completion of a one-year clinical internship at a site approved by the program.
6. Students who choose a teaching assistantship in the third or fourth year must have satisfactorily completed 528 College Teaching in Psychology.
7. Satisfactory completion of at least 3 additional graduate-level courses in non-clinical topics in psychology.
8. Satisfactory completion of a one-year clinical internship at a site approved by the program.

GRADUATE COURSES

409 Group Facilitation (3) Study of theory and technique through supervised experience in small groups. Prereq: 310 and consent of instructor. May be repeated. Maximum 6 hrs.
415 Psychology of Religion (3) History of psychology of religion: various philosophical and empirical orientations. Psychological function of religion for individuals and society. Prereq: Junior or senior standing.
424 Psychology and the Law (3) Psychological aspects of legal systems. Prereq: 110 or equivalent, upper-division standing and consent of instructor.
440 Organizational Psychology (3) Social-psychological analysis of organizations, role-theory and systems theory. Prereq: 360.
450 Comparative Animal Behavior (3) (Same as Ecology and Evolutionary Biology 450.)
459 Comparative Animal Behavior Laboratory (3) Coreq: 450. (Same as Ecology and Evolutionary Biology 459.)
461 Physiological Psychology (3) Nervous system and physiological correlates of behavior. Biological basis of emotion, learning, memory and stress. Prereq: 110 or equivalent, 210, and 1 yr of biology or zoology introductory sequences or equivalents.
469 Laboratory in Physiological Psychology (3) Laboratory studies of nervous system and physiological correlates of behavior. Coreq: 461.
470 Theories of Personality (3) Survey of major theories of personality and their development. Prereq: 220 and 300 or 330.
475 Adolescent Development (3) Theoretical perspectives and empirical research findings pertinent to adolescent development. Prereq: Child Psychology. SP
480 Theories of Learning (3) Classical and current approaches to learning and cognition. Prereq: 310.
482 Topics in Psychology (3) Intensive analysis of special topics: Afro-American psychology or evaluation of programs in community. Prereq: Biological Basis of Behavior or Behavior and Experience: Humanistic Psychology and at least 9 hrs in 300-level courses. Recommended prerequisite: Statistics in Psychology. Methods of Research in Psychology. May be repeated. Maximum 6 hrs.
489 Supervised Research (1-9) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs in 399, 489, 491, 492, and 493 combined may apply toward undergraduate major.
500 Thesis (1-15) P/NP only. E
simulated or empirical data. Prereq: 555. May be repeated. Maximum 6 hrs.

555 Psychometrics (3) Basic concepts: factor analysis, scaling, test theories, probability models and their applications, computerized adaptive testing and other topics. Prereq: Stat 543 or Stat 537-538 or equivalent. May be repeated. Maximum 6 hrs.

557 Applied Psychological Measurement (3) Issues and techniques in applying psychological measurement in organizational, clinical, and community research. Prereq: Statistics 537-538 or equivalent or consent of instructor. May be repeated. Maximum 6 hrs.

558 Interviewing and Observation (3) Sensitizing students to own feelings and beliefs and to feelings of interviewee, and analysis of language content, style, and body language. Exploration of various important aspects of interviewee's life. Prereq: Admission to doctoral program in clinical psychology or consent of instructor. Coreq: 559.

559 Laboratory in Interviewing and Observation (1) Prereq: Admission to doctoral program in clinical psychology or consent of instructor. Coreq: 558.

560 Psychology of Learning (3) Review of current evidence from research involving human and nonhuman animals. Prereq: 400 and consent of instructor. May be repeated. Maximum 6 hrs.

565 History and Systems of Psychology (3) History of psychology concerning psychology. Major systems of psychology which emerged during 20th century. Prereq: Graduate standing.

570 Personality: Theory and Research I (3) Advanced survey of humanistic and humanistic approaches to personality, related research. Prereq: Admission to clinical program or consent of instructor. F

571 Personality: Theory and Research II (3) Advanced survey of humanistic and humanistic approaches to personality, related research. Prereq: Admission to clinical program or consent of instructor. Sp

573 Descriptive and Theoretical Psychopathology (3) Current psychiatric taxonomic system. Theories of etiology for various diagnostic categories. Examples from written case vignettes and recorded interviews. Prereq: Admission to doctoral program in clinical psychology or consent of instructor. F

575 Psychopharmacology (3) Connections between pharmacology and psychology. Prereq: Consent of instructor.

580 Object Relations (3) European and American concepts of normal and psychopathological development of object relations. Significance for psychotherapy, psychosynthesis, and psychodynamic theory. Prereq: Admission to doctoral program in clinical psychology or consent of instructor.

587 Clinical Aspects of Human Sexuality (3) Variation in human sexual behavior. Theories of etiology, treatment. Prereq: Consent of instructor.

590 Research Questions and Designs (3) Question- asking process in research and strategies or designs through which answers might be derived; Prereq: Admission to doctoral program in clinical psychology or consent of instructor.

593 Independent, Off-campus, or Foreign Study (1-15) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/N only.

594 Psychological Assessment I (3) Basic concepts and techniques of adult assessment: intelligence tests and personality tests. Prereq: Admission to doctoral program in clinical psychology or consent of instructor. Sp

595 Psychological Assessment II (3) Basic concepts and techniques of adult assessment: intelligence tests and personality tests. Prereq: Admission to doctoral program in clinical psychology and 594 or consent of instructor. F

596 Laboratory in Psychological Assessment (1) Prereq: Admission to doctoral program in clinical psychology or consent of instructor. Coreq: 594 or 595. May be repeated. Maximum 4 hrs. S/N only.

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

601 Seminar in Psychology (3) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.


610 Seminar in Applied Psychology (3) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

613 Seminar in Existential-Phenomenological Psychology (3) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.


623 Seminar in Methods of Naturalistic Research (3) Prereq: 548 or consent of instructor. May be repeated. Maximum 12 hrs.

635 Ethical, Legal, and Professional Issues in Psychology (3) Research, human services, teaching and public policy. Prereq: Admission to doctoral program in psychology or consent of instructor. (Same as Counselor Education and Counseling Psychology 635 and Psychosocial Studies 635.) S/N only.

670 Psychodynamic Psychotherapy I (3) Theories and principles. Prereq: Admission to doctoral program in clinical psychology or consent of instructor. F

671 Psychodynamic Psychotherapy II (3) Theories and principles. Prereq: Admission to doctoral program in clinical psychology and 670 or consent of instructor. Sp

673 Laboratory in Psychotherapy (2) Prereq: Admission to doctoral program in clinical psychology or consent of instructor. Coreq: 670 or 671. May be repeated. Maximum 6 hrs. S/N only.

681 Seminar in Assessment (3) Prereq: Admission to doctoral program in clinical psychology or consent of instructor. May be repeated. Maximum 12 hrs.

683 Seminar in Behavioral Medicine (3) Current research and theory concerning relationships between behavior and health. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

695 Field Placement in Clinical Psychology (3) Prereq: Admission to doctoral program in clinical psychology and consent of instructor. May be repeated. Maximum 24 hrs. S/N only.

696 Advanced Psychology Clinic Placement (1-3) Prereq: Admission to doctoral program in clinical psychology or consent of instructor. May be repeated. Maximum 24 hrs. S/N only.


Rehabilitation, Deafness, and Human Services

(College of Education)

MAJORS

Counseling ................................................. M.S., Ph.D.

Robert F. Kronick, Leader

Professors:


Associate Professors:

Cassell, Jack L., Ph.D. ............. Kansas Colvin, Craig R., Ed.D. ............. Virginia Mulkey, S., William, Ph.D. .......... Florida State Warden, K., Ph.D. ............. Tennessee

Assistant Professors:

Barnes, Rhoda, Ph.D. ............. California McLean, James D., Ph.D. ............. Chicago

The Rehabilitation, Deafness and Human Services Education unit participates in graduate programs leading to degrees, majors, and concentrations in:

Master of Science

Counseling Rehabilitation counseling

Education

Track 1-education of the deaf and hard of hearing

Track 2-education of the deaf and hard of hearing

Doctor of Philosophy

Education

Rehabilitation/special education

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

The vision of the Rehabilitation, Deafness, and Human Services unit is one of full inclusion for persons with disabilities in a multicultural nation. Faculty and staff pursue, as a common mission, improvement in the quality of life for persons with disabilities and focus 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 unit is the preparation of graduates for future leadership and professional roles in business and industry, education, and community and government service.

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

GRADUATECOURSES

415 Language Development of Hearing Impaired (1-3)

Language problems of hearing impaired contrasted with scope and sequence of normal language development. Formal linguistic systems used to describe language development problems.

416 Language Development of Hearing Impaired II (3)


419 Speech Development of Hearing Impaired (4)

Theories of speech development, approaches in training perception and production of speech, and audiological practice experiences. Prereq: 415.

424 Nature of Hearing Impairments (3) Basic principles of audiology: anatomy and physiology of hearing; nature and causes of hearing loss; methods and instrumentation for assessment of hearing loss; application of audiological services to medical and other rehabilitative disciplines.

425 Introduction to the Psychology and Education of the Hearing Impaired (3) Primarily for those planning to teach hearing impaired. Overview of research related to psychology, social adjustment, communication meth-
Assistant Professors:

Beauvois, Margaret, Ph.D. .................. Texas
Essif, Les, Ph.D. ......................... Brown
Kaplan, Gregory, Ph.D. ................. Columbia
McAlpin, Mary K., Ph.D. ............... Sorbonne
Nakuma, Constancio, Ph.D. .............. North Carolina
Silvafilho, Euridice, Ph.D. ............... California

The Department of Romance Languages offers two advanced degrees: the Master of Arts in French and in Spanish and the Doctor of Philosophy in Modern Foreign Languages.

Inquiries should be addressed to the head of the department. The head, through the coordinators of Spanish and French, will make available further departmental requirements, regulations, and materials not listed below.

THE MASTER'S PROGRAM

Thesis Option

1. Completion of a minimum of 24 semester hours in coursework plus at least 6 hours in course 500 Thesis. In French, 501 is required; in Spanish, 550. A maximum of 6 hours may be taken at the 400 level, the rest at the 500 level, and under certain conditions, the student may take 600-level seminars. If the student chooses to have a minor, a thesis must be completed in the major, 6 in the minor.

2. A thesis, with a minimum of 6 semester hours in course 500.

3. A written examination covering the coursework and selected items from a master reading list.

4. A final oral examination covering the thesis.

Non-Thesis Option

1. Completion of at least 30 semester hours, with a maximum of 9 at the 400 level, the rest at the 500 level, including 501 (French) or 550 (Spanish). Under certain conditions, the student may take 600-level seminars. If the student chooses to have a minor, a thesis must be completed in the major, 6 in the minor.

2. Three term papers that have been approved by the student's advisory committee.

3. A written examination covering the coursework and selected items from a master reading list.

4. A final oral examination covering the papers (French M.A. only).

THE DOCTORAL PROGRAM

The Ph.D. in Modern Foreign Languages is offered jointly by the Department of Germanic, Slavic and Asian Languages and the Department of Romance Languages and requires advanced training in a major language and either a second language or applied linguistics. Students whose language of first concentration is German should consult the section on Germanic, Slavic and Asian Languages.

Admission Requirements

Applicants must have completed a B.A. in either French, German or Spanish to be accepted into this program. Both graduates of institutions in the United States and those with undergraduate degrees from institutions outside the United States must have a grade point average of at least 5.0. Consideration will also be given to applicants who do not have an undergraduate degree in one of the three foreign languages but do have the equivalent of an undergraduate major in one of them.

Degree Requirements

Candidates with German as a first concentration must complete a minimum of 60 semester hours of coursework beyond the bachelor's degree in addition to 24 hours of doctoral research and dissertation. Two tracks are available:

The coursework for Track I must be distributed as follows: at least 30 hours in the first concentration; at least 18 hours in the second concentration; and at least 6 hours in a cognate field.

The coursework for Track II must be distributed in this way: at least 45 hours in the first concentration; at least 12 hours in the second concentration; and at least 6 hours in a cognate field. Because Track II students will have taken 12 graduate hours instead of 18 hours in the second concentration, they will normally not be eligible to teach that field at institutions which follow SACS guidelines for college foreign language teaching.

1. First Concentration: French or Spanish. A minimum of either 30 (Track I) or 45 (Track II) hours of French or Spanish courses beyond the bachelor's degree, distributed as follows: 200-level: A maximum of 6 hours of 400-level classes taken for the M.A. may be applied.

400-level: A minimum of 12 hours must be taken, exclusive of dissertation hours.

2. Second Concentration. A minimum of 18 (Track I) or 24 (Track II) beyond the bachelor's degree, taken in the field of applied linguistics or in a second language, either French, German, Italian, Portuguese (Track II only), Russian or Spanish. For Track I, 12 of these hours must be at the 500 level or above. For Track II, 3 of these hours must be at the 500 level or above.

French students choosing applied linguistics must take French 421 or 429; 425; 512; and 9 hours of appropriate electives in English or French. Spanish students must take Spanish 421 or 428; 425; 512; and 9 hours of appropriate electives in English or Spanish. The student's graduate advisor must approve the electives selected.

3. Cognate Field. Six hours in graduate courses numbered 400 and above in a field outside the department of the first concentration but related to the student's principal area of research. Students choosing applied linguistics as a second concentration are strongly urged to take their cognate work in a second language.

4. Additional requirements: For any languages taken as a first or second concentration, a student must demonstrate competence by taking a test. The test will include reading, writing, listening, and speaking, and should be completed by the time the student reaches 40 hours of study beyond the bachelor's degree. Standardized examinations that may be used for this purpose include applicable portions of either the National Teachers Examination, the MLA Examination for
Teachers and Advanced Students, or the proficiency standards of the United States Foreign Service Institute (FSI). If a student has not chosen a third language as his or her cognate area, basic competence (determined by a reading examination with translation into English administered by the department concerned) in a third language is required. If the student’s first and second languages are Romance languages, the third language should be chosen from another language family.

For students choosing applied linguistics as an area of second concentration, reading competence in a second language is required. Competence will be determined by translation of a text from the foreign language into English, the test to be administered by the department offering the language.

A comprehensive examination on the language and literature of the first and second concentrations must be passed before the student may be admitted to candidacy. The candidate is required to defend his/her dissertation in an oral examination. Central emphasis is put on the doctoral dissertation as a final test of the candidate’s scholarly qualifications.

Graduate Teaching Assistants with a second concentration in another language should have the opportunity and will be strongly encouraged to instruct in the languages of both their first and second concentration, subject to staffing needs.

Doctoral students are strongly encouraged to reside and study abroad and will be assisted in identifying potential sources of financial support (e.g., Fulbright, McCrory, Rotary Fellowships).

For additional courses, see Germanic, Slavic and Asian Languages.

ACADEMIC COMMON MARKET

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

French

GRADUATE COURSES


411 French Literature of the 16th Century (3) Highlights of 16th-century French literature. Excerpts from Rabelais and Montaigne; readings of poems from writers from Lyon and members of Pléiade. Prereq: 300-level literature course.


413 French Literature of the 18th Century (3) Major works of Enlightenment. Prereq: 300-level literature course.


416 Survey of Francophone Literature (3) Examination of French literature outside metropolitan France, particularly Africa and Caribbean. Prereq: 300-level literature course.

420 French Cinema (3) French cinema from earliest days through New Wave directors. Prereq: 300-level literature course. May apply toward major.

421 Phonetics (3) Foundation in science of phonetics. Practical exercises and individual performance. Laboratory training highly recommended. Graduate credit not allowed for departmental majors. Prereq: Intermediate Composition and Conversation or equivalent.

422 Advanced Grammar (3) Improving one’s written French by studying basic and more refined structures of French language. Writing creative free-style compositions. Prereq: Intermediate Composition and Conversation or French for Business.

423-24 Advanced Conversation (1,1) Informal conversation with native speaker on contemporary topics. Stress in-class contact rather than outside preparation. Prereq: Intermediate Composition and Conversation or French for Business. 2 hrs weekly.

425 Introduction to Descriptive Linguistics (3) Theory and practice of techniques of linguistic analysis in subfields of phonetics, phonology, morphology, syntax, semantics, pragmatics and historical linguistics; discussion of relevance of learning and teaching of foreign languages and to study of literary texts. Recommended prerequisites: language, linguistics and society. (Same as German 425, Linguistics 425, Russian 425, and Spanish 425.)

426 Methods of Historical Linguistics (3) (Same as German 426, Russian 426, Spanish 426 and Linguistics 426.)

420 Romance Linguistics (3) Development of Classical Latin through Vulgar Latin into major Romance languages. (Same as Spanish 428 and Linguistics 428.)


431 Highlights of French Civilization (3) Survey of French civilization from the Gauls to World War II. Historical events, data, all forms of arts. Prereq: 300-level literature course.

432 Contemporary French Culture (3) French contemporary civilization and culture since World War II. Problems, trends, and organization of French society today. Prereq: 300-level literature course.

434 Literature of Quebec (3) Survey of literature of Quebec, as well as French literature connected with North America. Readings include explorers and missionary works, such as Voyages of Champlain and Jesuits, and literature of contemporary Quebec. Prereq: 300-level literature course.

445 Advanced French for Business (3) Advanced contemporary French language and culture as relates to business transactions. Comparative approach to explore differences and similarities between francophone business cultures and those of North America and Japan. Building knowledge of business terminology while being sensitized to cultural mores and dangers of simplistic stereotypes. Prereq: French for Business or consent of instructor.

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

501 Techniques in Literary Analysis (3) Required for M.A. program. Intensive course in explication de texte, a close stylistic analysis of texts representative of different eras and of different genres.

502 Registration for Use of Facilities (3-15) May be registered for use of facilities only. May not be used toward degree requirements. May be repeated. Only one credit per semester. E

512 Teaching a Foreign Language (3) Practical application of methods for teaching and evaluating basic language skills and foreign language skills, and cultural aspects through seminars, demonstrations, peer teaching, and observation of foreign language classes. Required of all M.A. and Ph.D. students holding Graduate Teaching Assistantships, except those whose previous training or experience warrants their being excused by department.

516 Bibliography and Methods of Research (2) Critical reviewing of bibliographies and scholarly practices in French literature and language. Practical exercises on compiling of scholarly data using computer-based and non-computer sources.


531 French Literature of the 16th Century I (3) Literature of first half of 16th century. Rabelais and other prose writers, humanists, and poetry of Motet, Lyonnais group, and young Pléiade poets.

532 French Literature of the 16th Century II (3) Literature of second half of 16th century. Mature works of Pléiade writers and such poets as d’Aubigné and Sponde; Montaigne, writers of scientific works and memoirists; drama.

541 French Literature of the 17th Century I (3) French prose and poems works of 17th century.

542 French Literature of the 17th Century II (3) Classical French theatre of 17th century.

551 French Literature of the 18th Century (3) Reading and interpreting works of Marmontel, Voltaire, Diderot, Rousseau, Beaumarchais, and others.

561 Lyric Poetry of the 19th Century (3) Reading and interpreting great French romantic poets, "Tart pour l'art" movement, Parnassians, Charles Baudelaire and Symbolists.

561-62 French Literature of the 19th Century (3,3) Reading and interpreting works of Hugo, Vigny, Stendhal, Balzac, Baudelaire, Flaubert, Zola, Verlaine, and others. 562-Reading and interpreting works of pre-Romantic and post-Romantic periods.

571-72 Trends in Modern French Literature (3,3) In-depth study of some of most revolutionary, challenging poets, novelists, dramatists of 20th century.

581-82 The French Novel (3,3) French Novel from 17th through 20th centuries.

583 Problems in Stylistics (3) Survey of comparative English-French stylistics. Development and improvement of one’s written French.

584 Modern Theory and Criticism (3) Survey of twentieth century critical theory, including psychoanalytic, Marxist, structuralism and more.

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

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

593 Independent Study (1-15) See College of Arts and Sciences. Letter grade or S/N.

594-95 French Directed Readings (3,3)

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


632-33 Seminar in French Literature (3,3) 632—19th Century; 633-20th Century. May be repeated with consent of department. Maximum 6 hrs each.

Italian

GRADUATE COURSES

401 Dante and Medieval Culture (3) Introduction to significance of this great Italian writer. Prereq: 212 or consent of instructor.
424 Advanced Composition (3) Prereq: 212 or consent of instructor.

423 Advanced Conversation (3) Prereq: Intermediate Italian or consent of instructor.

422 Advanced Grammar (3) Prereq: Intermediate Italian or consent of instructor.

421 Phonetics (3) Prereq: Intermediate Italian or consent of instructor.

420 Topics in Italian Literature and Cinema (3) Italian literature and cinema from the Renaissance to present focusing on literary works translated into English and adapted into film. Investigation of relationship between literature and cinema and achievement of greater understanding of Italian culture since 1930. Films in Italian with English subtitles. May be repeated. Maximum 6 hrs. (Same as Cinema Studies 421.)

510 Readings in Italian Literature (3) Topics vary. May be repeated with consent of department.

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

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

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

Portuguese

GRADUATE COURSES

400 Portuguese for Speakers of Another Romance Language (3) Accelerated class for beginning students of Portuguese with strong background in another Romance language. Introduction to grammar, reading and culture of Portugal and Brazil. Prereq: 3 hours of 300-level in another Romance language or equivalent.

431-32 Topics in the Literature & Language of Portuguese-speaking World (3,3) Outstanding works of literature and culture from Portuguese countries. Topics vary. Prereq: At least one course at the 300 level or equivalent. May be repeated. Maximum 12 hrs.

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

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

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

Spanish

GRADUATE COURSES

421 Phonetics (3) Prereq: Intermediate Conversation and Composition or consent of instructor.

422 Advanced Grammar (3) Prereq: Intermediate Conversation and Composition and Grammar of 9 hrs of upper division Spanish.

423 Advanced Conversation (3) Prereq: Intermediate Conversation and Composition or consent of instructor. Available to non-native speakers only.

424 Advanced Composition (3) Prereq: Intermediate Conversation and Composition or consent of instructor. Available to non-native speakers only.

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time for degree completion. May not be used toward degree requirements. May be repeated. Maximum 30 hrs.

503 Medieval Spanish Literature (3) Spanish literature through 15th century.

504 Golden Age Prose (3) Wide range of prose fiction in Spain during 16th and 17th centuries: Montemayor, picaresque, sentimental, pastoral and exemplary novels, and dialogues.

505 Don Quixote (3)

506 Golden Age Poetry (3) Garcilaso, Fray Luis de Leon, San Juan de la Cruz, Lope de Vega, Quevedo, and Gongora.

507 Golden Age Drama (3) Major dramatic works of period: Lope de Vega, Tirso de Molina, Ruiz de Alarcon, Guillermin de Castro, Calderon de la Barca, Moreto, and Rojas Zorrilla.

508 Eighteenth- and Nineteenth-Century Spanish Literature (3) Major works from 18th- and 19th-century Spain. Content varies with regard to theme, genre, or literary movements.

509 Twentieth-Century Spanish Literature: Generation of '20s through Civil War (3) Major achievements and representative directions in literature of Spain through Civil War years.

510 Twentieth-Century Spanish Literature: Post-Civil War through Present (3) Principal achievements and representative directions in literature of Spain from Post-Civil War period to present.

511 Techniques of Literary Analysis and Research Methods (3) Theoretical and critical essays on various techniques of literary analysis. Exploration of bibliographic and research materials.

512 Special Topics in Spanish or Spanish American Literature (3) Prereq: Intermediate Italian or consent of instructor.


515 The Spanish American Novel: Chile and the River Plate Nations (3) Novels from Chile, Argentina, Uruguay and Paraguay. Modern world.


517 Contemporary Spanish American Poetry (3) Major poets in Spanish American from post-modernismo to present day.

518 Spanish American Drama (3) Major playwrights of 20th-century Spanish America.


520 The Spanish American Short Story (3) Short story by major writers in Spanish America from Romanticism to present day, theory and criticism of genre.

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

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

523 Independent Study (1-15) See College of Arts and Sciences. Letter grade or S/NC only.

600 Doctoral Research and Dissertation (3-15) Prereq: 421.

524 Romance Linguistics (3) Same as French 429 and Linguistics 429.

525 Introduction to Descriptive Linguistics (3) (Same as French 429, German 425, Russian 424, and Linguistics 425.)

526 Methods of Historical Linguistics (3) (Same as German 426, French 425, Russian 426, and Linguistics 426.)

527 Romance Linguistics (3) (Same as French 429 and Linguistics 429.)

528 History of Spanish Language (3) Evolution of Spanish language from its origins to present. Major differences between Hispano-American and Iberian Spanish. Prereq: Intermediate Composition and Grammar.

529 Spanish Civilization (3) Social, political, cultural achievements of Spaniards from their civilization until today. Prereq: Aspects of Spanish and Spanish American Literature or equivalent.

530 Survey of Spanish Literature (3,3) Major works in Spanish literature since 1700. Prereq: Aspects of Spanish and Spanish American Literature or equivalent.

531 Old Spanish (3) Evolution of Spanish language from its origins through 15th century.
Russian

See Germanic and Slavic Languages

Small Animal Clinical Sciences

See College of Veterinary Medicine and Comparative and Experimental Medicine

Social Work

(College of Social Work)

MAJOR

DEGREES

Social Work .................................. M.S.S.W., Ph.D.

Karen Sowers, Dean

Professors:

Blanch, M. H. (Emeritus), M.S. Ohio State
Cetingok, M., Ph.D. ......................... Washington (St. Louis)
Faver, C., Ph.D. .............................. Michigan
Fryer, Gideon W. (Emeritus), Ed.D. Columbia
Glisson, C. A., Ph.D. .......................... Washington (St. Louis)
Gragner, Ben P. (Emeritus), Ph.D. .................................. Brandeis
Hirayama, H., D.S.W. .......................... Pennsylvania
McLarnan, G. (Emeritus), M.S.S.W. .................................. Tennessee
Murphy, M. Kate (Emeritus), Ph.D. ...... Chicago
Nooe, Roger M., D.S.W. .................... Tulane
Orten, J. D. (Emeritus), D.S.W. .............. Alabama
Rubenstein, H., Ph.D. ......................... Chicago
Shatz, Eunice (Emeritus), Ph.D. .......... Brandeis
Sowers, Karen, Ph.D. ....................... Florida State

Associate Professors:

Bell, W. J., D.S.W. ............................ Tulane
Combs-Orme, Terri, Ph.D. .................. Washington (St. Louis)
Cruthirds, C. Thomas, D.S.W. ............. Tulane
Fiene, Judith, Ph.D. ........................... Tennessee
Nugent, W., Ph.D. .............................. Florida State
Orme, J. Ph.D. ................................. Washington (St. Louis)
Spicuzza, Frank, M.S.S.W. ............... Tennessee
Thompson, J. Ph.D. ......................... Rutgers
Vaughn, H. H., Ed.D. .......................... Memphis State

Assistant Professors:

Campbell, P. M., D.S.W. .................... Alabama
Collar, J. C., M.S.W. .......................... Tulane
Crawford, S., M.S.W. .......................... Tulane
Davey, Timothy L., Ph.D. .................. Texas
Egan, Marcia, Ph.D. .......................... Florida State
Egan, Marcia, Ph.D. .......................... Maryland
Marley, Marsha, D.S.W. .................... Tulane
Neff, James A., Ph.D. .......................... Florida State
Page, Timothy F., Ph.D. ..................... Western Michigan
Patterson, D., Ph.D. ............................... Utah
Rocha, Cynthia, Ph.D. .......................... Washington (St. Louis)
Rogge, Mary, Ph.D. ............................ Washington (St. Louis)

Field Practice Coordinators:

Staudt, Maryls, Ph.D. .......................... Washington (St. Louis)

THE MASTER’S PROGRAM

The Master of Science in Social Work program prepares social workers to provide professional leadership in: 1) clinical social work practice and 2) social work management and community practice. These objectives are met through a curriculum requiring of all students a professional foundation and a concentration in either clinical social work practice or management and community practice.

Admission Requirements

Admission to the master’s program is based on the following requirements:

1. A Bachelor’s degree from an accredited college or university with appropriate preparation in the social sciences. At least three-fourths of the applicant’s undergraduate work should be in the social sciences, humanities, physical sciences, and other Arts and Sciences subjects. Applicants must have a course in human biology and demonstrate a liberal arts perspective through coursework in at least four of the following five areas: economics or mathematics; government, political science or history; sociology or anthropology; psychology, philosophy, literature, or the arts. Applicants with other academic backgrounds may request consultation to discuss ways that they can meet the requirements.

2. A grade point of 2.7 or higher on a 4.0 scale. Applicants falling below this average may be considered for probationary admission on the basis of supplemental evidence of the ability to perform at a satisfactory level. The University requires a minimum GPA of 2.7 for admission to The Graduate School.

3. Personal qualifications acceptable for entrance into the professional practice of social work.

4. All applicants must submit up-to-date scores from the Graduate Record Examination (general).

Preference is given to applicants with a GPA of 3.0 or above in their undergraduate preparation in the social sciences.

Advanced Standing

The University of Tennessee College of Social Work has an advanced standing program. Admission to advanced standing requires:

1. A B.S.W. from an accredited program,

2. An overall undergraduate GPA of 3.0 or greater, and

3. Personal qualifications acceptable for entrance into the professional practice of social work. Students admitted into advanced standing are required to complete a minimum of 42 hours of study in either of the college’s concentrations - clinical social work practice or social work management and community practice. These students will follow the curriculum plan and meet all requirements of the concentration during three semesters of study in the program.

Specific information about the advanced standing program is available from the college.

Application for admission to the advanced standing program is through the regular admission process.

Extended Study

Planned part-time programs are available in all three branches of the college. Admission requirements are the same as for full-time study. Coursework can be completed over a three-year period. One year of the student’s period of study must be on a full-time basis.

Financial Aid

Students may apply directly to the University’s Financial Aid Office for assistance such as the National Direct Student Loan or the Work-Study Program. Other stipends are administered by the College and awarded on the basis of financial need. Applications for these funds must be made to the Branch of the College the student will attend. A student must first apply for University assistance, since College funds are considered supplementary to those of the University. Additional information about College stipends may be obtained from the Office of Student Financial Services.

General Requirements

1. A minimum of 60 semester hours including completion of foundation courses and field practice (30 hours); at least five courses (15 hours) in the clinical concentration, or at least five courses (15 hours) in the management and community practice concentration, and one elective (3 hours).

2. Students may select a thesis or nonthesis option. Students pursuing the thesis option receive six credit hours for successful completion.

3. Successful completion of a comprehensive exam or thesis defense.

4. An overall GPA of 3.0 or better on all graded courses and satisfactory performance in field.

The Professional Foundation Curriculum

The foundation curriculum consists of 30 semester hours in five basic knowledge and skill areas required of all students before entering either of the concentrations. As the initial phase of the educational program, the foundation curriculum contributes to the process of professional identification and presents a comprehensive and broad base of theory, knowledge, and skills from which to operate in the future as practitioners, supervisors, managers, planners and program developers.

Upon completion of the foundation curriculum (at the end of the second semester), students select a concentration in either clinical social work practice or management and community practice.

Clinical Social Work Practice: The clinical social work practice concentration focuses on students’ developing expertise in providing services to individuals, couples, families, and small groups who are experiencing, or who are likely to experience, serious threats to their personal and social well-being. The concentration emphasizes students’ developing: theoretical and empirical knowledge and practice skills in differential assessment and intervention directed towards the prevention and amelioration of complex personal, interpersonal, and environmental problems; understanding of, and ability to practice
ethically and effectively with, socially and culturally diverse populations; and understanding of, and skills in influencing, the organizational context of practice towards the development of new services that may be needed and improvement in the provision of existing services.

Management and Community Practice: The management and community practice concentration focuses on students' developing: skills directed toward the management and analysis of complex service delivery needs within organizations and communities; knowledge and skills in the development of service intervention strategies to address such related needs; and the organizational and management skills that enable practitioners to work in a variety of challenging and turbulent environments. The concentration emphasizes theory and skills related to leadership and administration, and permits flexibility in tailoring a program to fit the student's individual interests, capabilities, and career goals.

Field Practice
Field instruction is a critical component of the student's first- and second-year programs. Through cooperation with a wide range of social agencies and human service programs throughout Tennessee, the college is able to provide field placements in a variety of social work practice areas. The faculty works closely with the placement agencies and the field instructors to ensure that students have quality field practice experiences, meeting the objectives of the core curriculum and the concentration.

The college uses a concurrent class and field plan. Students are in field two days per week during the first year and three days per week in the second year.

First-year agency placements are selected to provide field experiences related to the foundation curriculum content. Within the placement, each student's experiences are planned and designed according to educational objectives.

Second-year placements are selected according to the student's area of concentration, individual career interests, and educational needs. The student actively participates with the field practice coordinator and the educational committee in selection of the second-year placement. The second-year field placement experience focuses on the integration of social work knowledge and values, and emphasizes the acquisition and development of practice skills.

Students are responsible for meeting the requirements of their placement agencies in terms of office hours and workload coverage. This responsibility takes precedence over scheduled University breaks and may result in variations in holidays and office hours for the student.

Students receiving a grade of NC in field practice may not repeat the field practice.

Transfer Credits
Coursework equivalent to the first year of the master's program, completed in another accredited graduate social work program, is usually accepted toward degree requirements. Applicants must meet the admission requirements of The Graduate School and the College of Social Work. Transfer courses must be approved as equivalent to required and/or elective courses taken for graduate credit and passed with a grade of B or better. An S (earned on an S/NC system) for the field practicum is also accepted. In addition, transfer courses must be part of an otherwise satisfactory graduate program (B average) and be approved by the dean. This coursework must be completed within the six-year period prior to the receipt of the degree.

A maximum of 6 semester credits from work earned in disciplines other than social work may be transferred as elective credits. The student's academic committee must approve the request and the transfer credit must meet Graduate School requirements.

Proficiency Examination
Students in the master's program may earn a maximum of nine hours by proficiency examination, with the exception of field practice courses. Students interested in proficiency examinations are referred to the Graduate School statement describing the procedure for applying for examination.

THE DOCTORAL PROGRAM
The College of Social Work offers the Doctor of Philosophy with a major in Social Work.

The focus of social work education at the doctoral level is to foster the development of an attitude of scientific inquiry, knowledge of the scientific method, ability to evaluate the knowledge base of social work practice, and effective participation in leadership roles in social work education, research, and practice. The emphasis of the doctoral program is on:

--The analysis of direct intervention and social administration and of the interrelationships among each of them and their social policy, organizational, and community contexts.
--Research-based knowledge to inform and guide social work practice, social policy, and social welfare program development.
--The program consists of foundation courses, elective courses, and dissertation research. The courses are available only in Knoxville. Students and their committees can develop a plan for completing their research in Nashville and Memphis based on the availability of dissertation resources.

Students have the opportunity to work in the Children's Mental Health Services Research Center, a National Institute of Mental Health research center, as part of their training. The Center is one of only three such centers nationwide and focuses on services to children who have experienced mental health problems associated with abuse, neglect, violence and a variety of psychosocial problems.

Admission Requirements
The Ph.D. program is designed for students who have completed a master's degree in an accredited school of social work and have post-master's social work/social welfare experience. Applicants who do not meet these requirements, but believe they have equivalent credentials should contact the Chair of Ph.D. program for further information regarding admissions criteria.

General Requirements
1. A minimum of 63 hours beyond the master's degree including: a) completion of 24 hours of required coursework, b) completion of 15 credits of advanced electives, at least 12 of which are taken outside the department, and c) completion of at least 24 credit hours of dissertation research.
2. Successful completion of qualifying and comprehensive examinations.
3. Completion and defense of the dissertation.

Curriculum
The curriculum of the Ph.D. program consists of required coursework, electives, and dissertation research. The foundation curriculum consists of 24 hours of coursework in the history and philosophy of social work, issues in direct service and administration and planning, core areas of practice, and research methodology and statistics. Upon completion of the foundation, students and their academic committees develop a plan of study consisting of coursework in Social Work and other departments of the University.

Typically, the foundation curriculum is completed and elective coursework begins during the first year of study, the elective requirement is completed and dissertation research begins in the second year of study, and dissertation research is continued in the third year of study. While it is generally expected that the coursework will be completed on a full-time basis, dissertation research can be completed on a planned part-time basis.

Specific courses required are 601, 602, 612, 613, 640, 650 and Statistics 531 and 532 or any two graduate level statistics courses approved by the Doctoral Program Chair.

Examinations
All doctoral students are required to pass a qualifying examination and a comprehensive examination. The qualifying examination covers the foundation curriculum. The comprehensive examination is administered by members of the doctoral committee and is designed for the student to demonstrate comprehensive knowledge of the major and cognate areas and the dissertation topic. In case of failure of either examination, the student may request a retake. The result of the second examination is final.

Financial Aid
Financial aid is available to qualified students in the form of fellowships, scholarships, and teaching and research assistantships. Graduate assistantships and other forms of assistance are awarded on the basis of merit and interest to applicants who are accepted into the Ph.D. program.

MINOR IN GERONTOLOGY
Graduate students in the College of Social Work may pursue a specialized minor in gerontology. This interdisciplinary 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 among legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S.S.W. and Ph.D. programs in
508 Practicum in Social Work Research (3-6) Supervision and consent of instructor. Topics and techniques in research practice, including research design, data collection, analysis, and evaluation. May be repeated with the approval of the College of Social Work and the student's major professor.

509 Seminar in Social Work (3) Topics in social work practice, focusing on research, methodology, and research design. May be repeated with the approval of the student's major professor.

510 Field Practice (3-6) Field practice in social work settings, under faculty supervision. May be repeated. Maximum 36 hrs. S/NC only.

512 Leadership and Management in Human Services (3) Examination of leadership and management skills required in development and management of human service delivery systems. Issues relating to human resource management, resource allocation, strategic planning, and organizational development. Prerequisite: Completion of the foundation or consent of instructor.

513 Social Work with Children and Adolescents (3) Specialization in the assessment, planning, and implementation of services for children and adolescents. Prerequisite: Consent of instructor.

514 Human Behavior and the Social Environment I (3) Theories of human behavior and social environments, focusing on the development of social work practice in the helping professions. Prerequisite: Introduction to Social Work or consent of instructor.

515 Human Behavior and the Social Environment II (3) Development of social work practice in the helping professions, focusing on the development of social work practice in the helping professions. Prerequisite: Consent of instructor.

516 Social Welfare Policy and Services (3) Development of social work practice in the helping professions, focusing on the development of social work practice in the helping professions. Prerequisite: Consent of instructor.

517 Social Work and Oppression (3) Sources, dynamics, and impact of oppression in U.S. society as manifested in the social/behavioral sciences. Prerequisite: Consent of instructor.

521 Clinical Social Work Practice with Individuals (3) Clinical techniques and methods in practice with individuals, focusing on the development of social work practice in the helping professions. Prerequisite: Consent of instructor.

522 Clinical Social Work Practice with Families (3) Clinical techniques and methods in practice with families, focusing on the development of social work practice in the helping professions. Prerequisite: Consent of instructor.

523 Clinical Social Work Practice with Groups (3) Clinical techniques and methods in practice with groups, focusing on the development of social work practice in the helping professions. Prerequisite: Consent of instructor.

526 Research for Assessment of Social Work Treatment (3) Research methods and design, focusing on the development of social work practice in the helping professions. Prerequisite: Consent of instructor.

529 Seminar in Social Work (3) Topics in social work practice, focusing on research, methodology, and research design. May be repeated with the approval of the student's major professor.

532 Short-Term Treatment (3) Theory and practice of short-term treatment, focusing on the development of social work practice in the helping professions. Prerequisite: Consent of instructor.

533 Social Work Treatment with Couples (3) Theory and practice of treatment with couples, focusing on the development of social work practice in the helping professions. Prerequisite: Consent of instructor.

534 Social Work Treatment with Children and Adolescents (3) Theory and practice of treatment with children and adolescents, focusing on the development of social work practice in the helping professions. Prerequisite: Consent of instructor.

535 School Social Work (3) Theory and practice of school social work, focusing on the development of social work practice in the helping professions. Prerequisite: Consent of instructor.

536 School Social Work (3) Theory and practice of school social work, focusing on the development of social work practice in the helping professions. Prerequisite: Consent of instructor.

541 Administration and Management in Human Services (3) Examination of administrative and management skills required in the development and management of human service delivery systems. Issues relating to human resource management, resource allocation, strategic planning, and organizational development. Prerequisite: Consent of instructor.

542 School Social Work (3) Theory and practice of school social work, focusing on the development of social work practice in the helping professions. Prerequisite: Consent of instructor.

543 Fiscal Management and Resource Development (3) Administration of social work programs and policies, focusing on the development of social work practice in the helping professions. Prerequisite: Consent of instructor.

544 Evaluation Research (3) History and philosophy of research, focusing on the development of social work practice in the helping professions. Prerequisite: Consent of instructor.

545 Social Work and Oppression (3) Sources, dynamics, and impact of oppression in U.S. society as manifested in the social/behavioral sciences. Prerequisite: Consent of instructor.

550 Seminar in Management and Community Practice (2-3) Seminar in management and community practice, focusing on the development of social work practice in the helping professions. Prerequisite: Consent of instructor.

551 Seminar in Social Work with Families (2) Seminar in social work practice with families, focusing on the development of social work practice in the helping professions. Prerequisite: Consent of instructor.

552 Community Organization (3) Seminar in community organization, focusing on the development of social work practice in the helping professions. Prerequisite: Consent of instructor.
ing disadvantaged children and their families: Social Security Act (Title IV, Child Welfare and AFDC; Title V, the Maternal and Child Health Block Grant; Title XIX, Medicaid), Head Start, WIC and other nutrition programs, and Healthy Start. Current issues and controversy; legislative changes.


**693 Directed Study in Social Work Research** (3) Advanced individual study, under faculty guidance, of social work practice issues. Prereq: First year required Ph. D. courses or consent of instructor. May be repeated. Maximum 9 hrs. F, Sp.

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**Sociology**

*(College of Arts and Sciences)*

**MAJOR**

<table>
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<tr>
<th>DEGREES</th>
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<tr>
<td>M.A., Ph.D.</td>
<td>Michael L. Benson, Head</td>
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**Professors:**

Betz, D. Michael, Ph.D. .................. Michigan State
Black, James A., Ph.D. .................. Iowa
Gaventa, John P., Ph.D. ............. Oxford
Hastings, Donald W., Ph.D. ....... Massachusetts
Hood, Thomas C., Ph.D. ............ Duke
Perl, Robert G. (Liaison), Ph.D. .......... British Columbia
Shover, Neal, Ph.D. ................. Illinois
Wallace, Samuel E., Ph.D. ........ Minnesota

**Associate Professors:**

Benson, Michael L., Ph.D. .............. Illinois
Cable, Sherry, Ph.D. ................ Penn State
Jalata, Asafa, Ph.D. ................ SUNY (Binghamton)
Kurth, Suzanne B., Ph.D. .......... Illinois (Chicago)

**Assistant Professor:**

Jones, Robert E., Ph.D. ................ Washington State

The Sociology Department offers graduate study leading to the Master of Arts and the Doctor of Philosophy. The M.A. program includes a thesis and non-thesis option. The graduate program has concentrations in criminology; energy, environment, and resource policy; and political economy. The criminology concentration includes 506, 551, 563, and 566. The energy, environment, and resource policy concentration includes 522, 553, 556, 661, 662, and 662. The political economy concentration includes 504, 540, 541, 643, 644, and 645. Both the master's and the doctoral program allow for the construction of individualized programs of study. Detailed information may be obtained from the Director of Graduate Studies in Sociology. All incoming students will be advised by the Director of Graduate Studies. New students are admitted in fall semester only and applications must be received by the Graduate Admissions and Records Office by February 1.

**ADMISSION REQUIREMENTS**

1. Acceptable scores on the general Graduate Record Examination (verbal, quantitative, and analytical) are required. GRE scores in the subject area (Sociology) are requested but not required.

2. Three letters of recommendation (forms may be obtained from the department).

3. Completion of the appropriate previous degree (baccalaureate, preferably with a major in one of the social sciences, for the M.A. program; master's degree in one of the social sciences for the doctoral program).

**THE MASTER'S PROGRAM**

**Thesis Option**

A minimum of 30 hours beyond the baccalaureate degree, including 12 hours of coursework and 6 hours of Thesis 500, is required. Students must complete Sociology 521, 531, Statistics 531, and one foundation course (504, 505, or 560). At or near the end of all coursework, the student must take an oral examination on course material and thesis. The examination will be administered by the student's committee.

**Non-Thesis Option**

A minimum of 30 hours of coursework is required, including Sociology 521, 531, Statistics 531, and one of the following: 504, 505, or 560. Sociology 534, 622, and Statistics 532 are recommended. Sociology courses at the 400 level may be taken with the approval of the student's committee. A student's plan of study should follow one of the following approaches: Plan 1, 12 hours in one of the department's concentrations and 6 hours in a second area, including areas outside the department, subject to the approval of the student's committee; Plan 2, 12 hours in a special area of study approved by the student's committee and the department's Graduate Program Committee. Students are encouraged to prepare a paper synthesizing their knowledge of the concentration(s). Students who incorporate supervised field experience in their programs are encouraged to prepare a report based on those experiences that demonstrates their understanding of research, theory, and report writing. All students must take final written and oral examinations that include questions on their general coursework in theory and methods and on their special areas of study. Subject to approval by the student's committee, up to 12 hours may be taken in courses outside the department for either program.

**THE DOCTORAL PROGRAM**

**Coursework**

Twenty-four hours of coursework beyond the master's degree are required (exclusive of S/N/C credits). Twelve hours of course credit in Sociology at the 600 level. Students who enter the program without the courses required for the M.A. degree (521, 531, Statistics 531) or their equivalents must take them as remedial work which does not apply to their residence. Students must complete Sociology 622: 534, 535, 536, or 636; and Statistics 532 or another advanced course in statistics. Completion of 9 hours in each of two concentrations is encouraged. A student who cannot achieve his/her educational goals within the department's concentrations may construct an individualized course of study subject to the approval of the student's doctoral committee and the Graduate Program Committee. Sociology courses at the 400 level may not be taken without the consent of the student's advisor and the Graduate Program Committee.

Six hours may be taken in related fields without petitioning the Graduate Program Committee for approval. The student's program may include a minor or cognate field.

**Comprehensive Examinations**

Written examinations in four areas are required (sociological theory, research methodology, and two substantive areas). Doctoral students are eligible to take the theory and methodology examinations whenever offered. Substantive examinations may be taken upon completion of theory and methodology examinations. Detailed information on examinations and examination options (generalist, specialist, and colateralist) may be obtained from the department.

**Dissertation and Final Examination**

A dissertation based on original research must be completed (24 hours). The candidate must pass an oral defense of the dissertation, including the Theory and Methodology related to the research, in accordance with the deadlines specified by The Graduate School.

**MINOR IN ENVIRONMENTAL POLICY**

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

**MINOR IN GERONTOLOGY**

Graduate students in the Department of Sociology may pursue a specialized minor in gerontology. This interdisciplinary minor gives the student an opportunity for combining the knowledge about aging in American society with his/her major concentration. Please refer to Human Ecology for specific requirements.

**ACADEMIC COMMON MARKET**

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.A. program in Sociology is available to residents of the state of Virginia (concentration in criminology only); the Ph.D. to residents of West Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

**GRADUATE COURSES**

405 Sociology of Sport (3) Social meaning, organization, and process of sport. Prereq: 291 or consent of instructor.

414 Sociology of Health Care (3) Organization of health care facilities, staff-patient relationships, demographic characteristics, and prevalence of disease.

415 Sociology of Aging (3) How values and social change affect the aging process. How values and social change affect the aging process.

446 The Modern World System (3) Critical examination of world-systems as social system, its coherence, boundaries, regions, member groups, modules, and patterns of conflict. Analysis of who gets what, why, and in what political economic systems.

476 Rhetoric of the Contemporary Feminist Movement (3) Historical and critical study of rhetoric in campaign for women's rights in United States from 1840's to present. (Same as Women's Studies 476.)

570 Legal and Ethical Issues of Communication (3) Communication rights and responsibilities. Prereq: Consent of instructor.

590 Directed Reading and Research (3) May be repeated. Maximum 6 hrs.

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

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

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

Sport and Physical Activity

(College of Education)

MAJORS

Human Performance and Sport Studies .... M.S.

D. Kelley, Leader

Professors:

Beitel, Patricia A., Ed.D. ................. North Carolina (Greensboro)

Lay, Nancy E. (Emeritus), Ph.D. ... Florida State

Watson, Helen B. (Emeritus), Ph.D. .... Michigan

Associate Professor:

Jones, Ralph E., Ph.D. ................. Toledo

Kelley, Dennis R., Ph.D. ............. Georgia State

Assistant Professors:

Borovak, Patricia C., M.S. .......... Tennessee

McCutchin, M. G., Ed.D. .......... North Carolina (Greensboro)

The Sport and Physical Activity unit participates in graduate programs leading to degrees, majors, and concentrations in:

Master of Science

Human Performance and Sport Studies

Sport management

See Education under Fields of Instruction for full description of all degree requirements. Elective courses are offered in dance. These courses are appropriate for students interested in management of dance studios, teaching dance, or dance performance. The purpose of the unit is twofold: 1) to provide the opportunity for students to attain knowledge and to develop the essential skills to be successful sport managers, and 2) to coordinate and provide instruction in many physical activities designed to improve physical fitness and encourage future participation in lifetime sports.

ADMISSION REQUIREMENTS

Applicants are required to complete the unit application which will be sent to all persons upon their initial inquiry about the program. Preference will be given to students with an overall undergraduate GPA of 3.0 or higher. Students with a GPA between 2.7 and 2.99 are encouraged to submit GRE scores.

The following retention policy applies to all graduate students seeking a degree in this unit:

1. Graduate students are required to maintain an overall 3.0 GPA.
2. Any student who falls below this standard will be advised in writing by the unit leader of the need to discuss the matter with his/her advisor.
3. If a student's overall GPA remains below 3.0 for a second semester, the student will have his/her degree status revoked.

GRADUATE ASSISTSHIPS

A limited number of graduate assistantships are available for qualified women and men who are graduates of accredited colleges or universities. These assistantships are open to students in the master's program. Students interested in these opportunities should file their applications before February. Letters should be addressed to Graduate Assistantships Coordinator, Sport and Physical Activity unit, The University of Tennessee, Knoxville, TN 37996-2700.

GRADUATE COURSES

415 Development and Maintenance of Leisure, Sport, Tourism Services (3) Same as Recreation and Tourism Management 415

440 Sport Marketing (3) Application of fundamental marketing concepts to sport industry: Marketing research, promotions, fund raising, advertising, and assessment of marketing programs specific to sport. Historical development of sport marketing. Prereq: Consent of instructor.

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

501 Special Project (3) Culminating experience for nonthesis major. Research study suitable for publication, or practicum requiring special written work. Prereq: 532.

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


511 Administration/Supervision in Sport (3) Development of knowledge and analytic skills desirable for managers/administrators in sport business/organization: organizational, administrative, and supervisory strategies related to sport in profit and non-profit settings. Sp

512 Application of Legal Concepts to Sport Settings (3) Application of contract law, breach of contract, and monetary damages within sport settings: risk assessment and development of effective risk management strategies: development of contracts in sports; and analysis of cases involving discrimination based upon gender, race, and age as well as protection of rights at amateur and professional levels of sport. Sp

532 Research Techniques in Sport (3) Evaluate, compare, and contrast research techniques in sport with consideration for and experiences in appropriate review, design, analysis procedures, and proposal development. F, Sp

535 Ethics in Sport Administration (3) Development of ethical and related knowledge desirable of middle and upper level managers in sport business/organizations. Social issues and ethics in sport administration. Sp

544 Theories of Leadership and Leader Behavior in Sport (3) Integration of various theoretical approaches to leadership styles in sport administration within cultural contexts, research, and field experiences. Sp

553 Case Studies in Sport Administration (3) Current issues and problems in sport administration at all levels of amateur and professional sport. F

554 Readings in Sport Administration (3) Survey of pertinent literature in refereed and applied journals and texts. Su

555 Assessment of Sport Programming Needs (3) Development and assessment of approaches and/or instruction for purpose of evaluation, research, feasibility studies, and needs assessment in sport administration/management: qualitative and quantitative techniques. Prereq: 532. Sp

570 Event Management (1-3) Review of current research related to theory and practice in event management and involvement in event management capacity with one or more special events. Su

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

590 Practicum (1-3) Intern experience in areas of major interest. May be repeated. S/N only.

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

595 Internship (3) Full-time application of previous theoretical and applied knowledge and skills in appropriate sport setting. S/N only. E

Dance

GRADUATE COURSES


480 Dance Through the 19th Century (3) Dance of various societies and culture from pre-history through 19th century.

490 Dance in the 20th Century (3) History and philosophy of dance.

495 Dance Pedagogy (3) Principles and methods of teaching dance with practical application in mini-teaching experience. Prereq: Upperclass or graduate standing and consent of instructor.

Statistics

(College of Business Administration and Intercollegiate Program)

MAJORS

Business Administration ............... M.S.

Robert W. Mee, Head

Professors:

Bozdogan, Hamparsum, Ph.D. ......... Illinois

Guass, Frank M. (Director), Ph.D. ....... Florida State

McLean, Robert A. (Emeritus), Ph.D. .... Purdue

Mee, Robert W. Ph.D. .............. Iowa State

Parr, William C., Ph.D. ............. Southern Methodist

Philpot, John W., Ph.D. .......... VPI

Sanders, Richard D., Ph.D. ........... Texas

Sylwestra, David L., Ph.D. .......... Stanford

Thigpen, Charles E. (Emeritus), Ph.D. .... VPI

Associate Professors:

Leitmaker, Mary G., Ph.D. ............. Kentucky

León, Ramon V., Ph.D. .............. Florida State

Walker, Esteban, Ph.D. ............ VPI

Younger, M. S., Ph.D. ........ VPI
Additional Intercollegiate Program Faculty:
Bunting, Dewey, Arts and Sciences; Chattejee, Anu, Engineering; Dessart, Don, Education; Dyer, Carl, Human Ecology; Fitzpatrick, Ben, Arts and Sciences; Flibot, Henry, Agricultural Sciences and Natural Resources; Garti, Michael, Arts and Sciences; Glisson, Charles, Social Work; Gross, Louis, Arts and Sciences; Huck, Schuyler, Education; Ladd, R. T., Business Administration; Lounsbury, John, Arts and Sciences; Lyons, William, Arts and Sciences; McInemore, Dan, Agricultural Sciences and Natural Resources; Miller, Mark, Communications; Omre, John, Social Work; Ploch, Donald, Arts and Sciences; Rajput, Michael, Communications; Smith, Julius, Arts and Sciences; Wagner, Carl, Arts and Sciences.

THE MASTER'S PROGRAM

The M.S. program in Statistics provides students with the foundation in theory and practice required for careers in applied statistics. In addition to the education traditionally offered in such a program, the department offers a concentration in industrial statistics, which provides unique opportunities for experiences in practical applications of statistical theory. Through involvement in The University of Tennessee Institute for Productivity Through Quality and related programs, department faculty participate in a variety of consulting and research projects in industry. Students may supplement their classroom study with an industrial internship and participation in research projects dealing with industrial problems. Department faculty also collaborate with researchers from many academic disciplines and hold joint appointments with the College of Agriculture, the Computing Center and the Medical Center. Statistics graduate students may gain consulting experience by working with faculty involved in these consulting activities. All students are encouraged to participate in supervised internship or consulting activities as part of their graduate program.

Individuals with an undergraduate or graduate degree in other disciplines are encouraged to enter the program. The candidate's mathematical background should include differential and integral calculus of several variables. Individuals with limited mathematical background should seek departmental guidance regarding specific ways in which they may prepare themselves for the program by taking coursework as non-degree students. Requests for application forms and further information may be sent to the Director of Graduate Studies, Department of Statistics, Stokely Management Center, University of Tennessee, Knoxville, TN 37996-0532 or e-mail kwalker@utk.edu or http://funnelweb.utc.utk.edu/-stat/programs.html.

Admission Requirements

General admission requirements for The Graduate School are described beginning on page 12. Applicants for Statistics must submit results of the Graduate Record Examination (GRE) general portion, although GMAT exam scores may be substituted. Applicants for the statistics program must have completed at least two years of college-level mathematics, including the calculus of several variables and matrix algebra, and be proficient in a computer language. Applicants whose native language is other than English must submit results of the Test of English as a Foreign Language (TOEFL).

Curriculum

A minimum of 33 credit hours must be completed for the master's degree. Required of all students are 6 hours in statistical methods, 6 hours in statistical theory, 1 hour in statistical computing, and 3 hours in either supervised consulting or internship. Students must complete a minimum of 21 hours in approved statistics courses, exclusive of consulting, internship, independent study, or thesis. The thesis option for the master's degree requires the student to complete 6 hours for the thesis. Alternatively, the non-thesis option requires a minimum of 3 hours for an independent study project.

Comprehensive Examination

Students must pass a two-part written comprehensive examination covering 1) theory and 2) methods. Upon failing either part of the examination, the student may retake it. The result of the second examination is final. For students writing a thesis, this examination must be passed before the thesis is defended.

INTERCOLLEGIATE GRADUATE STATISTICS PROGRAM

The Intercollegiate Graduate Statistics Program (IGSP) is a full University of Tennessee academic program established to enable students to earn either a minor or an M.S. in Statistics simultaneously with a master's or doctoral degree in another department. Approved coursework taken to meet doctoral requirements in the student's home department may also be credited toward the M.S. in Statistics. Similarly, approved coursework in statistics taken to meet the requirements for a master's or doctoral degree in another department may also count toward the minor in Statistics. The program is open to graduate students in all departments which have an approved minor and/or M.S. joint major curriculum offered through the program. The program is administered by an Executive Committee, consisting of college representatives from all colleges with approved programs, with advisory input from the program faculty.

Degree Program

Hours in Approved IGSP Courses

Master's in home department, minor in Statistics 9
Master's in home department, M.S. in Statistics 24
Doctorate in home department, minor in Statistics 15
Doctorate in home department, M.S. in Statistics 24

*The M.S. in Statistics requires 33 hours.

Course options consist of courses in statistics, offered either by the Department of Statistics or by other departments, which have been reviewed and approved by the IGSP Executive Committee. Students taking an M.S. in Statistics must pass the two-part comprehensive examination covering statistical theory and methods. Students taking a minor in Statistics in conjunction with a master's in another field must pass a written comprehensive examination in Statistics, constructed and evaluated by the student's Examination Committee. No formal comprehensive examination is required of students earning a Statistics minor along with a master's in another field beyond questions which the home department wishes to include as part of the comprehensive examination for the master's degree.

General Admissions and Degree Requirements

1. The student's home department must have approved a program of courses with the Executive Committee. That program will specify the sequences of statistics courses, chosen from the IGSP approved list, that are considered appropriate by the home department. Students who wish to participate in this program should contact their college representative or the Chair of IGSP in the Department of Statistics.

2. The student's graduate committee must include a faculty member of the Department of Statistics at the rank of Assistant Professor or above.

3. The student's Admission to Candidacy form must contain all courses required for the chosen degree program set off in a group and labeled "Statistics Courses Required for the Minor or M.S. in Statistics." Should the student not decide to apply for admission to the program until after completion of some of the courses, the student's major professor should file a program change with the cooperating departments and assist the student in obtaining a Department of Statistics faculty member to serve on the student's graduate committee.

Successful completion of the Statistics M.S. or minor is recognized by appropriate documentation on the student's transcript. Students who do not complete the requirements of the minor or M.S. will still receive academic credit for the statistics courses they have successfully completed.

BUSINESS ADMINISTRATION CONCENTRATION

For complete listing of MBA program requirements, see Business Administration.

MBA Concentration: Statistics

Minimum course requirements are 571, 566, 572 with prereq or coreq of 561.

Ph.D. Concentration: Statistics

This degree provides students with a broad knowledge of the field of statistics, the ability to apply statistics in practical situations to problems of business and industry and the ability to develop new statistical methods; all of which takes place while students are exposed to coursework in the basic functional areas of business.

Minimum course requirements are: 673, 666, 691, and 592.

ACADEMIC STANDARDS

A graduate student in the College of Business Administration whose grade-point average falls below 3.0 will be placed on probation. A student on probation will be dropped from the program unless his/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 semester's coursework as established by the degree program for full-time students and the
next two semesters' coursework as established by the degree program for part-time students.

**GRADUATE COURSES**


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

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


**531 Survey of Statistical Methods I (3)** Univariate and bivariate data collection and organization, statistical estimation and hypothesis testing; analysis of relationships for categorical and numerical data, including Chi-square tests and simple linear and quadratic regression. Use of computing facilities. Credit not given for both 531 and 537. Prereq: 1 yr. college mathematics. E

**532 Survey of Statistical Methods II (3)** Multiple linear regression, including use of dummy variables; simple and multiple factor analysis of variance and covariance, issues in experimental design and analysis. Use of computing facilities required. Prereq: 531. E

**537 Statistics for Research (3)** Principles and application of statistical methodology, integrated with considerations of major statistical computing system. Probability and probability distributions, forming and testing hypothesis using parametric and nonparametric inference methods. Matrix-based multiple regression and correlation and regression. Credit not given for both 537 and 531. Prereq: 1 yr undergraduate mathematics and 1 undergraduate statistics course. F

**538 Statistics for Research II (3)** General linear model as applied to multiple regression and analysis of variance. Diagnostic and influence techniques. One-way, factorial, blocking, and nested designs, planned versus posthoc contrasts. Random factors and repeated measures. Prereq: 537 or 532. Sp.

**561 Introduction to Computing for Data Management and Analysis (1)** UTK computing environment for beginning statistics graduate students. Use of operating system commands, system utility editors, utility programs and SAS statistical packages for data entry and output. Learning management and statistical analysis. Use of UUTC computing facilities required. Coreq: 531, 537 or 537, or consent of instructor. F


**564 Theory of Statistical Inference (3)** Introductory theory underlying common statistical procedures of hypothesis testing and estimation. Prereq: 563.

**566 Statistical Techniques in Industrial Processes (3)** Applications of control charts and other statistical techniques in industrial setting. Attributes and variables control charts, process capability analysis, aspects of sampling, statistical tolerancing, estimation of variance components, problems of measurement, special industrial applications. Prereq: 571 or equivalent.


**572 Applied Linear Models (3)** Simple and multiple linear regression and analysis of variance, algebra and general linear model; polynomial regression, weighted least squares regression, variable selection techniques, multivariate linear regression and discriminant analysis. Prereq: 571 and matrix algebra.

**573 Design of Experiments (3)** One-way ANOVA, multiple range tests, equal and unequal variances, transformations; factorial experiments; confounding designs; analysis of covariance, split-plot and nested designs, fractional factorials, sequential designs. Prereq: 571.

**575 Applied Time Series (3)** Fundamental concepts of time series analysis: Box-Jenkins approach, stationarity and nonstationarity, forecasting, model identification, seasonal models, transfer function models, and spectral theory. Prereq: 538 or 572 or consent of instructor.

**576 Principles of Statistical Process Management (1-3)** Statistical and other techniques applied to management of organizational processes. Prereq: Consent of department head.

**577 Graduate Seminar (2-4)** Directed readings and active participation in colloquium program of Department of Statistics and of student's minor program. Prereq: Consent of statistics department director of graduate studies. May be repeated. Maximum 2 hrs. S/N Only.

**579 Independent Study (2-4)** Faculty directed readings and investigation of specified topic in probability or statistics. Written report and oral presentation. Prereq: 2 courses in statistics and consent of statistics department director of graduate studies. May be repeated. Maximum 6 hrs. S/N Only.

**578 Statistical Consulting Practicum (1-6)** Supervised experience helping on-campus researchers plan, manage data, and develop and perform analyses specific to designs and hypotheses. Discussion of activities in regular seminar meetings. Final written report to instructors. Prereq: 572 or 538. May be repeated. Maximum 6 hrs. S/N or letter grade.

**581 Special Topics in Probability (1-3)** Presentation of specialized topics in probability and stochastic processes. Prereq: 573 or consent of instructor. May be repeated. Maximum 6 hrs.

**583 Special Topics in Statistics (1-3)** Presentation of specialized topics in statistics. Prereq: 681. Maximum 6 hrs.

**587 Graduate Seminar (1)** Directed readings and active participation in colloquium program of Department of Statistics and of student's minor program. Prereq: Consent of statistics department director of graduate studies. May be repeated. Maximum 2 hrs. S/N Only.


**673 Advanced Topics in Experiment Design and Linear Models (3)** Experimentation for product and process improvement: response surface methodology and robust design methods; mixture experiments; optimal design topics; distribution theory and inference for linear models. Prereq: 573 or consent of instructor.

**675 Categorical Data Analysis (3)** Log-linear analysis of multidimensional contingency tables. Logistic regression. Other applications, and use of statistical software. Prereq: 1 yr graduate-level statistics, regression analysis and analysis of variance and familiarity with UNIX; or consent of instructor.


Theatre, concentrations in acting, scene design, costume design, lighting design and theatre technology. Not all areas of concentration accept applicants every year.

Applicants must have completed undergraduate degrees approximately equivalent in requirements to those specified for degrees conferred by The University of Tennessee, Knoxville.

Three letters of recommendation and interviews with appropriate faculty are required of all applicants. Applicants for admission to the M.F.A. design/technical theatre programs must submit samples of their work. Auditions are required of M.F.A. degree acting applicants.

For detailed information about the graduate program, contact the Director of Graduate Studies, Department of Theatre.

THE MASTER OF FINE ARTS PROGRAM

At least 60 semester hours, 40 of which must be at the 500 level or above, are required for the degree of Master of Fine Arts with a major in Theatre, which is normally to be completed in three consecutive years of full-time residence. Theatre 501 is required the first year of residence. Theatre 510 and 512 are also required of all students. Students in the M.F.A. degree program are evaluated annually by juried performance or portfolio submission. Continuation in the program is with the approval of the faculty committees for the M.F.A. degree program. Theatre 599, Projects in Lieu of Thesis, and an oral defense of the project must be completed satisfactorily before the degree is conferred.

In addition to the core requirements listed above, each area of concentration has specific requirements:

**Design/Technical Production**

Required courses are at least 12 hours of Theatre 580, Design and Technical Production Seminar, and at least 6 hours in the projects courses. Theatre 401, Principles of Design is required in the first year of residence.

**Acting**

Theatre 500-21-22-23-24-25 Master Class are required, along with one course in directing and two hours each in voice and dance.

**REQUIREMENTS FOR SECOND MASTER’S DEGREE**

Students admitted to the MFA program who have already earned a master’s or a doctoral degree may apply up to 12 credit hours from the previous graduate program to the M.F.A. degree with approval of the student’s committee, the Dean of the College of Arts and Sciences, and the Dean of The Graduate School.

Any such credits applied from a previous graduate program would be from courses that are directly relevant to the student's MFA curriculum and must have been earned within the time limit (6 years) established for completion of the MFA degree.

**GRADUATE COURSES**

401 Principles of Theatrical Design (3) Fundamental principles of design; visual and structural relationships. Projects assigned to develop understanding and perception.

409 Stage Make-up (3) Study and problems in make-up design and application: character analysis. Prereq: Introduction to Theatre.

420 Special Studies in Acting (3) Content varies. Exercises in selected areas such as style, approach, etc., Shakespeare, movement, humor. Prereq: Advanced Acting and consent of instructor. May be repeated. Maximum 9 hrs.

423 Period Movement and Dance (2) Movement styles and dances from Renaissance to 20th century. Prereq: Stage Movement or consent of instructor.

424 Theatre Dance II (2) Advanced dance technique incorporating elements of musical theatre. Prereq: Theatre Dance or consent of instructor. May be repeated. Maximum 6 hrs.

425 Selected Musical Theatre Techniques (3) Study and practice of musical theatre material: dance and vocal work. Prereq: Theatre Dance or consent of instructor. May be repeated. Maximum 4 hrs.

426 Applied Phonetics (3) Development of skills in interpretation and production of principal varieties of English Language in North America and Great Britain and selected foreign dialects in North America. Prereq: Consent of instructor.


445 Advanced Costume Construction (3) Advanced studies in construction technique, tailoring, vacuum forming, plastic molding, and draping. Prereq: 345 or consent of instructor.

446 Costume Painting (3) Draping patterns for period costumes. Costume and study of historic patterns 1500-1900. Prereq: 345 or consent of instructor.

450 Advanced Scenery Technology I (3) Study and practice of theatre woodworking; production participation required. Prereq: 250. Graduate credit to theatre M.F.A. students only.

451 Advanced Scenery Technology II (3) Study and practice of metalworking and plastics for theatrical productions; production participation required. Prereq: 250. Graduate credit to theatre M.F.A. students only.

452 Advanced Scenery Technology III (3) Study and practice of stage rigging for theatrical productions; production participation required. Prereq: 250. Graduate credit to theatre M.F.A. students only.

454 Scenery Painting (3) Introduction to materials, techniques, and principles of craft. Gaining skill and understanding through study experience. Prereq: Consent of instructor.


466 Rendering (3) Techniques in monochrome and full color illustration of space and form. Prereq: Acquaintance with basic mechanical perspective and freehand sketching.

462 Advanced Lighting Design (3) Advanced problems in lighting design and theory, lighting musical theatre, opera, and dance. Prereq: 362 or consent of instructor.


470-71 Playwriting (3,3) Advanced instruction in writing of plays. Prereq: Consent of instructor.

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

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

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

501 Introduction to Graduate Research in Theatre (3) Research tools and methods for theatre artist and scholar.

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

510 Studies in Theatre History (3) Intensive study of selected topics in theatre history. May be repeated. Maximum 9 hrs.

512 Dramatic Literature Analysis (3) Dramaturgical analysis of plays as related to society’s manners and mores, architecture and furniture.

536 Projects in Play Directing (3) Practical work in play direction involving various lengths and kinds of scripts. May be repeated. Maximum 9 hrs.

542 The Social History of Costume (3) Study and analysis of costume as related to society’s manners and mores, architecture and furniture.


545 Millinery for the Stage (2) Pattern making and construction techniques for hats from antiquity to present. Prereq: Consent of instructor.

546 Advanced Costume Pattern Cutting (3) Advanced studies in pattern period costume. Development of historic patterns through flat pattern method. Prereq: 446.

547 Painting and Dyeing for the Theatre (2) Fibers, dyes and dye processes; color matching and distressing.

549 Projects in Costume Technology (1-3) Individualized studies in costume technology in theatre production. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.


553 Projects in Scene Design (1-3) Conception and completion of major projects, both theoretical and practical, in scene design. May be repeated. Maximum 9 hrs.

554 Projects in Scene Design (3) Advanced scene design techniques and approaches to design for complex dramas and varied dramatic forms. May be repeated. Maximum 6 hrs.

555 Advanced Scenery Painting (2) Advanced instruction in materials, techniques and principles of scenic painting; studio experience in dimensional simulation, assassination, and color schemes. Prereq: 454 or consent on instructor.

556 Projects in Lighting Design (1-3) Conception and completion of major projects, both theoretical and practical, in lighting design. Prereq: Consent of Instructor. May be repeated. Maximum 6 hrs.

562 Special Problems in Lighting Design (3) Advanced problems in lighting design and theory, problems in Broadway production and tour. Prereq: 462 or consent of instructor.

570 Dramaturgy: Theory and Practice (3) Methods and materials. Prereq: Consent of instructor.

580 Design and Technical Production Seminar (1-6) Selected aspects of design and technical production. Prereq: Consent of instructor. May be repeated. Maximum 18 hrs.

585 Production Workshops (1-6) Directed experience in production collaborations. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.


599 Project in Lieu of Thesis (1-15) Available to theatre MFA students only. Prereq: Minimum of 30 hrs toward MFA degree and consent of advisor. May be repeated. Maximum 9 hrs.
Transportation
See Marketing, Logistics and Transportation.

Veterinary Medicine
(College of Veterinary Medicine)

MAJOR DEGREE
Veterinary Medicine .................. D.V.M.
Comparative and Experimental Medicine .......... M.S., Ph.D.

THE PROFESSIONAL PROGRAM

Admission Requirements
To qualify for admission to the professional program of the College of Veterinary Medicine, a candidate must have completed at least the minimum pre-veterinary course requirements listed below. These may be completed at any accredited college or university that offers courses equivalent to those at The University of Tennessee, Knoxville. Pre-veterinary course requirements must be completed by the end of spring term of the year in which the student intends to enroll. Pre-veterinary course requirements must have been satisfactorily completed within five years of the time the student wishes to enter the program.

Subject Area Semester Hours
English 6
Humanities and Social Sciences* 18
Physics 8
General Chemistry 8
Organic Chemistry 8
Biochemistry** 4
General Biology 8
Genetics 3
Cellular Biology*** 3

TOTAL 66

*May include, for example, courses in English literature, speech, music, art, philosophy, religion, language, history, economics, anthropology, political science, psychology, sociology, and geography.

**Exclusive of laboratory.

***It is expected that this requirement will be fulfilled by a course in cellular or molecular biology.

Admission Procedures
Admission of new students is for the fall semester, with first priority given to residents of Tennessee.

The College of Veterinary Medicine utilizes the Veterinary Medical College Application Service (VMCAS) for all applicants. Forms and instructions for making application for admission may be obtained beginning July 1, 1997 from the Office of the Associate Dean, The University of Tennessee, College of Veterinary Medicine, P.O. Box 1071, Knoxville, TN 37901-1071.

Note: The deadline for receipt of the completed application materials by VMCAS is November 1. NON-TENNESSEE APPLICANTS MUST HAVE A MINIMUM CUMULATIVE GRADE-POINT AVERAGE OF 3.2 ON A 4.0 SCALE FOR APPLICATION TO BE CONSIDERED.

Applications are accepted only from U.S. citizens or permanent residents of the U.S.

D.V.M. Curriculum
The curriculum of the College of Veterinary Medicine is a nine-semester, four-year program.

Each class begins in August and graduates four years later in May. The first three years follow the traditional fall and spring semesters with the summer break following years one and two. The final year of the professional curriculum begins immediately following semester six and is a continuous clinical rotation experience extending over one calendar year.

The first year consists mostly of the preclinical subjects of anatomy, physiology, histology, and microbiology. Also included in this first year are clinical subjects of physical diagnosis and anesthesiology. Considerable integration of subject matter is incorporated during this year.

The second and third years include the study of diseases, their causes, diagnosis, treatment, and prevention, and courses are team-taught on an organ system basis.

The final year (three semesters) is devoted to intensive education in solving animal disease problems involving extensive clinical experience in the Veterinary Teaching Hospital. Each student will rotate through a series of clinical blocks.

An innovative feature of this curriculum is the designation of semester six as one in which the individual student may select his or her courses of study. This allows select students who have specific educational goals (such as advanced or dual degree programs) to enroll in some, or none of the regularly scheduled courses during that semester. Students enrolled in the D.V.M. program are required to complete at least 16 credit hours in the sixth semester and may register for up to 10 credit hours of graduate courses without enrolling in The Graduate School and these hours will be credited toward the D.V.M. degree. This semester of elective study offers a unique educational alternative for select students in the CVM and is intended to enhance professional growth, concentration in an area of interest and career opportunities.

In addition to education in the sciences and art of veterinary medicine, students receive instruction in paramedical subjects such as animal behavior, medical communication, professional ethics, jurisprudence, economics, and practice management.

The curriculum requires successful completion of 152 semester credits.

THE GRADUATE PROGRAM

The College also administers a graduate program involving all departments which leads to the Master of Science and the Doctor of Philosophy degrees. Because of the interdisciplinary departmental administration of the College of Veterinary Medicine, the faculty have opportunities in the graduate programs of other instructional units, including Animal Science (nutrition, physiology, genetics and animal management), Microbiology (bacteriology, virology and immunology), Ecology and Evolutionary Biology (environmental toxicology), Public Health, and Comparative and Experimental Medicine. (Refer to other sections of this catalog for a full description of these programs.)

The majority of the graduate and postgraduate faculty of the College of Veterinary Medicine are involved in the Comparative and Experimental Medicine program. This program provides a wide spectrum of interdisciplinary training that prepares graduates for teaching and/or research careers in the health sciences.

PROFESSIONAL COURSES

811 Bacteriology and Mycology (4) Fundamental aspects of microbiology and disease causation, pathogenesis of bacterial and fungal diseases of animals, antimicrobial action and mechanisms of bacterial resistance. General approaches to diagnosis, treatment and prevention.


821-22 Veterinary Anatomy I, II (7,7) Integrated approach to study of developmental, macroscopic (gross), and microscopic anatomy of common domestic animals. Histology and Specialized Anatomy of Vertebrates. Normal anatomy to inherited anomalies.

823-24 Physiology I, II (4,4) Introduction to concepts and problems in physiology which form basic for applicants and for normal training in pharmacology, medicine, pathology, and surgery. Cellular, neural, cardiovascular, renal, respiratory, digestive, endocrine, and reproductive physiology.

827 Special Problems in Animal Science (1-8) Extra- mural and specially designed study for students interested in select topics in anatomy, histology, and physiology.

830 Art of Veterinary Medicine (1) Paramedical subjects important to veterinary medicine: practice management, interpersonal relations, communications, jurisprudence, ethics, careers, animal behavior and veterinary history. May be repeated. SNC only.

831 Physical Diagnosis I (1) Basic care, feeding, restraint, and handling domestic animals. Introduction to physical examination and diagnostic techniques used by veterinarian.

832 Anesthesiology (2) Principles of anesthesiology: pharmacology of anesthetic agents, and introduction to anesthetic techniques in veterinary medicine.

833 Epidemiology (2) Determinants of health and productivity in groups of animals, and critical appraisal of clinical information.

834 Hematopoietic System (3) Pathophysiology, special pathology, and clinical management of diseases of the hematopoietic and lymphoid organs and tissues. Principles and methods of laboratory evaluation of diseases of other organ systems.

835 Principles and Practice of Surgery (2) Principles of veterinary surgery: anesthetic technique, patient and surgeon preparation, care of surgical incisions, etc., and general operating room procedures. Proper methods of tissue handling, surgical instrumentation, and selection of sutures materials and tissue patterns. Pathophysiology of surgical and accidental wounds; wound healing and management.

836 Toxicology (2) Principles of toxicology, molecular mechanisms, pathologic processes and clinical features of animal diseases caused by toxic substances.

837 Food Hygiene and Zoonoses (2) Host-agent relationships, public health aspects of veterinary medicine and role of veterinarians in ecology and food hygiene.

840 Integumentary System (3) Pathophysiology, special pathology, medicine and surgery of integumentary system. Laboratory examination, pathology, diagnosis and treatment.

841 Reproductive System (4) Pathophysiology, special pathology, medicine and surgery of diseases of male and female reproductive systems and mammary glands.

842 Alimentary System (5) Pathophysiology, special pathology, medicine and surgery of diseases of alimentary systems.

843 Musculoskeletal System I (3) Pathophysiology, clinical description and basic treatment modalities of common diseases and conditions of skeletal system of small animals: development of basic diagnostic and treatment skills.
856 Special Senses (2) Pathophysiology, special pathology, medicine and surgery of diseases of visual and auditory systems. Applied principles, radiographic interpretation and surgical procedures.

845 Veterinary Nutrition (2) Principles of nutrition, and nutrition of animals in health and disease. Applied nutrition relating to individual small or large animal patient or herd situations.

846 Multispecies Medicine (4) Anatomy, pathophysiology, medicine, and surgery of avian species, laboratory and zoo animals and reptiles. Species and diseases seen by practicing veterinarian. Current topics on foreign animal diseases.

848 Art of Veterinary Medicine II (1) Paramedical subjects important to veterinary practice: practice management, interpersonal relations, communication, jurisprudence, ethics, careers, animal behavior and veterinary history. May be repeated. S/NC only.

849 Introduction to Clinics (1) Clinical veterinary practice with discussions and practical experience. Problem solving and integration of basic sciences with clinical applications. Problem-oriented veterinary medical record.

850 Urinary System (3) Pathophysiology, special pathology, medicine and surgery of diseases of urinary system. Urinary system in health and disease.

852 Cardiovascular System (2) Pathophysiology, special pathology, medicine and surgery of diseases of cardiovascular system. Anatomic, physiologic and pharmacologic principles which provide basis for treatment.


854 Respiratory System (3) Pathophysiology, special pathology, medicine and surgery of diseases of respiratory system. Upper and lower respiratory system, infections and noninfectious diseases.

855 Radiology (3) Basic, advanced and special techniques in radiology with interpretation and use of radiologic and related techniques in diagnosis and treatment of animal diseases.

856 Special Sensors (2) Pathophysiology, special pathology, medicine and surgery of diseases of visual and auditory systems.

857 Nervous System (3) Pathophysiology, special pathology, medicine and surgery of diseases of nervous system: clinical neurology and neuropathology.

858 Clinical Rotation in Specialties (2) Clinical training in specialty services: anesthesiology, ophthalmology or dermatology. Direct responsibility for diagnosis, patient care, and treatment of clinical patients in both large animal and small animal clinical sciences.

859 Clinical Clerkship (2) Advanced clinical training in small animal and large animal clinical sciences, comparative medicine, and pathology. S/NC or letter grade.

861 Pharmacology (4) Principles of pharmacokinetics and pharmacodynamic properties of veterinary drugs: modes of action, pharmacologic effects, chemical and physical properties, metabolism, toxicities, important idiosyncrasies and clinical application.

862 Clinical Rotation in Comparative Medicine (2) Clinical training in avian medicine, laboratory animal and zoo animal medicine, epidemiology, public health, and other related disciplines.

865 Clinical Rotation in Comparative Medicine (2) Clinical training in avian medicine, laboratory animal and zoo animal medicine, epidemiology, public health, and other related disciplines.

867 Special Problems in Comparative Medicine (1-8) Extramural and specially designed study for students interested in select topics in avian medicine, laboratory animal medicine, zoo animal medicine, epidemiology, public health, pharmacology or toxicology.

871 General Pathology (4) Principles of pathobiology: causes of disease, disturbances of cell growth, inflammation, and neoplasia.

873 Parasitology (3) Principles of parasitology: protozoology, helminthology, and entomology and relationship to diseases in animals.

875 Clinical Rotation in Pathology I (2) Clinical training and demonstrations in laboratory diagnosis: post-mortem examination and clinical pathologic, parasitologic and microbiologic techniques.

876 Clinical Rotation in Pathology II (2) Clinical training and demonstrations in laboratory diagnosis: post-mortem examination and clinical pathologic parasitologic and microbiologic techniques.

877 Special Problems in Pathology (1-4) Extramural and specially designed study for students interested in select topics in morphologic pathology, clinical pathology, clinical microbiology and parasitology.

881 Clinical Rotations in Small Animal Clinical Sciences I (4) Clinical training in medicine, surgery and specialty disciplines for companion animals. Direct responsibility for diagnosis, care, and treatment of clinical patients.

882 Clinical Rotations in Small Animal Clinical Sciences II (4) Clinical training in medicine, surgery and specialty disciplines for companion animals. Direct responsibility for diagnosis, care, and treatment of clinical patients.

883 Clinical Rotations in Small Animal Clinical Sciences III (4) Clinical training in medicine, surgery and specialty disciplines for companion animals. Direct responsibility for diagnosis, care, and treatment of clinical patients.

884 Clinical Rotations in Small Animal Clinical Sciences IV (4) Clinical training in medicine, surgery and specialty disciplines for companion animals. Direct responsibility for diagnosis, care, and treatment of clinical patients.

885 Clinical Rotation in Radiology I (2) Clinical training in radiographic techniques and interpretation of radiographs as part of diagnostic process.

886 Special Problems in Small Animal Clinical Sciences (1-8) Extramural and specially designed study for students interested in select topics in medicine, surgery, anesthesiology, radiology and medical specialties of small (companion) animals.

891 Clinical Rotations in Large Animal Clinical Sciences (4) Clinical training in medicine, surgery, specialty disciplines and herd health of food animals and horses. Direct responsibility for diagnosis, care and treatment of clinical patients.

892 Clinical Rotations in Large Animal Clinical Sciences II (4) Clinical training in medicine, surgery, specialty disciplines and herd health of food animals and horses. Direct responsibility for diagnosis, care and treatment of clinical patients.

893 Clinical Rotations in Large Animal Clinical Sciences III (4) Clinical training in medicine, surgery, specialty disciplines and herd health of food animals and horses. Direct responsibility for diagnosis, care and treatment of clinical patients.

894 Clinical Rotations in Large Animal Clinical Sciences IV (4) Clinical training in medicine, surgery, specialty disciplines and herd health of food animals and horses. Direct responsibility for diagnosis, care and treatment of clinical patients.

895 Clinical Rotation in Radiology II (2) Clinical training in radiographic techniques and interpretation of radiographs as part of diagnostic process.

897 Special Problems in Large Animal Clinical Sciences (1-8) Extramural and specially designed study for students interested in select topics in medicine, surgery, herd health, reproduction, radiology and medical specialties of large animals.

GRADUATE COURSES

536 Toxicology (2) Principles of toxicology, molecular mechanisms, pathologic processes and clinical features of animal diseases caused by common toxic agents. Prereg: Consent of instructor. (Same as Comparative and Experimental Medicine 536.) F