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.

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 outstanding undergraduate records in areas other than accounting may earn the M.Acc. degree by completing prerequisites in accounting and by including courses in other business and related disciplines to supplement the 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.

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
Fischer, Bruce D., LL.M. ...... George Washington
Herring, Hartwell C., III, CPA, Ph.D. ... Alabama
Kiger, Jack E. (Warren L. Slagle Prof. of Acct), CPA, Ph.D...................................... Missouri
Read, W. H. (Emeritus), CPA, MBA ........................................ Northwestern
Reeve, James M. (Distinguished Prof.), CPA, Ph.D. .......................................... VPI
Roth, Harold P., CPA, Ph.D. ..................... Oklahoma State
Stanga, Keith G. (Arthur Andersen Prof.), CPA, Ph.D.................................... Louisiana State
Williams, Jan R. (Ernst & Young Prof.), CPA, Ph.D. ................................. Arkansas

Associate Professors:

Gatian, Amy W., Ph.D. ......................... VPI
Masingale, Cheryl S., J.D. .......... Tennessee
Murphy, Daniel, CPA, Ph.D. ...... North Carolina
Posey, Imogene A., CPA, M.S. ...... Tennessee
Townsend, Richard L., CPA, Ph.D. ........ Texas

Assistant Professors:

Ayers, Susan, CPA, Ph.D. .......... Arizona State
Behn, 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

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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.
**Other Requirements**

To qualify for the degree, a student must maintain a B average (3.0) or above in the core and concentration area accounting courses and a B average or higher in the overall program. The student must satisfactorily demonstrate his/her ability to recognize, analyze, and solve accounting problem situations and integrate concepts from the various areas of accounting by passing a comprehensive written examination. This examination is included in the capstone courses in each concentration as follows: 519, Research in Financial Accounting and Auditing; 539, Tax Policy and Special Topics; and 549, Systems Policy.

**BUSINESS ADMINISTRATION CONCENTRATION**

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

Ph.D. Concentration: Accounting.

This degree provides a research-oriented terminal qualification for those seeking entry-level faculty positions in accounting. Students take approximately three years of coursework beyond the bachelor's degree, including a doctoral seminar, and must pass a comprehensive written examination. Among the courses in each concentration as follows: 519, Research in Financial Accounting and Auditing; 539, Tax Policy and Special Topics; and 549, Systems Policy.

### CONCENTRATION

- **BUSINESS ADMINISTRATION**

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**GRADUATE COURSES**

- **411 Financial, Compliance, and Operational Auditing**
  - Role of auditing in society from an internal and external perspective. The IIA Code of Ethics, the IIA Standards for the Professional Practice of Internal Auditing, auditing methodology, role of internal control and statistical sampling in auditing, fraud auditing, operational auditing, compliance auditing, and applications of auditing procedures to specific transaction cycles. Prereq: Principles of Managerial Accounting.
  - 3 credit hours.

- **414 Financial Reporting by Business and Non-Profit Organizations**
  - Continuation of 311: liabilities, stockholders' equity, earnings, accounting changes and error corrections, aggregation issues, international accounting, and governmental standards. Prereq: Corporate Financial Reporting with a C or better.
  - 3 credit hours.

- **415 Governmental and Nonprofit Accounting**
  - 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.
  - 3 credit hours.

- **451 Operational Auditing and Consulting**
  - Approaches to evaluate an entity's efficiency and effectiveness in a variety of settings and techniques used in consulting to provide entity competitive advantage.
  - 3 credit hours.

- **502 Registration for Use of Facilities**
  - 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.
  - 3 credit hours.

- **511 Advanced Corporate Financial Reporting**
  - Theory and practice of external financial reporting: earnings per share, income tax flows, leases, pension issues, changing prices, interim reporting, and advanced aggregation issues. Prereq: Financial Reporting by Business and Nonprofit Organizations and admission to MAcc program or consent of instructor.
  - 3 credit hours.

- **513 Advanced Auditing**
  - Theory and concepts underlying practice of internal and external auditing, fraud auditing, audit reporting, and other current auditing issues. Prereq: Auditing and admission to MAcc program or consent of instructor.
  - 3 credit hours.

- **514 Auditing Practice**
  - Design and performance of audits in computerized environments. Relationships among design of internal control, internal control effectiveness, and audit risk. Prereq: A variety of auditing contexts, highly automated situations. Prereq: 513 and admission to MAcc program.
  - 3 credit hours.

- **518 Seminar in Professional Accounting Practice**
  - Topics in financial reporting and auditing: taxation of business enterprises and emerging professional accounting standards. Development of written and communication skills. Prereq or coreq: 511 and admission to MAcc program.
  - 3 credit hours.

- **519 Seminar in Accounting and Auditing Policy**
  - 3 credit hours.

- **521 Seminar in Advanced Managerial Cost Accounting**
  - Analysis of cost concepts, data collection 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.
  - 3 credit hours.

- **522 Budgetary Planning and Control Systems**
  - Alternative approaches to formulation and use of planning and control systems to meet organizational objectives. Control systems and corporate structure, discretionary expense control, transactional control, and control in manufacturing, service, and non-profit organizations. Prereq: Admission to a graduate business program or consent of instructor.
  - 3 credit hours.

- **531 Tax Research, Methods, and Procedures**
  - 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 MAcc program.
  - 3 credit hours.

- **532 Corporate Taxation and Reorganizations**
  - Organization and structure, distributions, liquidations, reorganizations, and special problems in taxation of corporations and shareholders. Prereq: Admission to MAcc program or consent of instructor. Prereq or coreq: 531.
  - 3 credit hours.

- **533 Taxation of Partnerships and S Corporations**
  - Formation, operation, termination, and special problems of partnerships. Election for S Corporations, comparison of partnerships and S Corporations. Prereq: Admission to MAcc program or consent of instructor. Prereq or coreq: 531.
  - 3 credit hours.

- **534 Family Tax Planning**
  - 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 create family tax planning objectives. Prereq or coreq: 531.
  - 3 credit hours.

- **539 Tax Policy**
  - Basic concepts of tax policy: complexity, efficiency, equity, alternative tax bases, and political process. Current issues in tax policy and strategy, organizational form, governmental accounting principles, tax law, and selected other topics. Prereq: 431 and admission to MAcc program.
  - 3 credit hours.

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

- **542 Systems Analysis and Design**
  - 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.
  - 3 credit hours.

- **549 Systems Issues and Policies**
  - 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: 541.
  - 3 credit hours.

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**600 Doctoral Research in Accounting**

- 3 credit hours.

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**611-12 Doctoral Seminar in Accounting**

- 3 credit hours.

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**621-22 Accounting Colloquium**

- 1 credit hour.

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**619 Doctoral Research in Accounting**

- Study of research methodology and application of various research methods in accounting literature. Prereq: Consent of Ph.D. program advisor.
  - 3 credit hours.

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**621-22 Accounting Colloquium**

- 1 credit hour.

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**Business Law**

**GRADUATE COURSES**

- **511 Business Law and Professional Responsibility**
  - Legal framework and ethical implications of business transactions. Principles and practices in law of contracts, commercial transactions, real property, trusts, estates and professional responsibility. Prereq: Legal Environment of Business and admission to MAcc program or consent of instructor. Not available for students with credit for 471.
  - 3 credit hours.

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**Advertising**

(Office of Communications)

**MAJOR DEGREES**

- **Communications**
  - M.S., Ph.D.
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. E

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

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

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

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

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

**Aerospace Engineering**

*See Mechanical and Aerospace Engineering*

**Agricultural and Extension Education**

*(College of Agricultural Sciences and Natural Resources)*

**MAJOR DEGREE**

Agricultural and Extension Education ........... M.S.

Roy R. Lessly, Head

Professors:

Carter, Cecil E., Jr. (Emeritus), Ph.D. .......... Ohio State
Dickson, Lewis H. (Emeritus), Ed.D. .......... Cornell
Lessly, Roy R. (Liaison), Ed.D. .......... Texas


Associate Professor:

Waters, Randol G., Ph.D. .......... Penn State

The Department of Agricultural and Extension Education offers a program leading to the Master of Science degree with a major in Agricultural and Extension Education. The program is designed primarily for teachers of Agricultural Education and staff employed by the Agricultural Extension Service. However, due to the flexibility of the program, it would be of value to any student interested in agriculture or adult and continuing education. The program may be completed under a thesis or non-thesis option with a concentration in either agricultural education or agricultural extension education. Candidates for the master's degree must meet the general requirements of The Graduate School and those stipulated by the department.

**THE MASTER'S PROGRAM**

**Thesis Option**

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

1. A minimum of 30 hours of graduate credit in courses approved by the student's advisory committee. Six hours of thesis may be counted toward this requirement.
2. A minimum of 20 hours of graduate credit in courses numbered at or above the 500 level.
3. A minimum of 12 hours of graduate credit in courses appropriate to the area of concentration taught in the department and a minimum of 6 hours taught from outside the department.
4. A minimum of 3 hours of graduate credit in coursework in either research methodology or statistics.
5. A final oral examination.

**Non-Thesis Option**

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

1. A minimum of 36 hours of graduate credit in courses approved by the student's advisory committee.
2. A minimum of 24 hours of graduate credit in courses numbered at or above the 500 level.
3. A minimum of 12 hours of graduate credit in courses appropriate to the area of concentration taught in the department and a minimum of 6 hours taught from outside the department.
4. A minimum of 3 hours of graduate credit in coursework in either research methodology or statistics.
5. A creative component designed by the student and approved by the student's advisory committee for 3 hours of graduate credit.
6. A written and oral comprehensive examination.

**GRADUATE COURSES**

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 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 relationships and relative effectiveness. Result demonstrations, method 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 statistical, 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 for first-year teachers for planning, organizing and conducting program of vocational agriculture in local community. Group meetings in selected centers and visits by instructor. Prereq: 411 or 436 or consent of instructor.

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

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

529 Supervised Occupational Experiences in Agricultural Education (3) Historical and philosophical bases for supervised occupational experience programs and organizational patterns and procedures for conducting programs for on-farm and off-farm agricultural occupations. Prereq: 435, 436 or consent of instructor.

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

531 Extension History, Philosophy and Objectives (2) Historical and philosophical foundation of practical education in American agriculture, key figures, issues, legislative 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
economic theory and 6 hours of quantitative methods are required. In the rural sociology concentration, 12 hours in the department (9 hours rural sociology), 8 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 agribusiness 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, with at least 3 hours in 500- or 600-level courses. The student's committee must include a member of the faculty from the department who will be responsible for designing courses required for the minor.

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

Qualifying exams are required in macroeconomic and microeconomic theory. Comprehensive exams include three written exams and one oral exam. The written exams are in general agricultural economics, quantitative methods, and the area of concentration.

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

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

Agricultural Economics

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

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

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

440 Agricultural Production Economics (3) Application of microeconomic theory to problems of resource allocation, enterprise selection, scale of operation of agricultural firms; economic interpretation of technical agricultural production relationships. Prereq: Intermediate Agricultural Economics or consent of instructor. Sp

442 Agribusiness Management (3) Advanced decision analysis in farm and agribusiness settings. Planning and organizing functions, analyzing investment alternatives, evaluating budgets and financial statements, assessing profitability and solvency, use of computers in business decisions. Prereq: Farm Business Management and Microcomputer Applications to Problem Solving or consent of instructor. F

450 Agricultural Price Analysis (3) Analysis of demand and supply mechanisms in agriculture; price determination, market equilibrium, term structure, price patterns; pricing institutions. Prereq: Intermediate Agricultural Economics, Marketing of Agricultural Products and Statistical Methods.

460 Rural Economic and Community Development (3) Historical and theoretical perspective on problems facing rural communities; linkages between farm and nonfarm sectors; models and tools for analyzing rural development. Prereq: 210 or consent of instructor. F

470 Natural Resource Economics (3) Nature of natural resource economic efficiency as basis for natural resource use; externality in natural resource use; factors influencing environmental quality; alternative public policy for influencing natural resource use; improving environmental quality. Prereq: 210 or consent of instructor. Sp

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

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

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

522 Mathematical Programming Methods in Agricultural Economics (3) Linear, integer and quadratic programming techniques with empirical applications to problems of farm and region; profit maximization, cost minimization, transportation, risk allocation over space and time. Prereq: Consent of instructor. Sp

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

540 Advanced Agricultural Production Economics (3) Theoretical and empirical concepts in agricultural resource allocation; evaluation of both static and dynamic issues; decision theory with application to agricultural firms; aggregate income of firm decisions on industry. Prereq: 440 or equivalent. Sp

550 Advanced Agricultural Marketing (3) Analysis of structure, conduct and performance of agricultural marketing systems; application of price theory to existing circumstances in agricultural industries; examination of methods used to evaluate conduct and performance; analysis of transportation issues and location
theory. Prereq: Economics 311 or consent of instructor. Sp

560 Advanced Rural Economic Development (3) Theoretical and historical perspectives on process of economic development; analyze role of agriculture sector, interdependence and trade in development; application of theory to specific development issues. Prereq: 460 or consent of instructor. 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/NC only. E

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

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

620 Advanced Quantitative Methods (3) Discussion and evaluation of advanced statistical and mathematical techniques in current agricultural economics research. Prereq: 522, 524, and Economics 881-82, or consent of instructor. Sp,A

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

652 Consumer Demand and Food Consumption (2) Simultaneity 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 analysis of social institutions related to change in rural communities. Prereq: Rural Sociology or consent of instructor. (Same as Sociology 480.) Sp

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

590 Special Topics in Rural Sociology (1-3) Current sociological issues involving application of sociological theory. Prereq: 380 or consent of instructor. May be repeated. Maximum 6 hrs. (Same as Sociology 595.) E

Agricultural and Biosystems Engineering

(College of Agricultural Sciences and Natural Resources)

MAJORS DEGREES

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

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), 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), 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), 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
- Dissertation: 600 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

413 Component Design and Machine Synthesis (3) Synthesis of design: structural, kinematic, power, control-system development; preparation of design drawings, specifications, model of device, written and oral report on project. Prereq: Engineering Design Fundamentals. 1 hr and 5 labs. S

423 Irrigation and Waste Management System Design (3) Design of irrigation and agricultural waste management systems, consideration given to livestock waste characteristics, climate, water quantity, system characteristics, and impact on crop yield and water quality. Prereq: 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, system components and system components and system components, and control of mobile hydraulic systems. Prereq: Fluid Mechanics or Hydraulics. 2 hrs and 1 lab. Sp,A

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

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. Prereq: Circuits and Electro Mechanical Components. 3 hrs and 1 lab. Sp

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

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

504 Professional Development Seminar (1) Planning and executing research program; ethics and professionalism; departmental procedures and resources. Same as Biosystems Engineering Technology 504. S/N only. F

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

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

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

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

541 Principles of Compost Engineering (3) Comprehensive study of composting: survey of the field, thermodynamics of composting, biological composting; kinetics, fuel; oxygen; temperature; aeration; substrate characteristics; process kinetics; and odor control. Design component. Prereq: Thermodynamics, heat and mass transfer. F

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

545 Monitoring Hydrologic Phenomena (3) Application of instrumentation theory to monitoring hydrologic phenomenon, strong emphasis on documenting and strategies; equipment operation and solution of environmental monitoring problems. Prereq: 543. 2 hrs and 1 lab. (Same as Environmental Engineering 545.) Sp,A

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

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

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

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

620 Computer Simulation of Agricultural Systems (3) Scientific approach to digital simulation; system definitions and boundaries, formulation of models, algorithms and solution techniques, encoding of prediction equations, algorithms and solution techniques, encoding of prediction equations and model output: verification and validation of simulation model results. Prereq: Basic Engineering 101, 201 or equivalent. 2 hrs and 1 lab. F,A

630 Feedback and Control Systems (3) Differential equations models, algorithms and solution techniques, encoding of prediction equations and model output: verification and validation of simulation model results. Prereq: Basic Engineering 101, 201, or equivalent. 2 hrs and 1 lab. F,A

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

Biosystems Engineering Technology

GRADUATE COURSES

422 Food and Process Engineering Technology (3) Application of basic engineering principles to agricultural and food processes. Fluid handling, drying, evaporation, thermal processing, heating and cooling, refrigeration systems, and materials handling. Prereq: Introductory Physics, Basic Calculus. 2 hrs and 1 lab. F

432 Agricultural Machinery and Tractors (3) Agricultural machinery and power units, adaptation to agricultural practices, management considerations, field efficiencies; capabilities; adjustment and servicing. Prereq: Basic Calculus or Finite Mathematics or equivalent. 2 hrs and 1 lab. Sp

442 Agricultural Waste Management and Pollution Control (3) Use of on-site 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; safety considerations; materials handling and disposal methods. Prereq: Physics 212 or consent of instructor. 2 hrs and 1 lab. Sp

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

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

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

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

506 Physical Phenomena (3) Properties of materials, fundamentals of hydraulics, principles of electricity, thermal phenomena; applications in biological systems. Prereq: Consent of instructor. F

508 Special Problems in Biosystems Engineering Technology (1-3) Individual studies of current problems. May be repeated. Maximum 6 hrs. E

514 CAD Applications to Biosystems Engineering (3) Use of CAD software to create drawings of components, machinery systems, flow charts, and process diagrams relevant to biosystems. Prereq: Admission to degree program or consent of instructor; proficiency in use of specific personal computers. F

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

532 On-Site Domestic Water Supply and Wastewater Renovation (3) Basic ground water hydrology, selection and design of pumps and delivery systems, and point-of-use water treatment processes, soil-based wastewater renovation principles, and design and operating criteria for on-site wastewater renovation systems. Prereq: 506. 2 hrs and 1 lab. F,A

matics 231, Basic Engineering 101, 201, or equivalent. 2 hrs and 1 lab. F,A

matics 231, Basic Engineering 101, 201, or equivalent. 2 hrs and 1 lab. F,A
Assistant Professors:
Grizzle, J. M., Ph.D. Florida
Hollingsworth-Jenkins, K., Ph.D. Nebraska
Mathew, A. G., Ph.D. Purdue
Mendis-Handagama, L. C., D.V.M., Ph.D. Monash
Schrick, F. N., Ph.D. Clemson
Smailing, J. D., 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. Since the department is also part of the College of Veterinary Medicine, the areas of anatomy, systemic physiology (blood, cardiovascular, 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.

During the first full term of matriculation in each degree program, all graduate students are required to enroll in 556. All first- and second-year students are required to enroll in 556 each fall and each spring term.

THE MASTER'S PROGRAM

For admission to the M.S. program, a student must have obtained a 3.0 grade-point average on a 4.0 scale (or a 3.0 each term during the junior and senior years) in a completed undergraduate degree program in one of the animal sciences or in a related area. The student must submit evidence (letters of recommendation, personal interview, etc.) that indicates ability to complete requirements for the M.S. Prerequisite courses may be required if the student has 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 16 hours must be 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 5 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 three animal science members, one of whom may be outside of the Animal Science Department. 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.

THE DOCTORAL PROGRAM

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

1. A minimum of 16 hours in related fields outside of animal science.
2. At least 24 hours credit at the 500 and 600 level, exclusive of doctoral research and dissertation, of which a minimum of 6 hours must be at the 600 level. Students in the nutrition, breeding, physiology, or anatomy concentration must complete at least 12 hours at the 500 and 600 level in the respective concentration or closely related area. Students in the management concentration must complete Animal Science 561 and 562 and 9 hours at the 500 or 600 level in two non-management concentrations for a total of 12 hours (including 561).
3. A minimum of 1 hour of Agriculture 512 in addition to that required at the M.S. level.
4. A maximum 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 artificial insemination and techniques of artificial insemination and embryo transfer; herd sire and dam evaluation; pregnancy determination, gestation and parturition, infertility, recent advances in theriogenology. Prereq: 320 or equivalent. 3 hrs. F

430 Advanced Ration Formulation (2) Advanced ration formulation for beef and dairy cattle, sheep, horses, swine, poultry, laboratory, zoo, and companion animals. Mathematical and computer solutions and applications to formulating comprehensive rations with constraints. Prereq: 330 or equivalent and introductory computer science course. 2 hrs. 2 labs. Sp

440 Advanced Animal Breeding (2) Computer simulation of genetic improvement for multiple traits in swine, beef, and dairy cattle; selection of alternative breeding strategies; selection and management of populations in swine, poultry, and beef cattle. Prereq: 400 or equivalent. 3 hrs. 2 labs. Sp

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

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

Agriculture

(College of Agricultural Sciences and Natural Resources)

GRADUATE COURSES

512 Teaching Internship in Agriculture (1) Supervised experience in teaching; test preparation and evaluation of agriculture students. May be repeated. Maximum 6 hrs. E

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
Blemer, J. K. (Emeritus), Ph.D. ... Ohio State
Blemer, C. C. (Emeritus), Ph.D. ... Iowa State
Eder, H. (Emeritus), D.V.M., Ph.D. ... Illinois
Erickson, B. H. (Emeritus), Ph.D. ... Kansas State
Goddin, J. D. (Liaison), Ph.D. ... Massachusetts
Hall, O. G. (Emeritus), Ph.D. ... Iowa State
Hansard, S. L. (Emeritus), Ph.D. ... Florida
Henry, R. W., D.V.M., Ph.D. ... Ohio
Ludwall, E. R. (Emeritus), M.S. ... Tennessee
McDonald, T. P. (Emeritus), Ph.D. ... Tennessee
Mclaren, J. B. (Emeritus), Ph.D. ... Auburn
Miller, J. K., Ph.D. ... Georgia
Murphee, R. L. (Emeritus), Ph.D. ... Wisconsin
Oliver, S. P., Ph.D. ... Ohio State
Richardson, D. O., Ph.D. ... Ohio State
Robbins, K. R., Ph.D. ... Illinois
Saxton, A., Ph.D. ... NC State
Shirley, H. V. (Emeritus), Ph.D. ... Illinois
Sievert, T. W., Ph.D. ... Tennessee
Sims, M. H., Ph.D. ... Auburn
Togwell, R. L. (Emeritus), Ph.D. ... Kansas State

Associate Professors:
Backus, W. R., Ph.D. ... Tennessee
Bell, B. R., Ph.D. ... NC State
Elier, H., D.V.M., Ph.D. ... Illinois
Heitmann, R. N., Ph.D. ... Maine
Kattner, G., Ph.D. ... VPI
Masincupp, F. B., Ph.D. ... Kansas State
Quigley, J. D., Ph.D. ... Virginia Tech
Smith, M. O., Ph.D. ... Oklahoma State
Waller, J. C., Ph.D. ... Nebraska
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. F

483 Pork Production and Management (3) Integration of principles of nutrition, breeding, physiology, and marketing into complete production and management programs. Structure of industry, enterprise establishment, systems of production, production practices, and 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. Sp

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. Sp

486 Lamb and Wool Production and Management (3) Integration of principles of selection, nutrition, breeding, physiology, and marketing into complete lamb and wool production and management programs. Structure of industry, enterprise establishment, systems of production, production responses and economic returns. Alternate evaluations: production responses and economic returns. Prereq: Mammalian Organology and junior core courses 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 credited toward degree requirements. May be repeated: S/N only. E

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

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

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


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

533 Fumonoscopy (3) Anatomy, physiology, and microbiology of rumen ecosystem: microbial fermentation and metabolism of polysaccharides, lipids and nitrogen. Prereq: 530 or consent of instructor. Sp A

536 Nutritional Aspects of Companion Animal Health (2) Nutritional information 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 536.) Sp

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

552 Anatomy of Domestic Carnivores (4) Gross dissection by systems and regions of dog with comparison to cat. (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. Concepts of physiology, comparative hematologic, 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 methods; interpretation of results; 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

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 programs, alternative feeding systems, nutrition, health, biosecurity and environmental impact. Consideration of time, risk, and uncertainty in livestock production. Tools, linear programming, as aids in decision-making and resource allocation. Prereq: Management, economics, computer science, statistics. 2 hrs and 1 lab. Sp

595 Colloquium in Animal Science (1) Orientation; teaching, research and extension programs. Guidance in preparation of student's course of study and research plans. Required of beginning graduate students in animal science program. S/N only. F

596 Seminar (1) Advanced topics in animal science. Required of all first- and second-year graduate students. May be repeated. Maximum 4 hrs. S/N only. F 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, intermetabolism, deficiencies, excesses and interaction of minerals and vitamins. Prereq: 533 or 534, and Biochemistry and Cellular and Molecular Biology 410 or Nutrition 511 or consent of instructor. Sp A

651 Advanced Topics in Animal Anatomy (1-4) Current 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 and physiological aspects of diseases, endocrine glands of various animal species. Prereq: 521 or consent of instructor. (Same as Comparative and Experimental Medicine--Veterinary Medicine 652.) Sp A

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

- **M.A. Requirements**
  - The program leading to the M.A. is a general curriculum that allows for concentration after completion of a core course sequence. Formal requirements include:
    1. Selection of an M.A. advisor. This should be done as soon as possible in the student's program but must be done no later than the end of the first semester in residence. The department graduate secretary must be informed in writing of each student's advisor.
    2. A minimum of 30 credit hours in graduate courses. Twenty-four hours must be in coursework graded A-F. Coursework must include three core classes taken in the first year:
       a. 510 Method and Theory in Cultural Anthropology
       b. 560 Theory in Archaeology
       c. 590 Method and Theory in Biological Anthropology
  - Additional coursework should be selected in consultation with the student's advisor and must include one additional course from two anthropology concentrations besides the student's primary concentration. At least 20 hours of coursework must be at the 500 level or higher.
  - During the first year, comprehensive Graduate Evaluation Examinations (GEEs) are required of all M.A. students and are based on the content of the core courses. These examinations are given as the final examination in each core class (during regularly-scheduled final periods) and are graded by all faculty within the appropriate subdiscipline for each course. At the end of the first year, all M.A. students will be evaluated by the entire faculty and will either be retained or dropped from the program based on their first year's performance and GEE scores.
  - All M.A. students must attend the graduate section of the visiting lecturer program. To ensure compliance with this requirement, each student is required to register for one credit hour of Anthropology 501 in the Fall semester of each year and fulfill all requirements for the course defined by the instructor. Materials covered by visiting lecturers may appear on the GEE.
  - A graduate-level introductory course, usually Statistics 537.
  - In the second year of the program, students pursue their concentration area and undertake thesis research. Coursework will be determined through consultation with the student's advisor and committee (composed of the advisor and at least one other member of the Anthropology faculty along with other mutually-agreed upon members).
  - Successful completion of the thesis and final oral examination. Normally, students will complete and defend their theses during the Spring semester of their second year.
  - Two copies of the thesis are required by The Graduate School. In addition, bound copies of the thesis are to be provided to the department and to all members of the student's M.A. Committee.
  - In addition to the requirements listed above, M.A. students have the option of completing a minor in statistics. The statistics minor requires 9 hours of coursework, normally Statistics 537 and 538 plus one additional course from an approved list.

- **The Doctoral Program**
  - In addition to The Graduate School requirements, requirements for the Ph.D. degree with a major in Anthropology, in the appropriate sequence of completion, are as follows:
    1. **Admission:** Admission to the Ph.D. program is contingent upon completion of ALL requirements prior to that level. Master's thesis candidates at UTK who are conditionally accepted into the Ph.D. program can enroll as doctoral students the semester following conferral of the M.A. degree. Students holding Master's degrees from other institutions must apply by January 15 for admission the following Fall and must begin their studies in the fall semester.
    2. Admission to the Ph.D. program is based upon the applicant's academic record and credentials, but also on an individual's interest 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 must directly contact the potential chairperson and two additional members of the anthropology faculty who will be asked to serve on the committee.
    3. 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:
       a. 1. Acceptance of a Master's degree in anthropology; or
       b. Acceptance of a Master's degree in another discipline, with the provision that the student will follow the first-year program with entering M.A. students, i.e., complete the core courses (510, 560, 590) and pass the Graduate Evaluation Examinations.

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

- **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 600- or 600-level courses outside of anthropology, chosen in consultation with the doctoral committee, particularly the outside member who represents the cognate area. Outside coursework may be taken in a single discipline or be distributed across two or more disciplines as appropriate to the individual's program of study.

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

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

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

- **Doctoral Comprehensive Examination:** Students must successfully complete a written and oral comprehensive exam.
  1. Comprehensive Written Examination: When the Ph.D. aspirant has completed all of the foregoing requirements and is judged by the committee to be prepared in the field(s) of concentration, the student will be required to take a comprehensive written examination. The exam will consist of three sections and be given by the student's committee. All three sections must be taken within seven consecutive days.
  2. Comprehensive Oral Examination: This examination follows shortly after successful completion of the written exam. The major professor acts as chairperson of the committee.

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

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

- **Defense of Dissertation Examination:** When the dissertation has been tentatively accepted by the committee, a final oral examination will be held. The committee conducts the exam, which is ordinarily held as a colloquium 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 between residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.A. program in Anthropology is available to residents of the states of Louisiana (concentration in 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 the study of culture and 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 folklore studies from various tribal, peasant, and complex societies. Prereq: 130 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 settings through use of archaeological, ethnographic, and contemporary cases. Prereq: 130.

414 Political Anthropology (3) Organization and dynamics of power and politics in both stateless and state societies. Role of symbols, rituals, and ideologies in producing and reproducing power relations. Relationship between political structure and culture. Examination of political thought through the investigation of political systems of contemporary and prehistoric cultures. Prereq: Culture anthropology or consent of instructor.

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

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

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

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

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

464 Principles of Zoarchaeology (3) Basic osteological studies of major vertebrate groups, aboriginal use of animals in prehistoric and historic cultures; identification and interpretation of archaeologically derived molluscan and vertebrate remains; introduction to laboratory use of comparative collections. Prereq: 120 or consent of instructor.

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

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

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

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

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


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

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

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

502 Registration for Use of Facilities (3-15) Required of 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 Method and Theory in Cultural Anthropology (3) Development of primary theoretical orientations by cultural anthropologists; formulation of research problems and methods of collecting, organizing, and utilizing data. Prereq: Consent of instructor.

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

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

513 Rural Studies in Anthropology (3) Theory, method, and ethnographic research on selected problems and aspects of traditional agrarian cultures in U.S. and peasant societies. Prereq: Cultural areas course or equivalent. May be repeated. Maximum 6 hrs.

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

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

517 Forms of Social Inequality (3) Anthropological perspectives on sociocultural phenomena such as race, class, ethnicity, and gender. Prereq: 130. May be repeated. Maximum 6 hrs.

520 Seminar in Zoarchaeology (3) Approaches to analysis and interpretation of archaeological fauna. In-depth reading and evaluation of major works. Prereq: Consent of instructor.

522 Seminar in Archaeology (3) Theoretical and practical issues in contemporary archaeology: ethnoarchaeology, paleoanthropology, taphonomy, ceramic analysis, agricultural origins, and regional archaeological cultures. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

523 Seminar in Archaeology (3) Examination and comparison of skeletons of major vertebrate groups, shell lifeways of aquatic mammals, in relation to animal remains from archaeological contexts. Basic osteology and shell characters of species encountered in aboriginal sites; use of comparative collections. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

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

531 Quantitative Methods in Archaeology (3) Application of quantitative techniques to archaeological data critically examined through literature and problem solving. Basic and advanced statistical analyses and other mathematical methods. Prereq: Consent of instructor.

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

581 Archaeological Resource Management (3) Federal legislation and regulations affecting identification, protection, and management of archaeological resources. Professional ethics and responsibilities and relationship of federal and state agencies, public interest groups, and professional archaeologists in conduct of federally sponsored archaeology. May be repeated. Maximum 15 hrs.

582 Problems in Old World Archaeology (3) (Same as Classics 562.)

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 nutritional and population structure as related to nutrition and population structure. Prereq: Consent of instructor.

585 Anthropometry (3) Techniques of measuring and describing skeletal 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

610 Advanced Graduate Research (1-6) 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 Seminar in Cultural Anthropology (3) Selected topics, primarily for doctoral students in cultural anthropology. May be repeated. Maximum 6 hrs.

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

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

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

663 Selected Topics in Paleopathology (3) May be repeated. Maximum 6 hrs.
Architecture

(College of Architecture and Planning)

**MAJOR**

<table>
<thead>
<tr>
<th>Architecture</th>
<th>M. Arch.</th>
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<tbody>
<tr>
<td>Marleen K. Davis, Dean</td>
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<tr>
<td>William J. Lauer, Associate Dean</td>
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<tr>
<td>Jon P. Coddington, Graduate Program Head</td>
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</tbody>
</table>

**Professors:**
- Anderson, G. I., M. Arch. ...... Illinois
- Conley, G. (Emeritus), B. Arch. ...... Harvard
- Davis, Marleen, M. Arch. ...... Harvard
- Gierer, F., M. Arch. ...... Pennsylvania
- Kaplan, M., M. Arch. ...... Harvard
- Kelso, R. M., M.S. ...... Tennessee
- Kersavage, J. A., D. Sc. ...... Southern California
- Kinzy, S. A., Ph.D. ...... SUNY (Buffalo)
- Lauer, W. J. (Liaison), M.S. Arch. Engr. ...... Iowa State
- Lester, A. J. (Emeritus), M. Arch. ...... Virginia
- Lizon, Ph., Ph.D. ...... Pennsylvania
- Moffett, M. S., Ph.D. ...... MIT
- Rabun, J. S., M.A. ...... Texas
- Robinson, M. A., M. Arch. ...... Pennsylvania
- Rudd, J. W., M.A. ...... Northwestern
- Shell, W. S., M.S. Arch. ...... Columbia
- Watson, J.S., M. Arch. ...... Pennsylvania
- Wodehouse, L. M. (On leave), Ph.D. ...... St. Andrews

**Associate Professors:**
- Coddington, J., M. Arch. ...... Pennsylvania
- Davis, T. K., M. Arch. ...... Cornell
- Martelis, W. E., B. Arch. ...... California
- Schimmenti, M. M., M. Arch. ...... Florida

**Assistant Professors:**
- Almy, D. J., III, M. Arch. ...... Texas
- Fox, L. D., M. Arch. ...... Cranbrook
- French, R. C., B. Arch. ...... Tennessee
- Livingston, M., M.F.A. ...... Wisconsin
- Moir-McClean, T. W., M. Arch. ...... Michigan
- Ware, S. M., M.F.A. ...... Tennessee

**MASTER OF ARCHITECTURE PROGRAM**

The School of Architecture offers two tracks leading to the Master of Architecture degree.

**Track 1** is for students seeking the first-professional degree who already hold a Bachelor's degree or an advanced degree in another field.

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

For Track 2 applicants, a Bachelor of Architecture degree from an NAAB accredited program, or foreign equivalent. Candidates with a GPA less than 3.0 may be considered for conditional admission if evidence of exceptional promise is identified. Submission of a portfolio with a separate application to Architecture to include an essay and three letters of recommendation are also required. A personal on-site interview is desirable but not mandatory.

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

**Degree Requirements**

Track 1 requires a minimum of 42 semester hours of undergraduate preparation and 60 semester hours of graduate coursework, taking approximately 3 1/2 years of full-time study. A minimum of 4 hours of architectural electives or approved electives from another discipline must be taken at the 500 level or above.

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

Both tracks require 6 hours of Thesis 500 with a public presentation and oral defense of the thesis. Retention in the program is contingent upon evidence of satisfactory progress toward the degree. Each student's progress will be reviewed each semester by the Graduate Program Committee. Any questions regarding progress will be referred to the Graduate Program Advisory Committee.

For further information, contact the School of Architecture.

**ACADEMIC COMMON MARKET**

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M. Arch. program in Architecture 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**

<table>
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<tr>
<th>Course Number</th>
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<tr>
<td>403</td>
<td>Introduction to Preservation</td>
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<td>404</td>
<td>Preservation Technology</td>
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<td>405</td>
<td>Descriptive Analysis of Historic Buildings</td>
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**403 Introduction to Preservation** (3) History, theory, and legal aspects of architectural preservation and restoration.

**404 Preservation Technology** (3) Techniques of preservation: methods of analysis, history of materials and technology used in old buildings. Prereq: 403.

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

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

**410 History and Theory of Urban Form** (3) Patterns of community development. Selected historical and contemporary examples. Basic urban design issues and exemplary design approaches through lecture, reading, essays, and sketch studies. Historical change in urban form and design.

**412 Non-Western & Indigenous Architecture** (3) Building responsive to climate, material availability, and economic level, as designed by anonymous builders. Prehistoric times to present throughout world.5 Points.

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

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

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

**416 Forms of Utopia** (3) Ideas and architectural expressions of Utopian movements. Visionary and fantastic architecture. Concept of utopia.

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

**419 American Architecture I** (3) Development of North American architecture from arrival of immigrants in 1607 until 1800.

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

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

**422 Modern European Architecture** (3) Twentieth century architecture in Russia, Czechoslovakia, Poland, Hungary, East Germany, Romania, Bulgaria, Yugoslavia.

**425 Special Topics in Architecture** (1-6) Faculty initiated courses. Topics vary. Prereq: Consent of instructor.

**430 Computer Applications in Design** (3) Advanced computer design using three-dimensional modeling software. Design analysis using computer animation, rendering, visualization, and video. Prereqs: Computer Applications in Design I or consent of instructor.

**431 Building Energy Analysis** (3) Balancing heat flow through external skin of residential and commercial buildings. Local climate evaluation, site planning, building size and orientation, window area, wall treatment, infiltration control, and other design elements. Energy use, quantification methods and economic analysis of energy efficient design features. Architectural program analysis of existing and interior floor dominated buildings. Prereq: 341.

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

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

**463 Architectural Development** (3) Principles and practice of architect as developer. Impact of economics, technology and urban policy on design and development of real estate. Open to all students.
525 Special Topics in Architecture (1-3) Student or cultural and environmental focus. Theories of application related to generation of literature and related examples. Theories of calculation, factors creating building's character.

526 Architecutral Design Studio/Seminar I: Environmental Forces (6) Environmental factors influencing regional character of architecture. Examination of associated natural forces and cultural interpretation. Readings and discussions; application in design studio to specific projects. Prereq: Principles in Architectural Design 1 hr and 5 labs.


527 Architecutral Design Studio/Seminar III: Cultural Aesthetics (3) Role of cultural influences on architectural form. Investigation 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)

Art

(MAJOR DEGREE

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

Norman Magden, Head

Professors:
Blain, Sandra J., M.F.A. ................. Wisconsin
Brakke, P. M., M.F.A. ................. Yale
Clarke, R. A. (Emeritus), M.S. ................. Wisconsin
Cleaver, Dale G. (Emeritus), Ph.D. ......... Daehnert, R. H. (Emeritus), M.F.A. ......... Wisconsin
Darrow, J. F., Ed.D. ................. Illinois State
Falsetti, Joseph S., M.S. ................. Ohio State
Goldenstein, M. B., M.F.A. ................. Nebraska
Kenedy, William C., M.F.A. ................. Wisconsin
Lee, B., M.F.A. ................. Yale
Leiland, W. E., M.F.A. ................. Tennessee
Livingston, P. R., M.F.A. ................. Wisconsin
Lyons, B. (Liaison), M.F.A. ................. Arizona State
Magden, Norman, Ph.D. Case Western Reserve
Martinson, Fred, Ph.D. ................. Chicago
Metros, Susan E., M.F.A. ................. Michigan State
Moffat, 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
LeFevre, Richard, M.F.A. ................. Rochester IT
Longobardi, Pam, M.F.A. ................. Montana State
Neff, A., Ph.D. ................. Pennsylvania
Staples, Carolyn, M.F.A. ................. Michigan State
Wilson, D., M.F.A. ................. California (San Diego)

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

Hiles, Timothy, Ph.D. Penn 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, photography/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 at least 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 598, 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 academics 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 should directly address the need and relevance of this substitution to the student's concentration.

Four semesters (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. Residences are defined by the Department of Art as (1) a minimum 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 3 members and a maximum of 6 members and will be appointed prior to registration for Art 599. Three members of the committee shall be as follows: one from the candidate's concentration area who shall be the major professor, one from art history, and one from a studio discipline outside the concentration area.

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

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

GRADUATE MINOR IN THE HISTORY OF ART
A graduate minor in Art History may be arranged with consent of the student's committee, the instructors involved, and The Graduate School. Prerequisite is an undergraduate Art History minor, or its equivalent, and reading knowledge of French, German, or Italian, unless waived by the Art History faculty.

Art Design
GRADUATE COURSES

411 Advanced Graphic Design (3) Theory and techniques of visual problem-solving as applied to advanced applications of graphic design. Prereq: Intermediate Graphic Design II.

424 Ceramics: Clays and Glazes (3) Clay chemistry, clay bodies, glaze theory and calculation. Formulating, mixing and testing of clay bodies and glaze formulas. Prereq: Ceramics: Portfolio Review.

425 Ceramics: History Seminar (3) History of ceramics through art and student presentations. May not be used toward art history requirement. Prereq: Ceramics: Portfolio Review.

426 Ceramics: Kiln Design (3) Designing kilns, traditional and modern refractories, construction methods, and kiln operation. Prereq: Ceramics: Portfolio Review.

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

521 Graduate Ceramics I (2-5) May be repeated. Maximum 10 hrs.

525 Graduate Ceramics II (2-5) May be repeated. Maximum 10 hrs.

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

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

Art 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 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.

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

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

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

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

474 Theory of 20th-Century Art in Europe and America (3) Theoretical basis for modern movement. Analysis and discussion of individual works of art in light of contemporary writings by artists and theorists. Prereq: Western Art I and II, or consent of instructor.


476 History of 20th-Century Painting and Sculpture in Europe (3) Germany: Van Gogh, Gauguin, Symbolism, Fauvism, German Expressionism, Cubism, Futur-
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: 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.

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 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: 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.

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 (2-6) Exploration of individual projects through advanced color printing methods and combinations with other print media. Prereq: Intermediate Intaglio or consent of instructor. May be repeated. Maximum 12 hrs.
Audiology and Speech Pathology (College of Arts and Sciences)

MAJORS

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

Patrick J. Carney, Head

Professors:

Asp, Carl W., Ph.D. ........................ Ohio State
Carney, Patrick J. (Liaison), Ph.D. .............. Iowa
Nabokov, Igor V. (Emeritus), Sc.D. ............ Iowa
Peterson, H. A. (Emeritus), Ph.D. .............. Illinois
Silverstein, B. (Emeritus), Ph.D. ............... Purdue
Wallace, Giorlalean L., Ph.D. ..................... Northwestern

Associate Professors:

Burchfield, Samuel B., Ph.D. .......... Michigan State
Ferrill, Charles J., M.A. .................... Tennessee
Gordon, Pearl A., Ph.D. ..................... Tennessee
Krishnan, Ravi A., Ph.D. ..................... Texas
Thein, J. W., Ph.D. ........................... Iowa

Assistant Professor:

Hedrick, Mark, Ph.D. ....................... Vanderbilt
Rucker, Jack L., Ph.D. ....................... Pittsburgh
Swanson, Lori A., Ph.D. ..................... Purdue

THE MASTER’S PROGRAM

A major is offered in Audiology or in Speech Pathology. A minor is offered in each of the two areas when approved by the department.

The intent of each major program is to provide the student with the scholarly and professional skills 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 must 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 or hearing science. The degree program is research oriented with primary emphasis on processes involved in normal, deviant, or disordered speech, language and hearing. Students will be expected to demonstrate their knowledge in areas related to the concentrated field of study. These areas include:
1. Basic speech, hearing, or language processes;
2. Basic speech, hearing, or language disorders or differences;
3. Related disciplines providing insight into human communication processes;
4. Technical skills in instrumentation and experimental design which enable the student to investigate problems pertaining to speech and hearing processes.

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

The total program is a minimum of 60 semester hours, including a minimum of:
1. 24 semester hours in dissertation 600.
2. 6 semester hours in a research tool.
3. 6 semester hours in a cognate area outside the department.
4. 24 semester hours in 600-level coursework within the department of which:
   a. a minimum of 6 semester hours in the topic of major interest;
   b. a minimum of 6 semester hours in topic(s) of related interest;
   c. 3 semester hours in 611; and
   d. 3 semester hours in supervised teaching experience.

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

6. A final oral examination.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The 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: 320 or consent of instructor.

432 Observation of Clinical Practice (1) Prereq: Speech and Language Development, Articulation Disorders, or consent of instructor.

434 Clinical Practice in Speech-Language Pathology II (1-4) Prereq: 433 and consent of instructor. Enrollment for fewer than 2 hrs must have prior departmental approval.


455 Problems in Speech Pathology (1-3) Prereq: Consent of instructor.


466 Speech and Language of the Culturally Different Child (3) Speech and language differences of children of various minority groups, of different ethnic and class memberships and from different geographic regions.

473 Audiology (3) Basic principles of clinical audiometry; pure tone, speech, masking and overview of special auditory tests.

474 Auditory Rehabilitation/Rehabilitation of the Hearing Impaired (3) Psychosocial aspects, amplification components, characteristics, assistive devices, speech acoustics, speech perception, speech reading, parent-infant, preschool school years of children, communication impairments/handicaps/remediation of adults, effects of aging/remediation on the elderly, and case studies. Prereq: Phonetics and Acoustics of Speech and 473, or equivalents or consent of instructor.

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

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

504 Appraisal of Speech and Language Disorders (3) Diagnostic procedures for children and adults with speech and language problems including observation and practice with diagnostic tests. Prereq: Communication Disorders, Phonetics and Acoustics of Speech, and 433, or equivalents or consent of instructor.

506 Neural Bases of Speech and Language (3) Structure and function of the peripheral and central nervous systems, role in speech and language. Prereq: 306.

507 Anatomy and Physiology of Hearing (3) Structure and function of the peripheral and central auditory systems, and their roles in mediating auditory processes. Prereq: 473 or equivalent or consent of instructor.
Aviation Systems
(UT Space Institute)

MAJOR DEGREE
Aviation Systems ........................................ M.S.

R. D. Kimberlin, Program Chair

Professors:
Collins, F. G., Ph.D. ................................... California
Kimberlin, R. D. (Liaison), Ph.D. ....................... RWTH (Germany)
Mason, A. A. (Emeritus), Ph.D. ...................... Tennessee
Paludan, C. T., Ph.D. ................................... Denver
Wu, J. M., Ph.D. ....................................... Cal Tech
Young, R. L. (Emeritus), Ph.D. ..................... Northwestern

Associate Professors:
Lewis, William D., Ph.D. ............................... Tennessee
Solies, U. P., Ph.D. ..................................... Tennessee

The University of Tennessee Space Institute offers a program leading to the Master of Science degree in an area of specialization: Aerospace Systems, Aeronautics Engineering, or Air Traffic Administration. The program is designed for those who possess a bachelor’s degree in engineering or science and wish to study under a “system philosophy” toward careers in research and development or administration in areas pertinent to aviation. Current emphases include flight testing, aircraft design, aviation meteorology, air traffic control, and airport management.

To qualify for admission to this program, the applicant must possess a Bachelor’s degree in engineering or science from an accredited institution, show evidence of ability to pursue and benefit from the program, and fulfill The University of Tennessee Graduate School admission procedures and grade-point standards. It is expected that the student will have a basic knowledge of computer utilization and statistics; an understanding of aerodynamic fundamentals, aircraft propulsion, and performance; and some understanding of economics. Both thesis and non-thesis programs are available. The thesis program involves a minimum of 33 semester hours credit while the non-thesis program involves a minimum of 33 semester hours credit.

THESIS OPTION

The thesis program involves satisfactory completion of the following requirements:

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

Administration Specialization
1. Twelve hours of 500-level courses in the major field of aviation systems.
2. Three hours in industrial engineering (engineering management).
3. Three hours in economics or finance.

4. Six hours of electives selected from the major field, mathematics or engineering.
5. Six hours of Aviation Systems 500 demonstrating the ability to conduct and report on an independent investigation.

NON-THESIS OPTION

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

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

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

ACADEMIC COMMON MARKET

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

GRADUATE COURSES

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

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

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


504 Airports and the Community (3) Structure of airports and their communities. Technology and economics of cargo, baggage, ticket and passenger handling, airport management, economics and logistics, air traffic data, and community interfaces. Plans, programs, and developments for collecting and distributing passengers and freight from various types of airports. Types of air vehicle development and projections. Prereq: 501.

Biochemistry and Cellular and Molecular Biology
(UT Space Institute)

MAJOR DEGREE
Biochemistry ............................................. 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
Jeon, K. W., Ph.D. ....................... London
Joshi, J. G. (Emeritus), Ph.D. ....................... Poona
Kennedy, J. R., Ph.D. ....................... Iowa
MacCabe, J. A., Ph.D. ....................... California (Davis)
Monty, Kenneth J., Ph.D. ....................... Rochester
Roth, L. Evans, Ph.D. ....................... Chicago
Salo, T. P. (Emeritus), Ph.D. ....................... Michigan
Shivvers, C. A., Ph.D. ....................... Michigan State
Welsh, H. G. (Emeritus), Ph.D. ....................... Florida
Whitson, G. L., Ph.D. ....................... Iowa
Wicks, Wesley D., Ph.D. ....................... Harvard

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

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

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


550 Project in Aviation Systems (3) Enrollment limited to Aviation Systems students in non-thesis program. May be repeated. Maximum 3 hrs allowed toward degree.

588 Measurement Science I (3) (Same as Nuclear Engineering 588, Mechanical and Aerospace Engineering and Engineering Science 588)

589 Measurement Science II (3) (Same as Nuclear Engineering 588)
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
Roberts, Daniel M., Ph.D. ............California (Davis)
Serpersu, Engin H., Ph.D. ............... Hattrepe

Assistant Professors:
Bruce, Barry, Ph.D. .................. California (Berkeley)
Peterson, Cynthia B., Ph.D. .............. LSU
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 biology.
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 Recluiting 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. At least 6 hours of advanced seminar courses from the following: 601 through 611.
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 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 one other seminar or journal club each semester in residence.
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 600 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 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 methods in modern genetics: techniques in classical, cyto- and molecular developmental genetics. Model organisms, Drosophila and mouse. Prereq: General Genetics and Organic Chemistry.
410 Cellular and Comparative Biochemistry (4) Electrolyte behavior, chemistry and structure of proteins; enzyme behavior and biological function; catabolism and energy capture; carbohydrate; nucleic acid function; protein synthesis, and biochemical genetics; regulation of biological processes. Prereq: Organic Chemistry and General Biology. 3 hrs and 1 discussion. F Sp
419 Cellular and Comparative Biochemistry Lab (2) Experiments with enzymes, nucleic acids, and membranes and organelles. Chromatography, kinetics, hybridization, sequencing, and immunochromatographic 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 microscopy 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.
471-81 Biophysical Chemistry (3,3) Physicochemical principles with applications to biological systems. 471 Thermodynamics, chemical equilibrium, solution chemistry; transport; electrochemistry; kinetics; enzyme catalyzed reactions. 481-Elementary quantum chemistry; interactions of light with biological molecules; optical and magnetic spectroscopy; light scattering; case studies of selected macromolecules. Prereq: Calculus, Organic Chemistry, General Biology or consent of instructor. (Same as Chemistry 471-81). F Sp
480 Physiology of Exercise (3) (Same as Exercise Science 480)
Biomedical Sciences

(Office of the Vice Chancellor for Academic Affairs)

MAJOR
Biomedical Sciences .................. M.S., Ph.D.

Raymond A. Popp, Director

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

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

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

Shared faculty are drawn from the Oak Ridge National Laboratory.

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

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

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

The concentration areas available for master's thesis and Ph.D. dissertation work are biochemistry, biophysics, carcinogenesis, genetics, cellular, developmental and mammalian genetics, and radiation biology. Included are such subjects as immunology, protein and enzyme chemistry, nucleic acid chemistry, cytology, radiation and environmental biology, virology, 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, Biology Division, ORNL, Box 2009, Oak Ridge, Tennessee 37831-8077.

THE DOCTORAL PROGRAM

1. Satisfactory (B grade or better) completion of the following core courses or their equivalent: Biochemistry (511); Biophysical Biochemistry (514); Genetics (515); Advanced Protein Chemistry and Cellular Biology (512); Computing for the Life Sciences (525); and Survey of Statistical Methods (530).

2. Three semesters of Biomedical Sciences Laboratory (531-32-33).

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

4. Satisfactory completion of formal advanced courses in the areas of the student's interests. The number and nature of the 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 600 is required.

7. A final oral examination on the dissertation.

8. A formal seminar presentation of the dissertation research.

SPECIAL MASTER OF SCIENCE DEGREE PROGRAM

The graduate faculty has designed a Master of Science program in Biomedical Sciences primary to fill the need for such a degree within the Oak Ridge National Laboratories; however, a limited number of students from other institutions may be accepted if qualified and as space is available. The requirements for the degree are:

1. Graduate credit or a proficiency in the following core courses or their equivalents: Biochemistry (511); Biophysical Biochemistry (514); Advanced Protein Chemistry and Cellular Biology (512); plus the following courses: Genetics (515); Survey of Statistical Methods (530); or Computing for the Life Sciences (525).

2. Additional credits may be obtained (6 to 15 hours) with electives.

3. Thirty hours of approved graduate courses including 6 hours for thesis.

4. For admission to candidacy: Completion of any required prerequisite courses and one semester of graduate coursework with a B average. Admission to candidacy forms must be filed at least one full semester prior to receipt of degree.

5. A master's committee of three approved faculty members upon admission to candidacy.

6. A thesis resulting in original and significant scientific research.

7. Passing a final oral examination.

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, SNC only. E


512 Advanced Protein Chemistry and Cellular Biology (5) (Same as Biochemistry and Cellular Molecular Biology 511.)

514 Biophysical Biochemistry (3) Chemistry metabolism and biosynthesis of purines, pyrimidines and nucleic acids; biosynthesis of RNA, DNA, and proteins. Energy levels and excited states of large molecules; optical instrumentation; adaptation to systems; properties of macromolecules in solutions; molecular motions; conformational inter- and intramolecular forces; principles of microscopy. Prereq: 511.

515 Genetics (3) Mendelian genetics, mitosis and meiosis; transmission genetics; mapping and linkage; genetics of phage, bacteria and eucaryotes; mapping, linkage, mutagenesis; cytoplasmic inheritance. Mechanisms of recombination, chromosome structure and replication.

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

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

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

543-48-49 Graduate Research Participation (3,6,9) Special advanced research project not related to dissertation research. Topics chosen with consent of instructor. May be repeated.

551-52-53 Special Topics in Biomedical Sciences (3,3,3) Either tutorials or formal lectures. Potential topics: X-ray diffraction and crystallography; excited-state biophysics; physical chemistry of macromolecules; pathology; mammalian genetics coverage.

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

651-52 Advanced Topics in Biomedical Sciences (3,3) Current and future research developments; protein synthesis, protein chemistry and enzyme mechanisms; cytology, and special topics. Either as tutorial or literature survey requiring substantial student preparation. May be repeated.

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

Mullin, B. C., Ph.D. .......... North Carolina State University
Petersen, R. H. (Distinguished Professor), Ph.D. .......................... Columbia
Schilling, E. E. (Lissien), Ph.D. ........ Indiana
Schwarz, O. J., Ph.D. ........ North Carolina State University
Sharp, A. J. (Emeritus, Distinguished Professor), Ph.D. .......................... Ohio State
Walne, P. L. (Benwood Distinguished Professor), Ph.D. .......................... Texas

Associate Professors:
Amundsen, C. C., Ph.D. .......................... Colorado
Heilman, A. S., Ph.D. .......................... Ohio State
Smith, D. K., Ph.D. .......................... Tennessee
Wofford, B. E. (Curator), Ph.D. .......................... Tennessee

Assistant Professors:
Pigliucci, M., Ph.D. .......................... Connecticut University
von Ammon, A. G., Ph.D. .......................... East Anglia (UK)

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

The Department of Botany offers the Master of Science and Doctor of Philosophy degrees with concentrations in anatomy, biochemistry, cytology, cytogenetics, ecology, genetics, lichenology, morphology, mycology, phytology, physiology, plant pathology, and taxonomy.

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

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

ADMISSION REQUIREMENTS

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

1. Bachelor's degree: a B.A. or B.S. from an accredited college or university and a cumulative grade-point average of 2.5 or better on a 4.0 scale, with evidence of ability to do work of graduate quality.
2. General botany or general biology: 8 semester hours.
3. Advanced botany or closely allied biological sciences: 12 semester hours.
4. Physical sciences: general inorganic chemistry; 8 semester hours; organic chemistry. Physics highly recommended.
5. College mathematics: 6 semester hours including 1 term of calculus.

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

THE MASTER'S PROGRAM

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

Thesis Option

The thesis program is usually the 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 thesis and an oral defense to the student's committee of a research proposal suitable for a thesis. This must be completed before enrollment in Botany 500.
2. Successful completion of 30 hours of graduate credit, at least two-thirds of which must be at the 500 level or higher.
3. Satisfactory completion of two hours at the 600 level.
5. Presentation of a 30 minute departmental seminar.

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

Non-Thesis Option

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

THE DOCTORAL PROGRAM

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

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

1. Satisfactory presentation of a research problem by means of a written proposal and an oral defense to the student's committee. This must be completed before enrollment in Botany 600.
2. Satisfactory performance on a written comprehensive examination.
3. Presentation of at least one more cognate area outside of the department totaling 8 hours of graduate credit with at least a B average.
4. Satisfactory performance on an examination in one modern foreign language (see Graduate Coordinator) or an A or B in French 302 or German 332.

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


7. Presentation of a departmental seminar 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: bryology, lichenology, pteridology, agrostology, evolution of characteristicsof animal and plantsystems. Lectures; paper discussions on primary literature; current research in evolutionary ecology and genetics. Prereq: General Botany or Biodiversity; Organization and Function of the Cell. (Same as Ecology and Evolutionary Biology 403.)

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

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

451 Plant Tissue Culture (3) Methods for culture of cells, tissues, and organs: media preparation and maintenance of cultures. 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; Introduction to Microbiology and Lab; Plant Propagation; and Field and Forage Crops.

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 on campus. Use of study facilities and/or faculty time before degree is completed may not be used toward degree requirements. May be repeated. S/NC only. E

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

506 Physiology (4) Comparative study of major algal phyla, both freshwater and marine; morphological, developmental, ecological, taxonomic and phylogenetic aspects. Field and laboratory studies, identification, clas-
experience. Prereq: Senior or graduate standing, completion of at least 15 hrs of broadcasting courses, GPA 3.0 or better, and consent of department head.

**Business Administration**

(College of Business Administration)

**MAJOR DEGREES**

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

The College of Business Administration offers two college-wide programs, the MBA and the Ph.D., with a major in Business Administration. Two tracks are available for the MBA: the regular, full-time program and the executive program. A dual degree program is also available with the College of Law leading to the J.D.-MBA.

To obtain application materials, write or call: Office of Graduate Business Programs, Suite 527, Stokely Management Center, College of Business Administration, The University of Tennessee, Knoxville, TN 37996-0552, Telephone: (423) 974-5033. For the executive program, telephone (423) 974-1660.

**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 Ph.D. in Business Administration is available to residents of Alabama, Florida, or Kentucky (concentration in logistics and transportation only), or West Virginia; the MBA is available to residents of Louisiana (concentration in forest industries management or logistics and transportation), Alabama, Florida or Texas (concentration in logistics and transportation only), Kentucky (concentration in new venture analysis and entrepreneurship or environmental management), Virginia (concentration in environmental management or logistics and transportation), or West Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

**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.

**THE MBA PROGRAM**

The MBA program is designed for students with undergraduate degrees in the social and natural sciences, the humanities, and professional fields such as engineering, business, agriculture, and architecture. The MBA program is a two-year program with students beginning in the fall of each year and graduating in the spring, two years hence. During the summer between the first and second year, students must complete an internship with a company using those skills acquired during the first year of the MBA program.

The MBA program consists of a common 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 College of Business 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 on or before the MBA application deadline to allow for processing.

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

**Prerequisites**

College-level mathematics through at least one course in college-level calculus, taken within the past 5 years, with a grade of B or better, is the only prerequisite requirement for entrance 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 no 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
- Management Science
- 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:

- Up to 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 the department head in the student's area of concentration and the Associate Dean in the College of Business Administration. It should be submitted to the Graduate Office at least one full semester prior to the date the degree is conferred. (Admission to candidacy in the fall semester permits graduation in the following spring semester.)

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

BUSINESS ADMINISTRATION CONCENTRATIONS

For complete listing of MBA program requirements, see above.


In recognition of the growing globalization of business activities and the importance of the international environment to successful management of every firm, the MBA program offers a concentration in global business. The concentration comprises at least two courses taken from Economics 424, Logistics 507, Management 571, and departmental special topics courses with international content; and at least one but not more than two additional courses from the previous list, or from a list of electives as approved by the Director of Graduate Business Programs. Students pursuing a concentration in global business are strongly encouraged to pursue it as a second concentration in addition to one of the traditional departmental concentrations. Students pursuing this concentration are also strongly encouraged to pursue an international or internationally related internship for the summer between their first and second years of the MBA program. Students are expected to participate in a foreign exchange or field experience if at all possible, especially for those with no previous foreign experience. Language training is advised but not required, and beginning language courses are not typically available for graduate credit.

The concentration in new venture analysis and entrepreneurship is comprised of three specifically designed courses which are interdisciplinary in nature. This concentration strives to build a strong academic foundation for both entrepreneurial and intrapreneurial activities. The new venture analysis and entrepreneurship concentration is offered in recognition of the growing trend in American business today towards new product/venture development. The new venture analysis/entrepreneurship concentration courses may be combined with two elective courses in another area (management or marketing) to achieve a dual concentration.

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

PRE-MBA PROGRAM

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

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

Students interested in the program are counseled initially in the Arts and Sciences Advising Center regarding admission standards and Arts and Sciences requirements. At the end of their third 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 concomitant degrees of 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 law/management spectating 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 enter in MBA coursework while completing the first year of the law curriculum and may not enroll in J.D. coursework while completing the first year of the business curriculum. During the first year in the J.D. program, students register through the College of Law. For any term in which students take MBA courses, even though they are also taking law courses, they must register through The Graduate School. The Graduate School registration form must be approved by the Director of Graduate Business Programs.

Awarding of Grades

Grades for graduate business courses accepted by the College of Law and grades for law courses accepted by the College of Business Administration will be converted to either Satisfactory or No Credit and will not be included in the computation of the student's grade average or class standing in the college in which such grades are so converted. The College of Law will award a grade of Satisfactory for a graduate business course in which the student has earned a B grade or higher and a No Credit for any lower grade. The College of Business Administration will award a grade of Satisfactory for a law course in which the student has earned a 2.2 grade or higher and a No Credit for any lower grade. Grades earned in courses of either college may be used on a regular graded basis for any appropriate purpose in the college offering the course. The official academic record of the student maintained by the Registrar of the University shall show the actual grade assigned by the instructor without conversion.

Approved Dual Credit

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

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 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 9-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 12-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 average 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 Manage-
Admission Requirements

Students seeking a Ph.D. degree must be recommended for acceptance by the College of Business Administration to The Graduate School. Actual admission is based on the applicant’s overall standing compared with other applicants and on the availability 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 in an undergraduate business class or as a research assistant to a senior faculty member. Typically, the College of Business Administration offers financial support for doctoral students during their tenure in the program.

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

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

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

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

Degree Requirements

Doctoral students must file a program of study that has been approved by their doctoral committee within one year of completing their 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.

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

504 Core I (15) Development of roles and responsibilities of business manager; functional fundamentals (accounting, finance, management, operations, human resource management) through year-long case in which knowledge is applied to simulation of real-world enterprise. Core technologies covered include improvement and delivery of customer value: role of firm in society, attention to stakeholder value, economics, and the ethical and legal environment of business. Personal leadership skills: leadership, team building, 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. Core study work on organizational reality, global competition, managing technology, ethics and social responsibility, and strategic planning. Capstone integrated business simulation. Prereg.: 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 using activity blueprints, entity-relationship diagrams, database design principles, visual diagrams, and CASE (Computer-Aided Software Engineering) tools.

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


561 Management Project I (3) Company project. Preliminary investigation of strategic issue (new initiative, program or significant organizational change to enhance organizational effectiveness) in sponsoring organization. Work with faculty to develop project which defines issue and scope of project. Proposal 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 prearrangement with supervising faculty member. May require approval of Director of Graduate Business Programs. May be repeated. Maximum 6 hrs. S/N Credit or letter grade.

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

Chemical Engineering

( College of Engineering)

MAJOR DEGREES

Chemical Engineering..................M.S., Ph.D.

Charles F. Moore, Head

Professors:

Bienkowski, Paul R., Ph.D......................Purdue

Bohagen, Donald C., Ph.D.....................Delaware

Counce, Ph.D., M., Ph.D......................Tennessee

Hansen, Marion G., Ph.D......................Wisconsin

Holmes, John M. (Emeritus), Ph.D........Tennessee

Hsu, Hsin-Wen (Emeritus), Ph.D...........Wisconsin

Moore, Charles F. (Alumni Prof.) (Liaison), Ph.D...............Louisiana State

Parona, Joseph L. (Emeritus), PE.............Western Michigan

Prados, John W. (University Prof.), PE, Ph.D......................Tennessee

Associate Professors:

Bruns, Duane D., Ph.D.......................Houston

Wang, Tse-Wei, Ph.D.........................MIT

Weber, Frederick E., Ph.D....................Minnesota

Assistant Professors:

Frymier, Paul D., Ph.D..,.................Virginia

Ketten, David J., Ph.D.......................Minnesota

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

THE MASTER’S PROGRAM

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

1. A total of at least 21 hours in graduate coursework in chemical engineering and related areas excluding thesis. The minimum requirements are 15 hours in chemical engineering; 3 hours in other engineering, scientific, or business areas (as approved by the departmental faculty); and 3 hours chosen from either of these two categories.
3. Active participation in graduate seminars in the department. Resident students must register for CHE 501 every semester it is offered.
4. A final oral examination covering the thesis, related fields and graduate coursework.

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

1. A total of at least 33 hours in graduate coursework 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.
3. A written comprehensive examination over the major field and an oral examination covering the review paper and related areas.

THE DOCTORAL PROGRAM

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

Department requirements consist of the satisfactory completion of:

1. Graduate courses in chemical engineering, amounting to approximately 24 semester hours, at least 9 of which must be in 600 series courses.
2. Supporting courses in related scientific and engineering fields amounting to approximately 24 semester hours, subject to approval by the student’s faculty committee. These related fields will normally include chemistry, mathematics, physics, and engineering.
3. The comprehensive examinations, 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 it is offered.

GRADUATE COURSES

403 Introduction to Optimization (3) Principles and applications of optimization techniques to chemical process design: unconstrained and equality constrained optimization, linear programming, dynamic programming, and geometric programming. Prereq: Mathematics 241.


447 Honors: Transport Phenomena (3) Momentum, heat and mass transfer processes, analogies, differential and macroscopic balances, applications involving molecular diffusion, simultaneous mass transfer and chemical reaction. Prereq: Mass Transfer and Separation Processes and consent of instructor.


486 Hydrocarbon Processing (3) Chemical and physical properties of selected hydrocarbons and related processes utilized in conversion of raw materials into various fuels and selected chemical feedstocks. Prereq: Mass Transfer and Separation Processes, Organic Chemistry.

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

403 Introduction to Optimization (3) Principles and applications of optimization techniques to chemical process design: unconstrained and equality constrained optimization, linear programming, dynamic programming, and geometric programming. Prereq: Mathematics 241.


447 Honors: Transport Phenomena (3) Momentum, heat and mass transfer processes, analogies, differential and macroscopic balances, applications involving molecular diffusion, simultaneous mass transfer and chemical reaction. Prereq: Mass Transfer and Separation Processes and consent of instructor.


486 Hydrocarbon Processing (3) Chemical and physical properties of selected hydrocarbons and related processes utilized in conversion of raw materials into various fuels and selected chemical feedstocks. Prereq: Mass Transfer and Separation Processes, Organic Chemistry.

500 Thesis (1-15) P/NP only. E
501 Graduate Seminar (1) Prereq: Admission to graduate program. May be repeated. S/NC only. F, Sp

502 Registration for Use of Facilities (3-15) Required for the student who is 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 Engineering Analysis (3) Formulation and solution of problems in chemical engineering and materials science, ordinary and partial differential equations; types of ODE, PDE and solution techniques; transform methods; conformal mapping; integral methods; introduction to numerical methods. (Same as Materials Science and Engineering 505.)

507 Application of Numerical Linear Algebra in Systems and Control Engineering (3) Fundamental concepts of linear algebra and applications to systems and control areas. Geometric and physical interpretations of relevant concepts: least square problems, LU, QR, and SVD decompositions of matrix, eigenvalue problems and similarity transformations in solving difference and differential equations. Numerical computational aspects of various algorithms. Application of linear algebra concepts in optimization problems. Introduction to linear programming. Computer projects. Prereq: Graduate standing or consent of instructor. (Same as Electrical Engineering 550.)

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


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

542 Diffusive and Stagewise Mass Transfer Operations (3) Analysis of mass transfer phenomena, coupled mass transfer and reaction, mass transfer operations in packed towers and agitated vessels, membrane separations. Equilibrium stage concepts applied to mass transfer operations, emphasizing nonequilibrium and multicomponent systems.

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


575 Applied Microbiology and Bioengineering (3) Crossdisciplinary course combining basic concepts in microbiology, biochemistry, reaction kinetics, and biochemical and environmental engineering. Commercial processes, biodegradations/wastewater treatment, analysis of basic bioreaction systems, biosensors, and immobilization methods. Fundamental laboratory techniques during the entire period. (Same as Environmental Engineering 575, Agricultural Engineering 575 and Microbiology 575.)


581 Industrial Pollution Prevention (3) Principles and practical aspects of industrial waste minimization. Regulatory environment, waste minimization strategies, economic analysis, and feasibility study; analysis of alternative waste minimization/management technologies. Prereq: Graduate standing in engineering or consent of instructor. (Same as Environmental Engineering 581 and Engineering Science and Mechanics 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) S/P only.

631 Advanced Topics in Statistical Thermodynamics and Molecular Dynamics (3) Statistical thermodynamics, molecular based computer simulations, Monte Carlo and molecular dynamics calculations; applications to supercritical fluids, macromolecules and biological systems. Prereq: 531.


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


661 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 systems analysis, model optimization (deterministic, stochastic, phenomenological), and utility and limitations of models. Prereq: 575 or consent of instructor.

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

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**Chemistry**

(3-15)

**MAJOR DEGREES**

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

Michael Sepaniak, Head

Professors:

Adcock, J. L., Ph.D. .................................. Texas
Alexandatros, S. D. (Hoechst-Celanese
Prof. of Polymer Science, Ph.D. ........................ California
Baker, D. C., Ph.D. .................................... Ohio State
Barnes, J. E., Ph.D. .................................... Northwestern
Bloor, J. E. (Emeritus), Ph.D. ................................ Manchester
Bull, W. E. (Emeritus), Ph.D. .............................. Illinois
Chambers, J. Q., Ph.D. .................................. Kansas
Compton, R. N., Ph.D. .................................... Tennessee
Cook, K. D., Ph.D. ....................................... Wisconsin
Dean, A. J. (Emeritus), Ph.D. ............................... Michigan
Eastham, J. F. (Emeritus), Ph.D. ............................ California
Fletcher, W. H. (Emeritus), Ph.D. .......................... Minnesota
Fleming, A. F., Ph.D. ..................................... Cornell
Guiochon, G. (Distinguished Scientist), Ph.D. .......... Ecole Polytechnic and Paris VI
Kabakia, G. W. (Robert H. Cole Prof.,
Distinguished Prof.), Ph.D. ............................... Purdue
Kleinfeiler, D. C., Ph.D. ..................................... Princeton
Kovac, J. D., Ph.D. ........................................... Ithaca
Lichtker, M. H. (Emeritus), Ph.D. .......................... Wisconsin
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 Prof.), Ph.D. ........ Illinois
Sepaniak, M. J., Ph.D. .................................... Iowa State
Smith, W. T. (Emeritus), Ph.D. ............................ Ohio State
Van Hook, W. A. (Paul and Willma Ziegler Prof.), Ph.D. John Hopkins
Wehry, E. L. (Emeritus), Ph.D. ............................. Purdue

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**Chemistry (College of Arts and Sciences)**

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**THE DOCTORAL PROGRAM**

The department offers concentrations in eight areas for the Ph.D.: 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 presentational portion 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 above) and/or a related field. A minimum of 30 hours, including one of the following sequences: 530-31-32, 550-51-52, 570-72-73, 590-94-95, or three courses from 510-11-12-20. At least 14 hours of this graduate coursework must be at the 600 level or above.
5. A final oral examination.

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**THE DIPLOMA PROGRAM**

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

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

1. Research and a dissertation to give at least 24 hours of graduate credit in Chemistry 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 process 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: 510-12, 550-31-32, 550-51-52-53-54, 570-71-72-73, and 590-94-95.
6. A final oral examination.
The Ph.D. program with concentration in physical chemistry 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, bonding theories, descriptive chemistry of elements, kinetics and mechanism of inorganic reactions, applications of spectroscopy, characterization, coordination and organometallic chemistry. Prereq: 230. Prereq or coreq: 380 or 381. Sp
431 Radioactivity and Its Application (2) Radioactive materials in tracer and therapeutic applications. Radioactive decay, detection apparatus and techniques, tracer procedures, safety precautions in agriculture, biology, medicine, nutrition. Not for credit by chemistry or physics majors or minors. Prereq: Mathematics 122 or equivalent and 1 yr of physical chemistry. Sp
471-81 Biophysical Chemistry (3.3) (Same as Biochemistry and Cellular and Molecular Biology 471-81.)
473-83 Physical Chemistry (3.3) Students may not receive credit for both 471 and 473 or 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. Prereq: 431-83. (Kinetics of chemical reaction; introduction to quantum mechanics and applications to electronic structure of atoms and molecules; molecular spectroscopy. Prereq: General Chemistry, Fundamentals of Physics I and II. Sp
479-89 Physical Chemistry Laboratory (2.2) Experiments on topics discussed in 471-81 or 473-83. Prereq or coreq: Corresponding courses 471 or 473 for 481 and 483 or 483 for 469. Lab. F, Sp
484 Advanced Physical Chemistry (3) Chemical dynamics, statistical thermodynamics, quantum mechanics of atomic and molecular systems, crystal structure and solid state. Prereq: 481 or 483, Sp
500 Thesis (1-15) P/NP only. E
501 Chemistry Seminar (1) Lectures and discussion on current research. May be repeated. Continuous registration required for resident graduate students. S/NC only. F, Sp
502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. Prereq: Consent of department. May be repeated. Maximum 6 hrs. S/NC only. E
505 Special Problems (3) Specialy assigned theoretical or experimental work on problems not covered in other courses. Prereq: Consent of department. May be repeated. Maximum 5 hrs. S/NC only. E
510 Analytical Spectrometry (3) Principles and practice of optical and mass spectrometric techniques in quantitative chemical analysis. Prereq: 1 yr of physical chemistry.
511 Analytical Separations (3) Principles and practice of chemical separations based on extraction, chromatographic, and electrophoretic phenomena. Prereq: 1 yr of physical chemistry.
512 Electroanalytical Chemistry (3) Fundamentals of electrocatalysis; principles and practice of electroanalytical techniques in quantitative chemical analysis and applied to study of chemical systems. Prereq: 1 yr of physical chemistry.
520 Chemical Instrumentation (3) Principles of analog and digital systems in chemical instrumentation; practice in design and construction of chemical instruments. Prereq: Consent of instructor. 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, biorganic compounds. Prereq: 530. Sp
532 Experimental Methods of Inorganic Chemistry (3) Electronic, infrared, Raman, microwave, NMR, ES, 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, reaction detection. Prereq: 1 yr of physical chemistry.
550 Structure and Reactivity in Organic Chemistry (3) Structure and bonding in organic compounds; molecular orbital theory, stereochemistry, conformational analysis, and molecular mechanics; substituent effects on acidity and reactivity; introduction to reaction mechanisms. Prereq: 360. F
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. Coreq: 655 F
554 Organic Spectroscopy Laboratory (1) Use of IR, UV, MS and multinuclear 1H NMR spectrometers. Development of problem-solving ability in area of spectroscopic characterization of organic molecules. Prereq: 360 or equivalent. Coreq: 655. F
570 Quantum Chemistry and Spectroscopy (3) Basic principles of quantum chemistry 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 phenomena in chemistry: chemical kinetics, chemical dynamics, transport theory. Prereq: 1 yr of physical chemistry. F
590 Polymer Chemistry (3) Fundamentals of polymer synthesis and characterization through application of organic and physical chemical principles. Prereq: 1 yr each of organic and physical chemistry.
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 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 offers a graduate concentration in child development or equivalent coursework. A non-thesis option only is available in Track 2.

Track 1 - All students in the child development concentration must enroll in CFS 510, 540, and 571. At least 6 hours in a cognate area outside the department must be completed. 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.

THE PH.D. CONCENTRATION

The doctoral program in Human Ecology prepares scholars in the concentration areas of child development and 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 the 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 10-13 credits in child and family studies required foundation courses: 510, 550, 570, 571 and 630 (child development area) or 634 (family studies area).
2. Minimum of 12 credits in 500- and 600-level courses in child development or family studies, with at least 3 credits in 600-level courses (in addition to the required courses described in #1).
3. Minimum 6 credits in a cognate area.
4. Minimum 9 credits in graduate-level statistics, with at least 3 of these credits in a more specialized area than a sequence of survey courses.
5. Minimum 3 credits in special research methods.
6. Pre-doctoral research project approved by student's committee.
8. Minimum 8 credits 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 he/she is using student facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/C only.
505 Development of Interpersonal and Supervision Skills (2) Development of interpersonal skills needed to work with families and other professionals. Supervisory training in other's skill development, active listening, self-disclosure, relationship building, and negotiation.
510 Survey of Theory and Research in Child Development (3) Theoretical models and research literature in child development (conception through adolescence); application to research intervention and education. Prereq: 9 hrs of either upper division graduate or graduate social science or consent of instructor.
512 Survey of Research in Early Childhood Education (3) Current literature and issues in early childhood education. Prereq: 610 or equivalent or consent of instructor.
515 Children in Contemporary Society (3) Theories and research on environmental and developmental issues in contemporary families and environments for children from infancy through middle childhood. Implications for programs and policy.
521 Organizational Management in Early Childhood Education (3) Designing, implementing, and evaluating physical and human resources in educational environments. Development of skills in organizational management, interpersonal leadership, and supervision of staff. Prereq: 512 or equivalent or consent of instructor.
522 Naturalistic Interventions for Parents and Teachers of 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 development: theoretical perspective on play.
530 Families of Handicapped Children (3) Developmental nature of familial 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 parent and child, applications of systems models, child abuse, and impact of divorce on children. Prereq: 550 or equivalent or consent of instructor.
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.
552 Family in Contemporary Social Thought (3) Alternative conceptualizations of family in current social thought. Variations of family construction by race, gender, and social class. Prereq: 550. F/A
555 Children, Divorce and Remarriage (3) Children's and adolescents' adjustment to transitions involved in parental divorce, single-parenthood, and remarriage. F/A
560 Marital Dyad (3) Communication, power, sexuality, marital stability, and marital satisfaction. Prereq: 550 or equivalent or consent of instructor.
563 Family Life Education Programs (3) Planning, implementing and evaluating programs in marital, parent-child, and family relationships, and parenting edu
Civil and Environmental Engineering
(College of Engineering)

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

Professors:
Gregory D. Reed, Head

Bennett, R. M., Ph.D., P.E. Illinois
Burtt, E. G. (Fred N. Peebles Prof.), Ph.D., P.E. Illinois
Chatterjee, A., Ph.D., P.E. NC State
Davis, W. T., Ph.D. Tennessee
Deatherage, J. H., Ph.D., P.E. Tennessee
Drum, E. C., Ph.D. Arizona
Ghosh, M. (Goodrich Chair of Excellence), Ph.D. Illinois
Goodpatre, D. W., Ph.D. Illinois
Grecco, W. L. (Emeritus), Ph.D. Michigan State Heathington, K. W. (Emeritus), Ph.D.
Humphreys, J. B. (Emeritus), Ph.D. Texas A&M Johnson, H. L. (Emeritus), Ph.D. Tennessee
Miller, W. A. (Granger Prof.), Ph.D., P.E. Tennessee
Mulder, E. A. (Emmette J.) Mississippi
Pine, E. (Condra Prof.), Ph.D., P.E. Mississippi
Rogers, V. D. (Emeritus), Ph.D. Arizona
Reed, G. D. (Liaison), Ph.D., P.E. Arkansas
Robinson, R. B. (Fisher Prof.), Ph.D., P.E. Iowa State
Smoot, J. L., Ph.D., P.E. VPI
Tschertanz, B. A. (Condra Prof.), Ph.D., P.E. New Mexico State
Walker, C. R. (Emeritus), M.S. MIT
Wegmann, F. J., Ph.D. Northwestern
Arabia, E. K. (Condra Prof.), Ph.D., P.E. Illinois
Humphreys, J. B. (Emeritus), Ph.D. Texas A&M
Johnson, H. L. (Emeritus), Ph.D. Tennessee
Miller, W. A. (Granger Prof.), Ph.D., P.E. Tennessee
Mulder, E. A. (Emmette J.) Mississippi
Rogers, V. D. (Emeritus), Ph.D. Arizona
Reed, G. D. (Liaison), Ph.D., P.E. Arkansas
Robinson, R. B. (Fisher Prof.), Ph.D., P.E. Iowa State
Smoot, J. L., Ph.D., P.E. VPI
Tschertanz, B. A. (Condra Prof.), Ph.D., P.E. New Mexico State
Walker, C. R. (Emeritus), M.S. MIT
Wegmann, F. J., Ph.D. Northwestern

Associate Professors:
Choi, K. G., Ph.D. Northwestern

Assistant Professors:
Han, L. D., Ph.D. California
Jackson, N. M., Ph.D., P.E. Oregon State Mauldin, M., Ph.D. California

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

THE MASTER'S PROGRAM

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

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

Civil Engineering

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

Thesis Option: A minimum of 30 semester hours, including 8 hours of thesis, is required. Non-Thesis Option: A minimum of 33 semester hours, including a 3-hour special problem is required. The special problem will culminate in a written report which must be approved by the student's major professor.

Environmental Engineering

For a Master of Science with a major in Environmental Engineering, normally a Bachelor's degree in a field of engineering is required. For a student who does not have an engineering background, the following minimum prerequisite courses will be required: Basic Engineering or Computer Science 101; Basic Engineering 121, 131; Engineering Science and Mechanics 231; Statistics 251; Civil Engineering 390, 395; 386; Mathematics 141, 142, 231, 241; Chemistry 120, 130. In general, these must be completed with a B average before courses for graduate credit can be taken.

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

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

Non-Thesis Option: The student must present a minimum of 33 semester hours of approved graduate courses. The major shall include a minimum of 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 department and the student's committee to suit the individual academic objectives.
THE DOCTORAL PROGRAM

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

1. A minimum of 72 semester hours beyond the Bachelor's degree, exclusive of credit for the M.S. thesis. Of this number, a minimum of 24 semester hours in 600 Doctoral Research and Dissertation will be required.

2. A minimum of 24 semester hours of graduate courses in civil engineering, exclusive of thesis or dissertation credit, at least 6 hours of which must be 600-level courses.

3. Supporting courses in related scientific and engineering fields, amounting to approximately 24 semester hours, subject to approval by the student's faculty committee. These related fields will normally include such disciplines as mechanics, chemistry, mathematics, microbiology, physics, and other engineering fields. A minimum of 9 semester hours of mathematics will be required beyond the civil engineering undergraduate requirements.

4. One foreign language if the student's faculty committee feels that a knowledge of an additional language is crucial to the student's research efforts.

5. Upon completion of at least one-half of all coursework, each student must pass a comprehensive examination.

6. After completion of the dissertation, prior to graduation, each student must pass a comprehensive final 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 residents of all states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S. program in Environmental Engineering (concentration in air quality or waste management) is available to residents of the state of Alabama. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

Civil Engineering

GRADUATE COURSES

421 Portland Cement and Asphaltic Concrete (3) Aggregate properties and tests, tests 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; both geometric and pavement design. Prereq: 210, 251, 352.

452 Traffic Engineering (3) Characteristics of driver, vehicle, and roadway and their interrelationships; traffic studies; basic considerations of traffic circulation and control, lighting; capacity analysis, roadway safety analysis 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 wind, snow, and earthquakes; methods of analysis; conclusions. Prereq: 210, 251, 352.

470 Pavement Design (3) Design of pavement systems; analysis of layered systems; design of techniques to test and evaluate pavement systems; and methods of analysis. Prereq: 210, 251, 352.


485 Principles of Hydrogeology (3) Same as Geological Sciences 465.

490 Water Resources Project Design (3) Coherent development of multipurpose reservoir and dam project, data acquisition, spillway and outlet works design, and evaluation of gravity and dynamic stability analyses; and design of safety measures and operation procedures. Prereq: 470, 390, 395.


495 Water Resources Development and Management (3) Principles of water resources project development and management. Prereq: 493.


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 equipment. May not be used toward degree. Prereq: 500, 395.

505 Urban Traffic Engineering-Characteristics (3) Traffic volume, traffic flow, traffic pattern analysis, and traffic management. Prereq: 451 or 551.


511 Water Resources Development and Management (3) Principles of water resources project development and management. Prereq: 490, 390, 395.

512 Urban Systems: Engineering and Management (3) Various urban systems usually under the responsibility of city managers: streets, sewers, and parks. Prereq: 451, 470.

513 Urban Systems: Engineering and Management (3) Urban systems such as transportation, energy, and water resources. Prereq: 451, 470.

514 Urban Systems: Engineering and Management (3) Urban systems such as transportation, energy, and water resources. Prereq: 451, 470.

515 Traffic Engineering-Characteristics (3) Traffic volume, traffic flow, traffic pattern analysis, and traffic management. Prereq: 451 or 551.

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520 Traffic Engineering-Characteristics (3) Traffic volume, traffic flow, traffic pattern analysis, and traffic management. Prereq: 451 or 551.

521 Pavement Design (3) Empirical and theoretical based methods of pavement design and analysis, strengthening existing pavements, pavement distress and economic design alternatives. Prereq: 520, 390.


531 Soil Stabilization (3) Stabilization of soils by compaction, drainage, and consolidation; chemical stabilization of soils with admixtures, waterproofing and modification of soils and additives. Reinforced earth and stabilization of geosynthetics. Prereq: 470, 490.


533 Transportation Planning and Design (3) Transportation planning and design. Prereq: 451, 470.

534 Transportation Planning and Design (3) Transportation planning and design. Prereq: 451, 470.


536 Geotechnical Engineering (3) Geotechnical engineering. Prereq: 470, 490.

537 Transportation Planning and Design (3) Transportation planning and design. Prereq: 451, 470.


539 Urban Systems: Engineering and Management (3) Urban systems such as transportation, energy, and water resources. Prereq: 451, 470.

540 Urban Systems: Engineering and Management (3) Urban systems such as transportation, energy, and water resources. Prereq: 451, 470.

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557 Urban Systems: Engineering and Management (3) Urban systems such as transportation, energy, and water resources. Prereq: 451, 470.

558 Urban Systems: Engineering and Management (3) Urban systems such as transportation, energy, and water resources. Prereq: 451, 470.

559 Urban Systems: Engineering and Management (3) Urban systems such as transportation, energy, and water resources. Prereq: 451, 470.
561 Computer-Aided Structural Analysis (3) Fundamental concepts of computation 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 Statically Indeterminate Structures (3) Deflections of beams and frames; foundation settlement and other displacement methods; secondary stresses. Prereq: 361.

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

587 Structural Systems (3) Structural system analysis and design; dead, live, wind, and earthquake loads on buildings; wind and earthquake effects on structures. 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 research 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: 571.

574 Behavior of Reinforced Concrete Members (3) Moment-curvature and load-displacement relationships for reinforced concrete beams; combined bending and axial load; shear in reinforced concrete. Stress-strain relationships between research results and specifications for design. Prereq: 571.

575 Repair and Retrofitting of Structures (3) Techniques, 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. Prereq: Calculus II or consent of instructor.

590 Special Problems in Civil Engineering (1-6) Enrollment limited to civil engineering students in non-thesis programs. May be repeated. Maximum 6 hrs. S/NC only.

595 Special Topics (1-4) Topics and problems related to current developments in field. May be repeated. Prereq: Consent of instructor.

600 Doctoral Research and Dissertation (3-15) Prerequisite: 502.

651 Analysis Techniques for Transportation Systems I (3) Analysis of trip generation, trip distribution, modal split and traffic assignment; employing mathematical, statistical, and computer science techniques. State of the art and new modeling techniques. Prereq: 554 or 556.

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

666 Reliability of Constructed Systems (3) Development of safety-related probability based design codes; Monte Carlo methods; constructed system reliability; evaluation of existing infrastructures. Prereq: 580. Introduction to Structural Design or consent of instructor.

571 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.

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

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

Environmental Engineering

GRADUATE COURSES

500 Thesis (1-15) Prerequisite: 502.

502 Registration for Use of Facilities (1-15) Required enrollment limited to environmental engineering advanced problems of current interest. Prereq: Consent of instructor.

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

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

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

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

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

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

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

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

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

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

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

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

573 Sampling of Air Pollutants (3) Standard sampling methods for particulate and gaseous air pollutants from industrial processes; ambient air monitoring instrumentation techniques. Prereq: 570.

575 Applied Microbiology and Bioengineering (3) Same as Chemical Engineering 575, Microbiology 575, and Agricultural Engineering 675.

581 Industrial Pollution Prevention (3) Same as Chemical Engineering 561 and Engineering Science and Mechanics 585.

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

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

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

651 Industrial Waste Unit Operations and Processes (3) Theoretical design and laboratory modeling of industrial waste treatment processes and operations. Prereq: 551. 553. Prereq or coreq: 552. 2 hrs and 1 lab.

652 Advanced Physicochemical Treatment (3) Advanced physicochemical concepts applied to treatment of water and wastes. Concepts of colloid chemistry, crystalization, flocculation technique, and topics of current
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. 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.

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 an existing course or concentrating on one aspect of existing survey, Prereq: According to topic. May be repeated. Maximum 9 hrs.

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

531 Special Topics in Latin Literature (3) Advanced study of classical or medieval Latin literature, authors selected by students and instructor. May be repeated. Maximum 9 hrs.

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

**Communications**

**DEGREES**

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.

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 fifty percentiles 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 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 without the appropriate background are 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 may take a proficiency test on any prerequisite course, subject to review by the master's or doctoral committee of the College of Communications.

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

**THE MASTER'S PROGRAM**

The Master of Science with a major in Communications is intended for students who desire a career in the mass media with an emphasis on communications management and a deeper understanding of the communication process and social role of the mass media. The program follows a broad-based multi-media approach 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 rather than an advanced degree.

**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 550), 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.

A student's internship experience requires approval by his/her advisor. Credit will be given through Advertising 596, Broadcasting 596, or Journalism 596 on the basis of 3 hours of credit for the equivalent of 15 weeks of full-time professional experience. This credit is to be included in the hour requirements for the M.S. program. Previous professional experience will be evaluated by the student's committee.

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

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

**THE DOCTORAL PROGRAM**

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

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

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

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

1. A 3.0 (4.0 system) grade-point average in undergraduate studies, or 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 reasons for pursuing the doctorate. Personal interviews with members of the Ph.D. Admissions Committee are recommended and may be required. Professional experience in some field of communications is a highly desirable criterion for admission.

A minimum of 88 hours of approved graduate work is required for the Ph.D.:
1. Twenty-eight hours of core courses--Communications 610, 612, 620, 640, 641; 6 hours of statistics; and three of the following courses: Communications 622, 632, 642, and 662.
2. Fifteen hours in a primary concentration (advertising, broadcasting, information sciences, journalism, public relations, or speech communication) supplementing the core. Courses may be taken in one or more of the Departments of Advertising, Broadcasting, Speech Communication, and/or the Schools of Information Sciences and Journalism.
3. Twelve hours in a secondary concentration (outside the College of Communications).
5. Twenty-four hours of dissertation.

All courses require the approval of the student's advising committee.

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

Each doctoral student's progress will be reviewed annually by the Doctoral Committee of the College of Communications. Results will be reported to the student by his/her program advisor, who will convey the committee's recommendation concerning the student's remaining in the program (non-binding) and suggestions for improvement in performance.

Candidates without prior teaching experience must register for Communications 521, Tutorial in Communications Teaching.

Planned course offerings in the College of Communications for a full calendar year are available the preceding November. This information is available from the Graduate Studies Office, 426 Communications Building, 974-6651. Susan 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, Alabama, and Louisiana (concentration in advertising only). The Ph.D. program is available to residents of the states of Arkansas, Alabama, Louisiana, Maryland, Virginia, or West Virginia. Additional information may be obtained from the Administrations 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 is 3.0 or higher at the end of the probationary period. The probationary period is defined as the next 12 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: Written for Mass Communication or consent of instructor. E

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

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

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

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

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

540 Theory for Media Management (3) Selected research hypotheses and theories in the literature of mass communications, managerial decision-making. Prereq: Consent of instructor or admission to program. Sp

550 Seminar in Media Economics and New Technology (3) Electronic and computer 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 or admission to program. Sp

552 Seminar in Health Communications (3) Problems, and issues of communication in health field. Media's reporting of health issues. Setting of media's "health agenda," strategies of media and social marketing efforts; public communication of complex social/medical issues. Prereq: 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. Potgieter, Director

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

The Comparative and Experimental Medicine degree program (M.S. and Ph.D.) is a jointly-administered graduate program intended to prepare students for teaching and/or research careers in the health sciences. This program emphasizes the comparative approach to the study of experimental pathobiology, infectious diseases, pharmacokinetics, epidemiology, clinical medicine, immunopathology, hematology, aberrant metabolism, oncology, and genetic disorders. The Ph.D. program is open to approved graduate students seeking training in this area and is especially useful for individuals with professional degrees. For the student with undergraduate biological science background, the Comparative and Experimental Medicine program provides an unusual opportunity to study disease processes common in humans and animals from a multidisciplinary perspective. The scope of this intercollegiate program, which pools faculty resources from both veterinary and human medicine, is broadened which pools faculty resources from both veterinary and human medicine, is broadened.

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 histology, oncology, comparative biopathology, comparative pharmacology, 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. The fourth member is the director of the 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, Medical Biology, Obstetrics and Gynecology, Pathology, Pediatrics, Radiology, and Surgery.

500 Thesis (1-15) P/NP only. E
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
508 Graduate Research Participation (3) Advanced research techniques while conducting individual biomedical research projects under supervision of faculty. Open to all graduate students. Prereq: Consent of instructor. May be repeated with consent of instructor. Maximum 9 hrs. S/NC only. E
521 Principles of Oncology (3) Lectures, classroom discussion, and case reports surveying major topics of oncology. Prereq: Biology 220-30 or consent of instructor. E
541 Molecular Basis for Metabolic Disease (4) Diseases at the molecular level. Changes in molecular events in cells that lead to disease and occur as result of disease. Correlation with clinical and pathological states. Prereq: Biochemistry and Cellular and Molecular Biology 410-418 or equivalent. F,Sp
545 Clinical Genetics (3) Human genetic disorders: new developments in cytogenetics, molecular genetics, clinical diagnoses and prevention. Prereq: Biology and genetics background or consent of instructor.
600 Doctoral Research and Dissertation (3-15) P/NP only. E
610 Medical Biology Seminar (1) Invited speakers. Topics posted in advance. May be repeated. S/NC only. F,Sp
611 Advanced Topics in Medical Science (1-3) New developments in biological research applicable to clinical medicine. Primarily for doctoral candidates in Comparative and Experimental Medicine. Prereq: Consent of...
603 Correlative Post-Mortem Pathology (1-3) Gross and microscopic post-mortem examination of animals. Correlative interpretation of clinical diseases and lesions. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

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

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

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

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

608 Descriptive and Applied Epidemiology (2) Principles of epidemiology and historic and modern application to diseases of animals. Host-agent relationships, measurement of disease frequency, animal production and disease monitoring and control, field investigations, animal health economics. Prereq: Consent of instructor. F

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

610 Advanced Topics in Comparative and Experimental Medicine (1-3) Specialized in-depth experience in various disciplines. Current and future research methodology, recent advancements in instrumentation in analytical techniques for comparative medicine. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. E

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

652 Disorders of the Endocrine System (2) (Same as Veterinary Medicine 651) E

Computer Science

MAJOR DEGREES

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

Robert C. Ward, Head

Professors:

Dongarra, Jack, Ph.D. ......................... New Mexico

Langston, Michael A., Ph.D. ............... Texas A&M

Pierce, J., Ph.D. ............................... Georgia Tech

Sherman, Gordon R. (Emeritus), Ph.D. .... Purdue

Thomason, Michael G., Ph.D. ............... Duke

Ward, Robert C., Ph.D. ........................ Virginia

Associate Professors:

MacLennan, Bruce J., Ph.D. .................. Purdue

Vander Zanden, Bradley, Ph.D. ............... Cornell

Vose, Michael D., Ph.D. ........................ Texas

Assistant Professors:

Beck, Mich. , Ph.D. ........................... Cornell

Berry, Michael W., Ph.D. ........................ Illinois

Gregor, Jens, Ph.D. ................................ Aalborg (Denmark)

Jones, Mark T., Ph.D. ............................ Duke

Plank, James S., Ph.D. ........................ Princeton

Raghavan, Padma, Ph.D. ........................ Penn State

Straight, 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 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 should satisfy the same background requirements as for the master's program. See the departmental brochure for details.

Original research reported in a dissertation of high quality is emphasized. The minimum hour requirements are 24 hours of course 600 Doctoral Research and Dissertation and 24 hours of graduate courses beyond the equivalent of a master's degree (i.e., beyond 30 graduate credit hours) graded A-F. Computer Science 530, 550 and 580 are required for the degree. At least six hours of 600-level graded courses must be taken in computer science at UTK. The student's advisor and committee will establish the specific course requirements. The comprehensive examination consists of a departmental written examination and a subsequent oral examination conducted by the student's committee.

GRADUATE COURSES

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

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

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

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

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

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

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

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

521 Artificial Intelligence (3) Heuristic search, automatic theorem proving, symbolic methods, semantic information processing, representation theory. 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.


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


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


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) Techniques of computer image processing and understanding. Prereq: 551.

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

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

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

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

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

576 Sparse Matrix Computations (3) Solution of large sparse linear systems: graph models, reordering techniques, symbolic factorizations, data structures, numerical algorithms, complexity analyses, parallel algorithms. Prereq: 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. Maximum 9 hrs.

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 Recognition (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.
ADMISSION REQUIREMENTS

Admission requirements include up-to-date scores from the GRE, the unit admissions 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 sexual role and its relevance in educational and counseling settings. F, Su

431 Personality and Mental Health (3) Various perspectives of mental health with application to education and other social institutions. 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 facility and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. Maximum 15 hrs. S/NC or letter grade. E


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

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

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

525 Formal Measurement in Education and Counseling (3) Principles of test construction and item analysis. Survey of standardized tests of intelligence, achievement, aptitude, vocational interest, attitudes and personality. Prereq: 520 or equivalent. F, Su

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

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

551 Theory and Practice of Counseling (3) Philosophical bases of helping relationships; development of counselor and client self-awareness; counseling theory/techniques. F, Su

552 Career Development: Vocational Theory, Research and Practice (3) Relationship of vocational theory, career development research and societal factors to life career roles. F, 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: 550 or consent of instructor and Internet access account. E

554 Group Dynamics and Methods (3) Theory and types of groups, descriptions of group practices, 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. 431, 525, 551 and consent of instructor. May be repeated. Maximum 9 hrs. 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 2 hrs. S/NC only. F, Sp

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

561 Development and Operations of School Counseling Programs (3) Management of comprehensive school counseling programs to include needs assessment, program goals, resource identification, evaluations, and use of computer-based program management software. Prereq: 550, Sp-Su.

566 Approaches to Family Intervention and Counseling (3) (Same as Child and Family Studies 566.)

570 Cross-Cultural Counseling: Theory and Research (3) Theory and research on issues and problems in counseling of clients from different cultural backgrounds in U.S. and abroad. Sp

571 Individual Cognitive Assessment in Counseling (3) Basic concepts and applications in individual assessment of intelligence; proficiency in administrative scoring, interpretation for Wechsler, adults and children. Stanford-Binet. Prereq: 525 and 520 and admission to counseling program or consent of instructor. S/NC only. Sp, A

585 Seminar in Gerontology (1) (Same as Human Ecology 585, Exercise Science 585, Nursing 585, Public Health 585, Psychosocial Studies 585, Social Work 585, and Sociology 585.)

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

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

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

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

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

635 Ethical, Legal, and Professional Issues in Psychology (3) (Same as Psychology 635 and Psychosocial Counseling 635.) Sp

650 Seminar in Counselor Education (1) Professional issues related to role and function of counselor-educator. Prereq: Admission to doctoral program in counselor education. May be repeated. Maximum 2 hrs. S/NC only. F

655 Practicum in Counselor Education (3) Supervised practice and application of counseling skills with clients. Prereq: Admission to counselor education program and consent of instructor. May be repeated. Maximum 8 hrs. Sp

659 Internship in Counselor Education (1-6) Supervised employment in academic unit approved internship sites in counselor education. May be repeated. Maximum 12 hrs. S/NC only. E

661 Education Implications of Neuropsychology (3) Theory and 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: 625 and course in abnormal psychology, or consent of instructor. A

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

674 Practicum in Counseling Psychology (3) Supervised practice of individual counseling. Minimum 150 clock hrs required each semester. Prereq: Admission to counseling psychology doctoral program and consent of instructor. May be repeated. Maximum 6 hrs. E

678 Theory and Practice of Counseling Supervision (3) Theory and practice of supervision in counseling. Prereq: 655, or 674, or consent of instructor. S/NC only. Sp

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

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

DEGREES

Cultural Studies in Education

Majors

Education

M.S., Ph.D.

Human Performance and Sport Studies

M.S.

J. Paul, Leader

Professors:

Allison, C. B., Ph.D. ................................................................. Oklahoma

DeSensi, J. T., Ph.D. ................................................................. Ed.D. ................................................................. North Carolina (Greensboro)

Howard, Robert (Emeritus), Ph.D. .................................................. Ohio State

Malik, Anand, Ed.D. ................................................................. Purdue

Morgan, W. J., Ph.D. ................................................................. Columbia

Paul, Joan (Liason), Ed.D. ............................................................ Alabama

Phillips, Madge M. (Emeritus), Ph.D. ............................................. Illinois

Wilsniewski, Richard, Ed.D. .......................................................... Wayne State

Wirsing, C. A., Ph.D. ................................................................. Michigan

Assistant Professor:

Wright, Hael 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

Motor behavior/sport psychology

Sociocultural foundations of sport
American society--colonial to present.


507 History of Games. Modern Olympics, 1896 to date: political, social considerations.

Examination of various aspects of ancient and modern.

503 Problems in Lieu of Thesis (2-3) May be repeated. 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.

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

501 Special Project (3) Culminating experience for non-thesis major. Research study suitable for publication, or practicum requiring special written work. Prereq: 532.

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

503 Problems in Lieu of Thesis (2-3) May be repeated. Maximum 9 hrs. 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 AD. Panhellenic Games. Modern Olympics, 1896 to date: political, social class, gender, and economic issues that influence Games.


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

515 Social Theories of Sport (3) Liberal, democratic and Marxist social theories of sport. (Same as Sociology 594.)


539 Development of Education Thought (3) History and philosophic approach to lives and writing of influential educators: Plato, Quintilian, Comenius, Rousseau, Pestalozzi, Froebel, Dewey. Prereq: Graduate status and consent of instructor. Sp, 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.

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.

540 Foundations of Educational Policy (3) Relationship between theory, policy, and practice; educational policies that arise from philosophical and practical considerations relative to human nature, to educational purpose, 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.

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

543 Human Motor Development (3) Changes in selected motor performance and related attributes areas during critical developmental periods within context of perceptual-motor development theories and explanations of factors affecting motor behavior.

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

546 Topics in History of Education (3) May be repeated. E.

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

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

560 Introduction to Qualitative Research in Education (3) Fundamentals of qualitative research methods and development of skills needed for qualitative research proposals. Overview of qualitative research methods: ethnography, case study, historiography, biopraphy, oral and life history. Critical reading and evaluation of qualitative research studies. F, Su.

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

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

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

596 Topics in History of Education (3) Selected philosophical issues in education. Prereq: 2 courses in history or philosophy of education. May be repeated with consent of instructor. E.

604 Seminar in Curriculum and Instruction (1) Required 2 consecutive semesters. S/N only. E.

609 Seminar in Philosophy of Education (3) Selected philosophical issues in education. Prereq: Doctoral student in Education.

608 Seminar in Philosophy of Education (3) Selected philosophical issues in education. Prereq: Doctoral student in Education.


633 Advanced Motor Behavior (3) In-depth analysis, synthesis, and discussion of contemporary theory and research in motor control learning, sport psychology, motor development. May be repeated. Maximum 9 hrs.


652 Advanced Studies in Educational Anthropology and Sociology of Education (3) Ethnographic methods applied to formal and non-formal educational settings. Analysis of selected research in field. Prereq: 461, 2 courses in cultural anthropology, or consent of instructor. Sp.


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


Dr. Robert J. Schmidt, Head

The Department of Ecology and Evolutionary Biology offers the Master of Science and Doctor of Philosophy in Ecology and Evolutionary Biology (College of Arts and Sciences). The program is designed to provide students with a broad understanding of the principles and methodologies that underlie the study of ecological and evolutionary processes. Students are encouraged to develop a strong foundation in the core areas of ecology and evolutionary biology, and to pursue advanced coursework and research in a specific area of interest.

The Department offers both full-time and part-time options for students, allowing flexibility in program completion. The program requires a minimum of 36 hours of coursework, including core courses in ecology, evolution, population biology, and systematics.

For more information, please visit our website at http://www.ecology.rutgers.edu/ >> Ecology and Evolutionary Biology >> Degrees >> Ecology.
of Philosophy degrees with a major in Ecology or Zoology, concentrations in behavior, ecology, environmental toxicology, and evolutionary biology.

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 verbal, mathematical and analytical sections of the GRE of at least 1550. Submission of scores on appropriate (e.g., biology, mathematics) advanced GRE examinations are recommended but not required. Applicants are also expected to have an overall grade-point average of at least 3.0, and 2.7 or above for all science and mathematics courses, on a 4.0 scale (successful applicants will usually have grade-point averages exceeding these minimums).

Applicants should take the GRE and submit the results to both the Graduate School and the department. The departmental application requires 3 letters of reference from persons capable of assessing the applicant's suitability for graduate work in biology and a statement of professional goals and reasons for applying to this program. Applicants for the doctoral degree are expected to have made prior contact with potential research advisors in the department's graduate program and this approach is recommended for applicants for the Master's degree program as well. Inquiries should be directed to the Chair, Graduate Affairs Committee, Department of Ecology and Evolutionary Biology, The University of Tennessee, Knoxville, TN 37996-1610.

THE MASTER'S PROGRAMS

In addition to general requirements of the Graduate School, aspirants for the Master of Science degree are expected to: (1) during the first semester in residence, take a prescriptive diagnostic examination covering major concepts in ecology and evolutionary biology. The examination may be taken twice and must be passed before the student is admitted to candidacy; (2) complete course requirements as determined by the department and the student's faculty dissertation research committee; (3) pass a written and oral comprehensive examination designed to test for adequate knowledge in those areas essential to the student's research program; and (4) satisfactorily complete and defend a dissertation. The department does not require a reading knowledge of a foreign language, but this may be imposed by the student's faculty dissertation research committee. If so, the student has the option of demonstrating reading knowledge of the prescribed language by either (a) passing the official reading examination given by the language department or (b) earning a grade of at least a B in the second semester of a special language reading course for graduate students.

MINOR IN ENVIRONMENTAL POLICY

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

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 Ecology is available to residents of the states of Alabama or Texas. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

NOTE: The departmental graduate program is currently undergoing revision. During this transition, questions regarding the program should be addressed to your advisor or the department head.

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 departmental listing for topics offered. Prereq: As announced. May be repeated. Maximum 4 hrs. may apply toward departmental major.
431 Plant Ecology (3) Interactions between individuals, species, communities and their environments. Circulation of energy and matter in ecosystems. Weekly field trips or laboratory periods, and at least two weekend field trips. Prereq: Field Botany or equivalent. Su
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 phyla. Prereq: GeneralEcology or consent of instructor.

470 Aquatic Ecology (3) Introduction to the physicochemical nature of inland waters with description of biotocommunities and their interrelationships. Prereq: GeneralBotany and GeneralEcology. 2 hrs and 1 lab.
484 Conservation Biology (3) Application of principles and practices of ecological research to conservation of biological diversity at genetic, population, community, and ecosystem levels. Prereq: General Genetics and GeneralEcology.
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 term when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
503 Ecology and Evolutionary Biology Seminar (1) Advanced topics in ecology, behavior, and evolutionary biology. Senior departmental majors encouraged. Required of all first- and second-year graduate students. May be repeated. Maximum 4 hrs. S/NC only.
504 Special Topics (1-3) Selected directed readings or special course in topics of current interest. Consult departmental listing for offerings. May be repeated with consent of instructor. Maximum 9 hrs. S/NC only.
505 Basic Concepts in Organic Evolution (3) Processes and systems in organic evolution. Prereq: Admission to program in Ecology and Evolutionary Biology. Required of all first-year students. F
507 Basic Concepts in Ecology (3) Contemporary issues in ecology. Prereq: Admission to program in Ecology and Evolutionary Biology. Required of all first-year students. Sp
508 Introduction to Faculty Research (1) Orientation of new graduate students to current research of departmental faculty. Prereq: Admission to program in Ecology and Evolutionary Biology. Required of all first-year students. S/NC only.
509 Foundations: Readings in Ecology (1-2) Readings and discussion of classic papers in field
511 Foundations: Readings in Evolution (1-2) Readings and discussion of classic papers in field.
513 Foundations: Readings in Behavior (1-2) Readings and discussion of classic papers in field.
515 Foundations: Readings in Environmental Toxicology (1-2) Readings and discussion of classic papers in field.
516 Colloquium in Ethology (1) (Same as Psychology 516.)
520 Ecology for Planners and Engineers (3) Ecological principles and effects that human-caused changes may have on living organisms. Lectures and field trips. Appropriate for students in Planning and Environmental Engineering. Not intended for graduate students in Ecology and Evolutionary Biology.
524 Physiological Ecology of Animals (3) Adaptive physiological responses of animals to natural changes in their environment and behavior. Terrestrial vertebrates. Prereq: Undergraduate courses in animal physiology and ecology, Biochemistry and Cellular and Molecular Biology 440 and GeneralEcology or equivalent.
535 Ecology and Development in the Amazon (3) Natural history, ecosystem diversity and function, and opportunities for sustainable economic development in the Amazon Basin. Includes field trip of 7-10 days to Manaus, 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.
Economics

(College of Business Administration)

MAJORS

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

Business Administration ............... MBA

William F. Fox, Head

Professors:

Bohm, Robert A. (Liaison), Ph.D. .... Washington (St. Louis)
Bowlby, Roger L. (Emeritus), Ph.D. .... Texas
Carroll, Sidney L., Ph.D. ............... Harvard
Chang, Hui S., Ph.D. ................. Vanderbilt
Clark, Don P., Ph.D. ................... Michigan State
Cole, William E. (Emeritus), Ph.D. .... Texas
Davidson, Paul (J. Fred Holly Chair of Excellence), Ph.D. ...... Pennsylvania
Fox, William F., Ph.D. .............. Ohio State
Garrison, Charles B., Ph.D. .......... Kentucky
Hersch, Henry W., Ph.D. ........... Maryland
Jensen, Hans E. (Emeritus), Ph.D. .... Texas
Lee, Feng-Yao, Ph.D. ............... Michigan State
Mayhew, Anne, Ph.D. .............. Texas
Mayo, John W., Ph.D. .............. Washington (St. Louis)
Moore, John R. (Distinguished Prof.) (Emeritus), Ph.D. ........... Cornell

Neale, Walter C. (Emeritus), Ph.D. .... London
Russell, Milton, Ph.D. .............. Oklahoma
Schollman, Alan M., Ph.D. .......... Washington (St. Louis)
Spiva, George A. (Emeritus), Ph.D. .... Texas

Associate Professors:

Gauger, Jean A., Ph.D. ............... Iowa State
Glisstoff, Errol, Ph.D. .............. Stanford
Kahn, James R., Ph.D. .............. Maryland
Murray, M. N., Ph.D. ................ Syracuse

Assistant Professors:

Bearse, Peter M., Ph.D. ............ Virginia
Farmer, Amy L., Ph.D. .............. Duke
Rubin, Jonathan D., Ph.D. .......... California (Davis)
Stango, Victor O., Ph.D. .......... California (Davis)
Stanley, Denise L., Ph.D. .......... Wisconsin

The Department of Economics offers graduate programs leading to the M.A. and Ph.D. The M.A. may be completed by either a thesis or non-thesis option, while the Ph.D. requires successful completion of a dissertation. Applicants to these programs should contact the Director of Graduate Studies, Department of Economics, for further information. The Department also offers an area of concentration for the MBA degree. Students interested in the MBA program should contact the Director of Graduate Business Programs, College of Business Administration.

ACADEMIC STANDARDS

A graduate student whose grade-point average falls below 3.0 will be placed on probation. A student on probation will be dropped from the program unless his/her cumulative 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 established by the degree program for full-time students and the next two semester’s coursework as established by the degree program for part-time students.

STUDENT’S RIGHT TO PETITION

Graduate students in good academic standing have the right to petition the department for modification of departmental degree requirements and redress of grievances. Petitions must be in writing and addressed to the Director of Graduate Studies.

THE MASTER’S PROGRAM

Admission to the M.A. program is based on undergraduate academic performance and on scores from the general portion of the GRE. The student may choose either the thesis or non-thesis option.

The non-thesis option requires 30 hours of coursework at the 400 level or above. Of these, at least 24 hours (at least 18 hours of which are in economics) must be at the 500 level or above. Of the minimum of 18 hours in economics at the 500 level or above, 12 hours must consist of 511, 512, and 513, 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 score achieved on the general portion of the GRE, and by recommendations. The program requires a minimum of 48 hours of coursework beyond the bachelor’s degree or 24 hours beyond the master’s degree, at least 24 hours of 600 Doctoral Research and Dissertation, and successful completion of the following:

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

   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.

2. 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.

3. Students are required to complete with a grade of B or better two elective courses in economics at the 500 level or above, outside the core subject areas and outside the fields of specialization.

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 Science 414 or Geography 453 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 fluctuation, theoretical explanations of cycles, and rate of monetary and fiscal policies. Benefits and costs of 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 consumption, external effects, public investment, social decision making. Major writing requirement. Prereq: 201.

472 Public Finance: Taxation and Intergovernmental Relations (3) Analysis of individual taxes and of tax systems, non-tax sources of revenue, fiscal federalism. Major writing requirement. Prereq: 201.

482 Introduction to Mathematical Economics (3) Application of basic mathematical tools: calculus, matrix algebra, etc. to major topics of economic theory. Prereq: Intermediate Microeconomics with B or better and Calculus.

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

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

511-12 Microeconomic Theory (3,3) Theory of consumer choice and demand, theory of revealed preference, attributes of goods and implicit prices, market demand, labor supply, individual behavior under certainty, 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 national expectations paradigms.


525 Economic History of Europe (3) Nature and functioning of economic systems and policies in history of Western civilization, major issues of method and interpretation. Prereq: Graduate standing in economics or consent of instructor.

526 Economic History of the U.S. (3) Interpretation of American economic structure and policies from colonial times. Prereq: Graduate standing in economics or consent of instructor.

537 Managing in a Regulated Economy (3) Economic effects of antitrust and public utility, international and environmental regulation on business. Development of decision-making skills in areas of governmental-business relations.

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


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

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

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


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

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


642 Labor History and Legislation (3) Development of organized labor as an important economic and political force in U.S., from Colonial times to present. Evolution of legal status of labor unions and of individual workers via their employers.

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

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

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

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


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

677 Environmental and Natural Resource Economics (3) Alternative paradigms for allocating and valuing environmental resources. Exploration of issues related to market failure and differences between renewable and nonrenewable resources.
Education

(College of Education)

MAJORS DEGREES

College Student Personnel M.S.
Counseling M.S.
Education M.S., Ed.S., Ed.D., Ph.D.
Educational Psychology M.S.
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 (LCHE)
Leadership Studies in Education (LSE)
Psychoeducational Studies (PES)
Rehabilitation, Deafness, and Human Services (RDHS)
Sport and Physical Activity (SPA)

The College also offers initial teacher licensure programs at the graduate level. The program features a professional year internship with accompanying coursework which may lead to a master's degree 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 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 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) are available in:
  - Art education (LCHE)
  - Curriculum (ESMRT)
  - Early childhood special education (IECE)
  - Education of the deaf and hard of hearing (RDHS)
  - Elementary education (HTL and IECE)
  - English education (LCHE)
  - Foreign language/ESL education (LCHE)
  - Instructional media and technology (ESMRT)
  - Mathematics education (ESMRT)
  - Modified and comprehensive special education (HTL)
  - Reading education (HTL)
  - Science education (ESMRT)
  - Social foundations (CSE)
  - Social science education (HTL)

The non-thesis option requires completion of 30 hours, including 6 hours of Thesis 500 for the thesis option, or 33 hours for the non-thesis option.

Leadership Studies in Education

The master's degree program with a major in Leadership Studies in Education offers a concentration in educational administration and supervision (LSE), requiring a minimum of 30 hours, including 6 hours of Thesis 500 for the thesis option, or 33 hours for the non-thesis option.

The concentration in educational administration and supervision consists of a minimum of 18 hours of coursework in Educational Administration and Supervision. A final oral examination is required for the thesis option, with a written exam at the option of the committee. A final written comprehensive examination is required for the non-thesis option, with an oral exam at the option of the committee. Students entering either of these options must complete the introductory core consisting of Educational Administration and Supervision 513, 515, 516, and 535 or a demonstrated computer proficiency. These courses are prerequisites to other courses in the unit.

THE SPECIALIST IN EDUCATION PROGRAM

The Educational Specialist degree program with a major in Education encompasses concentrations (with abbreviated unit designations) in:

- Curriculum (ESMRT)
- Educational administration & supervision (LSE)
Elementary education (HTL)
English education (LCHE)
French language/ESL education (LCHE)
Instructional media and technology (ESMRT)
Mathematics education (ESMRT)
Reading education (HTL)
School counseling (CECP)
School psychology (PES)
Science education (ESMRT)
Social science education (HTL)
Teaching and learning (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 practicum and internship experiences. The school psychology concentration requires the completion of a minimum of 66 semester hours beyond the baccalaureate. Refer to Degree Requirements under The Graduate School for complete program requirements.

THE DOCTOR OF EDUCATION PROGRAM

The Ed.D. program with a major in Education provides seventeen concentrations. The units participating in the Ph.D. program are Counselor Education and Counseling Psychology; Cultural Studies in Education; Education in the Sciences, Mathematics, Research, and Technology; Exercise Science; Holistic Teaching/Learning; Inclusive Early Childhood Education; Language, Communication, and Humanities Education; Leadership Studies in Education; Psychoeducational Studies; and Rehabilitation, Deafness, and Human Services. The program requirements are:

Requirements

<table>
<thead>
<tr>
<th>Research Area</th>
<th>Minimum Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign or Computer Language (demonstrate proficiency)</td>
<td>6</td>
</tr>
<tr>
<td>General Core Requirements</td>
<td></td>
</tr>
<tr>
<td>Option A</td>
<td></td>
</tr>
<tr>
<td>History and philosophy of education, (both areas must be represented)</td>
<td>4</td>
</tr>
<tr>
<td>Learning theory and curriculum (both areas must be represented)</td>
<td>4</td>
</tr>
<tr>
<td>Administrative/Leadership theory</td>
<td>2</td>
</tr>
<tr>
<td>Trans-college seminar: two consecutive semesters</td>
<td>2</td>
</tr>
<tr>
<td>Option B</td>
<td></td>
</tr>
<tr>
<td>Philosophy of education</td>
<td>3</td>
</tr>
<tr>
<td>History of education</td>
<td>3</td>
</tr>
<tr>
<td>Administrative theory</td>
<td>3</td>
</tr>
<tr>
<td>Learning theory</td>
<td>3</td>
</tr>
<tr>
<td>Curriculum theory</td>
<td>3</td>
</tr>
<tr>
<td>Trans-college seminar: two consecutive semesters</td>
<td>2</td>
</tr>
<tr>
<td>Option C</td>
<td></td>
</tr>
<tr>
<td>Philosophy of science</td>
<td>3</td>
</tr>
<tr>
<td>Trans-college seminar: two consecutive semesters</td>
<td>2</td>
</tr>
<tr>
<td>Seminar(s) in primary concentration</td>
<td>3</td>
</tr>
<tr>
<td>Learning theory/group dynamics or independent study in this area</td>
<td>3</td>
</tr>
<tr>
<td>Concentrations</td>
<td></td>
</tr>
<tr>
<td>Primary Concentration: A minimum of 15 hours normally selected from one or two</td>
<td></td>
</tr>
<tr>
<td>specializations within the primary concentration</td>
<td>15</td>
</tr>
<tr>
<td>Supporting Concentration: A minimum of 9 hours selected from a concentration</td>
<td></td>
</tr>
<tr>
<td>other than the primary concentration</td>
<td>9</td>
</tr>
<tr>
<td>Cognitive</td>
<td></td>
</tr>
<tr>
<td>A minimum of 6 hours selected from outside the college in addition to the</td>
<td></td>
</tr>
<tr>
<td>designated research courses</td>
<td>6</td>
</tr>
<tr>
<td>Dissertation</td>
<td>24</td>
</tr>
</tbody>
</table>

The concentrations are:

- Adult education
- Counseling psychology (counseling psychology; counselor education)
- Cultural studies in education (cultural studies; sport history; sport philosophy; sport sociology)
- Early childhood education
- Educational psychology (individual and collaborative learning)
- Elementary education
- English, foreign language, ESL education
- Exercise science
- Instructional technology/curriculum
- Leadership for teaching and learning
- Leadership studies (educational administration and supervision; higher education)
- Literacy studies (reading/language arts)
- Mathematics, science, and social science education
- Motor behavior/sport psychology
- Rehabilitation and special education
- Research/assessment/evaluation
- School psychology
- Social foundations in education
- For the Ph.D. with a major in Education under Counselor 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 Counselor Education and Counseling Psychology, the following minimum number of hours is required, according to which field the student chooses: counseling psychology, 98; counselor education, 86. Residence is three consecutive semesters of full-time coursework.
- The program requires coursework in both a supporting concentration and a cognate area, as well as either foreign language or computer proficiency.
- Coursework in statistics and research design is required in all specializations.
- Pre-dissertation research participation is also a requirement. The 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.
- The concentration in educational psychology also requires supervised practicum experience in classroom teaching.
- Under Psychoeducational Studies, the following minimum number of hours is required in each program: educational psychology, 92; school psychology, 97.
- 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:

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>573 Internship</td>
<td>4 hrs</td>
</tr>
<tr>
<td>574 Specialty Studies</td>
<td>6 hrs</td>
</tr>
<tr>
<td>574 Analysis of Teaching for</td>
<td>2 hrs</td>
</tr>
<tr>
<td>Professional Development</td>
<td></td>
</tr>
</tbody>
</table>
Education in the Sciences, Mathematics, Research, and Technology

588 Teacher-Parent-Community Relations (3) Techniques for effective relations between parents and teachers; examination of roles and expectations; parental involvement; volunteer programs; influence of community on educational process. Prereq: Consent of instructor. Sp, Su

574 Analysis of Teaching for Professional Development (2) Strategies to document and analyze the impact of teaching-related experiences in professional settings. May be repeated. Maximum 12 hrs. S/N only. F, Sp

575 Professional Internship in Teaching (1-8) Intensive teaching and teaching-related experiences in professional settings in public schools. Enrollment limited to postbaccalaureate students in professional year program. Prereq: Admission to Teacher Education program. May be repeated. Maximum 12 hrs. S/N only. F, Sp

576 Practicum in Classroom Teaching (1-8) Teaching and teaching-related experiences in elementary and secondary school settings. Specific hours and school level assignment determined by instructor. May not be used toward degree requirements. May be repeated. Maximum 12 hrs. S/N only. E

589 Field Experience (3-1) Application of current and instructional principles, methods, and materials in schools. Prereq: Program prerequisites and consent of instructor. May be repeated. Maximum 9 hrs. S/N only. E

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

601 Trans-College Seminar (1) Introduction to Ph.D. program in Education; research requirements; meaning of scholarship in graduate and issues/problems in education. Minimum of two consecutive semesters preceded or followed by summer term required of all Ph.D. students. Prereq: Admission to Ph.D. program or consent of Ph.D. program coordinator. May be repeated. Maximum 3 hrs. May not be used to meet 600 requirement. S/N only.

618 Interpretation and Application Curriculum and Instruction Research (3) Analysis of research in curriculum and instruction, new methodologies and strategies. Utilization of research to improve curriculum and instruction practices, application of research principles in context of specific professional assignments. Prereq: Consent of instructor. Sp

635 Teacher Education in America (3) For students preparing to enter teacher education. Brief historical development, program analysis and evaluation, current issues, and future directions. F

Mintyre, Lonnie D., Ed.D .................................. Indiana
Myer, M. E. (Liaisoon), Ph.D. ..................... Florida
Ray, John R., Ed.D. ...................................... Tennessee
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 State

Assistant Professor:
Robinson, Stephanie O., Ph.D. ................. Florida State

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-curriculum
Track 2-instructional media and technology
Track 1-mathematics education
Track 1-science education
Track 2-secondary teaching

Educational Specialist
Education
Curriculum
Instructional media and technology
Mathematics education
Science education

Doctor of Education
Education
Curriculum
Educational research
Instructional media and technology
Mathematics education
Science education

Doctor of Philosophy
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.

The unit is composed of four areas: science and mathematics education, educational research and statistics, instructional media and technology, and curriculum studies. The mission of all areas focuses on the preparation of teachers and instructors in curriculum and integrative mathematics and sciences and in the preparation of various other professionals who desire to utilize educational research and instructional technology.

GRADUATE COURSES

475 Utilization of Instructional Media (3) Basic concepts of communication and instructional development for improving instruction through 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 registered during any semester when student uses University facilities and does not register before degree is completed. May not be used

517 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/N only. E

522 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

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

530 Topics in Improvement of Instruction (1-3) Special conferences, workshops, and inservice programs. May be repeated. Maximum 6 hrs. S/N only. E

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

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Myer, M. E. (Liaisoon), Ph.D. ..................... Florida
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Educational Specialist
Education
Curriculum
Instructional media and technology
Mathematics education
Science education

Doctor of Education
Education
Curriculum
Educational research
Instructional media and technology
Mathematics education
Science education

Doctor of Philosophy
Education
Instructional technology/curriculum
Mathematics/science/social science education
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541 Direction and Supervision of Student Teaching (3) Roles and responsibilities of cooperating teachers and student teacher; objectives and policies of student teaching program; elements of clinical supervision; overview of research. F, Su
Admission Requirements

Two or three years of study in the evening.

Science with a major in Electrical Engineering

The Master's Program

Jointly offers a master's degree program in the department, and the Department of Nuclear Engineering.

The graduate assistantships are available at each location. Further information about this program is available from the department.

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 the degree may be obtained in two or three years of study in the evening.

Admission Requirements

Students applying for admission to the Master of Science program and who hold a B.S. or B.A. in a field other than electrical engineering are also expected to have a minimum cumulative grade-point average of 3.00 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 GPA 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

Specific degree requirements which must be met include:

1. Electrical Engineering 503 and 504.
2. Six semester hours of graduate credit in mathematics consisting of mathematics courses of 400 level or higher which have been approved by the E.E. Graduate Committee.
3. An additional 12 semester hours of 500-level work in electrical engineering courses or 6 semester hours of 500-level work in one area of electrical engineering courses and 6 semester hours of 500-level work in another area approved by the student's committee.
4. The 500-level work in electrical engineering courses must include at least 6 hours in the student's major areas.
5. The thesis, totaling 6 semester hours.
6. A final oral examination covering the thesis and related coursework.

The Doctoral Program

The Ph.D. with a major in Electrical Engineering may be pursued in the concentration areas of circuit theory, computers, electromagnetics, communication theory, electromagnetic theory, plasma engineering, power systems, solid-state 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.
3. A minimum of 24 semester hours of work in electrical engineering courses at the 500 and 600 levels.
4. A minimum of 24 semester hours of 600-level coursework. At least 3 semester hours of this course must be in an area other than the student's major area.
5. A minimum of 12 hours of mathematics courses approved by the Electrical Engineering Graduate Committee. All 12 hours must be at 500-level or above, and at least 6 hours must be at 500-level or above.
6. Three foreign languages required if the student's language facility committee feels that a reading knowledge of a foreign language is crucial to the student's research efforts.

Satisfactory performance on both the qualifying and comprehensive examinations. The qualifying examination is prepared by the Electrical Engineering Faculty and consists of a 3-hour written examination in each of four areas. Areas (1) mathematics and transform methods, and (2) basic electrical network analysis, are required of all Ph.D. candidates. Areas (3) and (4) are usually chosen from two of the graduate course divisions in the department and cover material from undergraduate courses and first year graduate courses. A student who fails the qualifying examination must take and pass the examination the next time it is offered to remain in the Ph.D. program. The qualifying examination is normally taken after the completion of 24 hours of graduate coursework or immediately after completion of a master's degree. A student must complete at least 18 hours of graduate coursework before taking the qualifying examination the first time.

A comprehensive examination is required by the Graduate School in this department. The comprehensive exam is administered by the student's committee; the exam results are reported to the graduate committee for approval; and the exam is filed in the department. The comprehensive exam is given when the student is ready to apply for admission to candidacy.

The exam consists of both written and oral parts, written part as follows: 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 student must demonstrate the mastery of the dissertation area, ability to think analytically and creatively, skill in using academic resources, and ability to complete the dissertation satisfactorily.

The oral part consists primarily of a professional presentation of a proposal for dissertation work and its defense. The committee may cover additional topics in the oral part.

5. Participation in departmental seminars.

Many 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 programs are also available at the Institute of Technology, Tullahoma.

Departmental actions regarding a graduate student may be appealed in writing, first to the Department Graduate Committee and then to the Graduate School.

Graduate Courses

Note: Courses required in the Electrical Engineering undergraduate curriculum cannot be used in either the M.S. or Ph.D. programs. No 400-level course may be used toward a graduate degree in Electrical Engineering except when required by the program.

400 Senior Design (6) Major design project focusing attention on professional practice, accumulated background of curricular components, and recent developments in this field. Prereq: Completion of required junior EE courses.

411 Digital Signal Processing and Filter Design (3) Discrete-time signals and systems, sampling, discrete Fourier transforms, analog filter characteristics, non-recourse and recursive filter design, and CAD tools for filter design, experiments and projects. Prereq: Frequency-Domain Analysis of Signals and Noise, Linear Systems Analysis, Systems and Power Lab.


423 Electric Machines (3) Principles of electromechanical energy conversion. Machine windings; design of concentrated and distributed windings, effect on magnetic parameters. Steady and unbalanced faults; magnetic circuits; design of magnetic circuits; performance; design procedures. Prereq: Linear Systems Analysis, Electric Energy System Components.

432 Electronic Amplifiers (4) Feedback amplifier principles: wideband amplifier design; low-noise preamplifier design; audio power amplifier design; linear regulated power supply design and switching regulator principles. Implementation of radio frequency amplifier design: oscillator principles, laboratory experiments and design projects. Prerequisite: 431.

441 Digital Communication (3) Discrete Fourier transform, binary and M-ary signaling, digital communication in presence of noise, matched filtering and equalization, introduction to information theory. Prerequisite: Analog Communication Amplitude and Frequency Modulation.

442 Communication System Design (4) Application of communication theory to system design. Development of communication systems, System simulation utilizing a graphical programming language, hardware and software design and simulation. Construction and performance evaluation of a complete analog or digital transmitter and receiver or significant subsystems. Prerequisite: 441.

443 Antennas and Propagation (3) Linear antennas, arrays, other simple antennas. Antenna gain, impedances, communication link parameters. Wave propagation in earth bound free space, earth's troposphere and ionosphere. Reflections from earth, effects on link reliability. Prerequisite:Transient Analysis, Fields, Analog Communication Amplitude and Frequency Modulation.

444 Microwave Circuits and Electronics (3) Scattered wave description of circuits: isolators and amplifiers, couplers and power dividers, circulators, phase shifters. Loading and interconnection of systems. Power generation and amplification and transmission of solid state (hole and electron) junctions. Microwave switching, filtering and multiplexing devices. Transmission line and waveguide components. Projects. Prerequisites: Senior standing.

445 Electro-Acoustics (3) Wave equation for sound, radiation from pistons, impedance of piston. Loudspeakers, horns, speaker systems, phonograph recording and reproduction, tape recording and reproduction, noise reducing systems, digital recording. Prerequisites: Senior standing.

512 Multivariable Linear Control System Design (3) Analysis and design of continuous and discrete time control systems, feedback theory, stability, steady-state performance, compensation, engineering aspects of control systems. Prerequisites: 511-2 or 518-9.

518 Control Systems Design (3) Analysis and design of continuous and discrete time control systems, feedback theory, stability, steady-state performance, compensation, engineering aspects of control systems. Prerequisites: 511-2 or 518-9.


545 Introductory Microwave Networks and Components (3) Synthesizer and transmission system design for multiphase: unilateral and bilateral microwave and millimeter wave devices. Component and system parameter measurements by modern circuit analyzers. Electronic oscillators and amplifiers, frequency synthesizers, detection and tracking of time courses, parametric devices, mixers, switches.


555 Digital System Design II (3) State identification and state determination for sequential logic circuits. Digital system architecture design: microprogramming and interrupt control. Prerequisite: 551.

561 Plasma Diagnostics (3) Principles of active, passive, perturbing and nonperturbing diagnostic methods used in low temperature plasmas, and high-temperature plasmas.
562 Plasma Diagnostics I (3) Laboratory instruction in operation of plasma diagnostic instruments in plasma science laboratories. Prereq: Consent of instructor.

565 Industrial Plasma Engineering I (3) Low temperature plasma relevant to industrial applications: kinetic theory, particle dynamics in electric fields, gaseous discharges, and plasma sources. Prereq: Graduate standing or consent of instructor.

566 Industrial Plasma Engineering II (3) Continuation of 565 in industrial applications: ion implantation in solids, plasma deposition and etching, space propulsion systems, plasma chemistry, plasma lighting devices, insulating dielectric materials, mass analysis 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.


573 Vision and Sensing for Robotics and Automation I (3) Acquisition, processing, integration, and interpretation of a wide range of vision and non-vision sensing modalities as applied to autonomous and teleoperated robotic systems. Prereq: Consent of instructor.

574 Vision and Sensing for Robotics and Automation II (3) Aspects of robot programming and motion using various sensing techniques. Select topics from current literature. Prereq: Consent of instructor.


598 Graduate Seminar (1) Topics of interest discussed in weekly seminar. May be repeated. Maximum 6 hrs. S/C or letter grade.

599 Special Topics (1-3) May be repeated. Maximum 9 hrs.

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

614 Optimal Control (3) Deterministic and stochastic dynamic programming in continuous and discrete time, minimum principle and minimum principle, computational methods in optimal control. Prereq: 611.

617 Special Topics in Systems Theory I (3) Topics of current interest to students and faculty: large scale systems, model order reduction, algebraic and geometric system theories, and advanced design methods. Prereq: 503 and consent of instructor.

618 Special Topics in Systems Theory II (3) Topics of current interest to students and faculty: large scale systems, model order reduction, algebraic and geometric system theories, and advanced design methods. Prereq: 617.

623 Advanced Power Electronics and Drives (3) Phase-controlled, cycloconverters, cycloconverter-fed ac drives, resonant converters, vector and scalar control of synchronous machines, static Kramper drives, static Schenur drives, VSCG generation, modern control theory in ac drives.

624 Electrical Insulation (3) Principles, testing, and case studies. Basic principles of aging, losses, charging, conduction, and breakdown in vacuum, gas, liquid, solid, and composite insulation systems. Testing with low-noise instrumentation, pulse height analysis, optics, acoustics, and bridges; associated statistics and distributed parameter effects. Case studies drawn from active research, power systems, electronic circuits and devices, shielding, and stress grading. Prereq: 503, 504, and consent of instructor.

631 Advanced Topics in Electronic Instrumentation I (3) Based on particular interests of students. Fundamental physical processes in instrumentation transducers: thermoelectric, magneto-electric, 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 schemes: deterministic, stochastic, and hierarchical methods. Prereq: 543.

651 Computer-Aided Design of VLSI Systems I (3) Fabrication of microelectronic devices; computer architecture design; algorithmic state machines; partitioning; structured design methodology. Prereq: 551-2 or consent of instructor.

652 Computer-Aided Design of VLSI Systems II (3) Computer-aided design tools; design and implementation of custom very large scale integrated (VLSI) circuits; design for testability; testing of fabricated chips. Prereq: 651.

663 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, 561-2, or 563-4, 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, multimodal sensor systems. Prereq: 572 or 573 or consent of instructor.

672 Image Processing and Robotics II (3) Stereovision, shape theory. Prereq: 671.

673 Image Processing and Robotics III (3) Time-varying imagery, path planning and navigation. Prereq: 672.

691 Advanced Graduate Seminar (1) Research in department. May be repeated. S/C 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.

694 Special Topics (1-3) Advanced topics of current interest to Ph.D. students in Mechanical and Aerospace Engineering. May be repeated. Maximum 9 hrs.

Engineering Science
See Mechanical and Aerospace Engineering and Engineering Science
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 coursework received 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.

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 400-level. Two 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 a 3.0 GPA.

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.

Final Examination: The comprehensive 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 course work required. A student must also have met all requirements for foreign languages before beginning the first part of the examination.

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. This comprehensive examination is given twice a year, normally at the same time as the M.A. annual meeting.

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 1589 and 1601. Reading and discussion of selected plays from romantic comedies, including Twelfth Night; English histories, including Henry IV, and early tragedy, including Hamlet.

405 Shakespeare II: Later Plays (3) Shakespeare's dramatic achievement between 1601 and 1613. Reading and discussion of selected plays from tragic comedies, including Othello; problem plays, including Measure for Measure; and dramatic romances, including The Tempest.
Entomology and Plant Pathology

MAJOR
Entomology and Plant Pathology

DEGREE
M.S.

Carroll J. Southards, Head

Professors:

Bernard, Ernest C., Ph.D. .................................. Georgia
Gerhardt, Reid R. (Liaison), Ph.D. .................. NC State
Hilty, James W. (Emeritus), Ph.D. .......... Ohio State
Johnson, Leander F. (Emeritus), Ph.D. ............. Louisiana State
Lambdin, Paris L., Ph.D. ................................. Clemson
Wright, Charles D., Ph.D. ............................... NC State

Associate Professors:

Grant, Jerome F., Ph.D. ................................. Clemson
Vinson, Kimberly D., Ph.D. ............................... NC State
Wright, Mark T., Ph.D. ................................. NC State

Assistant Professor:

Owlnay, 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, insect pest management, or biological control. Students in plant pathology may specialize in foliar and stem fungus diseases, soilborne pathogens, disease physiology, biocontrol, plant nematology, or virology. For specific information, contact the department head.

THE MASTER'S PROGRAM

Admission Requirements

For admission to the M.S. degree program, a student must meet all requirements of The University of Tennessee Graduate School and must have completed: (1) general botany or biology, 6 hours; (2) advanced biological sciences, 8 hours; (3) general inorganic chemistry, 6-8 hours; (4) organic chemistry, 3 hours. In addition, three completed rating forms and a written statement of career goals and interest in entomology or plant pathology are required.

Degree Requirements

The program requires a written thesis based on original research and the completion of a minimum of 24 hours of coursework for graduate credit, approved by the student's advisory committee. Included in the course requirements are two acceptable seminar presentations for 1 hour each. An oral final exam must be passed to the satisfaction of the advisory committee before the thesis has been completed. A minor is not required but may be selected at the option of the student. The minor will include at least 6 hours and not more than 10 hours of graduate-level credit in the minor department. The student's committee shall include a member of the faculty from the minor department to assist in designating courses required for the minor.

GRADUATE COURSES

410 Diseases and Insects of Ornamental Plants (2) Symptoms, identification and management of diseases and insect pests that affect plants in greenhouse, nursery, and landscape environments. Prereq: Plant Pathology or Economic Entomology or consent of instructor. 3 hrs. F, 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 the 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 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, cultural, and chemical control. Prereq: Plant Pathology or consent of instructor. 2 hrs and 1 lab. F

514 Bacterial Plant Diseases (4) Morphology, taxonomy, ecology, physiology, and genetics of bacterial plant pathogens; infection and disease development; pathogenesis and resistance; 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. F

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

520 Plant Parasitic Nematodes (4) Morphology, physiology, taxonomy, ecology, and management of plant parasitic nematodes; host-parasite relationships. Prereq: 6 hrs biological science or consent of instructor. 2 hrs and 2 labs. F

521 Plant Virology (3) Symptomatology, epidemiology, and management of virus infection; structure, morphology, replication, transmission, purification, characterization, and classification of plant viruses; sorrel; plant pathogenic viroids, mycoplasmas and virophages. Prereq: 313 or consent of instructor. 3 hrs and 1 lab. F

523 Field Crop and Vegetable Insects (3) 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

560-61 Readings in Twentieth-Century Literature (3,3) Content varies: genre, theme, literary movement, or other coherent emphasis.

576 Introduction to Contemporary Criticism (3) Introductory survey of twentieth-century literary criticism from New Criticism to present.

580 Fiction Writing (3) Advanced fiction projects under supervision of instructor and time for independent study. Prereq: Extensive background in reading and writing fiction. May be repeated. Maximum 6 hrs.

581 Colloquium in Poetry Writing (3) Major poetic project or compilation of projects begun in 463. Individual consultation with instructor supplements 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 Literature (3) Topics vary: genres, modes, and other literary subjects not in standard period divisions.

585 Issues in Invention, Style, and Audience (3) Theoretical perspectives in contemporary research in rhetoric and composition.

586 History of Rhetoric I (3) Survey of rhetoric from Sophists to Rameus.

587 History of Rhetoric II (3) Survey of rhetoric from Bacon to present.

588 Readings in Applied Rhetoric (3) Content varies: Writing across curriculum, writing centers, technical communication, text linguistics.

590 Topics in Critical Theory (3) Topics vary.

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

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

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

594 Film History, Rhetoric, and Analysis (3) Film as narrative art form: historical development of film; the "rhetoric" of film; critical approaches to film study: genre, auteur, formalist, and historical; critical analysis of individual films.

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 Literature (3) Seminar in literary and literary genres of Medieval English literature, read in Old and Middle English. Subject matter varies from year to year.

621 Studies in Chaucer (3) Seminar in text, interpretation, and criticism of Chaucer's writings. Prereq: Previous course in Chaucer.

630-31 Studies in Renaissance Literature (3,3) Seminar: Sponser, Milton, seventeenth-century prose and poetry; Shakespeare, sixteenth-century prose and poetry, non-Shakespearean drama.

640-41 Studies in Restoration and Eighteenth-Century Literature (3,3) Topics vary: Swift, satire, restoration literature, Johnson and Boswell, Addison and Steele, restoration drama, Dryden.

650 Studies in English Romanticism (3) Seminar content varies: particular literary figures or figures, genres, theme, or other coherent focus.

651-52 Studies in Victorian Literature (3,3) Seminar content varies: particular literary figures or figures, genre, theme, or other coherent focus.

660-61-62 Studies in American Literature (3,3,3) Southern literature before 1830, frontier, regionalism, woman's literature, Irving, Cooper, Poe, Emerson, Thoreau, Hawthorne, Melville, Whitman, Dickinson, James, and Twain.
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:
Capen, 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. ................. Iowa
Namey, T. C., M.D. ......... Washington (St. Louis)
Rockett, Ian R. H., Ph.D. .......... Brown
Walch, Hugh (Emeritus), Ph.D. .... Florida

Associate Professor:
Bassett, David R., Jr., Ph.D. ............ Wisconsin

Assistant Professors:
Thompson, Dixie, Ph.D. ............... Virginia
Zhang, Songning, Ph.D. ................ Oregon

The Exercise Science unit participates in graduate programs leading to degrees, majors, and concentrations:

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.

Exercise Science

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 entomology course. May be repeated. Maximum 6 hrs. F,Sp

541 Seminar (1) Review of literature and current research in entomology and plant pathology. May be repeated. Maximum 2 hrs. E

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

501 Special Project (3) Culminating experience for non-theis major. Research study suitable for publication, or practicum requiring special written work. S/NC or letter grade.

502 Registration for Use of Facilities (3-15) Required practicum requiring special written work. S/NC or letter grade.


504 Research in Exercise Science (3) Research for writing of thesis and/or dissertation. Prereq: 502 or consent of instructor. S/NC or letter grade. May be repeated. Maximum 6 hrs.

505 Graduate Seminar in Public Health (1) (Same as Public Health 505.) F

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


508 Physical Activity and Positive Health (3) Review of physical activity and health, for fitness and sport. Prereq: Consent of instructor. S/NC or letter grade.


511 Laboratory Techniques in Exercise Physiology (3) Laboratory course in experimental methodology and instrumentation: respiratory and metabolic measurements, blood chemistry, and gas analysis. Prereq: 480.

512 Advanced Laboratory Techniques in Exercise Physiology (3) Quantitative apparatus and equipment for current and clinical questions in exercise physiology. Prereq: 480 and 567.

513 Biomechanics of Orthopaedic Rehabilitation (3) Effect of physical activity on bone and soft tissue development, and mechanical implications of exercise, theoretical bases for rehabilitative programs.

516 Therapeutic Exercise (3) Therapeutic exercise programs designed for specific medical conditions: McKenzie, neutral spine; based on specific biomechanical considerations: eccentric, closed kinetic chain, and more general in nature. Feldenkrais, myofascial release.

521 Analytic Epidemiology (3) Epidemiologic methods for evaluating research questions concerning causes, prevention and treatment of morbidity and mortality. Prereq: Consent of instructor. (Same as Public Health 585.) F

525 Epidemiology of Injury and Violence (3) Epidemiologic methods to describe magnitude and examine etiology of unintentional and intentional injury. Prereq: Consent of instructor. S/NC or letter grade.

541 Seminar (1-3) Advanced study in selected areas of exercise science. May be repeated.

563 Laboratory Techniques in Exercise Physiology (3) Laboratory course in experimental methodology and instrumentation: respiratory and metabolic measurements, blood chemistry, and gas analysis. Prereq: 480.

565 Advanced Physiology of Exercise (3) Quantitative apparatus and equipment for current and clinical questions in exercise physiology. Prereq: 480 and 563.


568 Physical Activity and Positive Health (3) Review of physical activity and health, for fitness and sport. Prereq: Consent of instructor. S/NC or letter grade.


571 Seminar in Gerontology (1) (Same as Human Ecology 585, Counseling Education and Counseling Psychology 585, Nursing 585, Public Health 585, Psychology 585, Sociological Studies 585, Social Work 585, and Sociology 585.)

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

601 Research Seminar in Exercise Science (1) Research seminar in exercise science. Prereq: 500 or consent of instructor. May be repeated. S/N only.

622 Directed Independent Research (3-6) Prereq: Doctoral student or consent of instructor. Prereq: 500 or consent of instructor. May be repeated. S/N or letter grade.

661 Seminar in Exercise and Applied Physiology (1) Selected topics in exercise and applied physiology. Prereq: 563 and 565. May be repeated with consent of instructor.

664 Research Participation in Applied Physiology (1-6) Participation in research with faculty member whose interests coincide with those of student. S/N only.
522 Portfolio Analysis and Management (3) Portfolio theory and evidence of behavior of security returns with view to determination rational 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.

561 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 the 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.

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

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 on their master’s program. Completion of 510 or equivalent is also required.

4. An oral, final examination covering the thesis and coursework is required.

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.

2. In addition to the requirement for 6 hours of 503, a minimum of 24 semester hours of graduate coursework is required. This work must be approved by the student’s committee and a minimum of 14 hours must be courses numbered above 500. The committee may require additional coursework if the student’s progress or background indicates such need.

3. All students are required to take 2 hours of 501 Seminar in their program and are expected to attend this course and participate in discussions during their master’s program. Completion of 510 or equivalent is also required.

**Associate Professors:**

Christen, G. E., Ph.D. .... Missouri
Loveday, H. D., Ph.D. .... Kansas State
Mount, R. J., Ph.D. .... Ohio State

**Assistant Professor:**

Boastie, S. E., Ph.D. .... Oregon State
Golden, D. A., Ph.D. .... Georgia
Hulbert, G., Ph.D. .... Illinois
van Laack, R. L., Ph.D. .... Utrecht

**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.**

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**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.

2. In addition to the requirement for 6 hours of 503, a minimum of 24 semester hours of graduate coursework is required. This work must be approved by the student’s committee and a minimum of 14 hours must be courses numbered above 500. The committee may require additional coursework if the student’s progress or background indicates such need.

3. All students are required to take 2 hours of 501 Seminar in their program and are expected to attend this course and participate in discussions during their master’s program. Completion of 510 or equivalent is also required.

**Associate Professors:**

Christen, G. E., Ph.D. .... Missouri
Loveday, H. D., Ph.D. .... Kansas State
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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**

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**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.

2. In addition to the requirement for 6 hours of 503, a minimum of 24 semester hours of graduate coursework is required. This work must be approved by the student’s committee and a minimum of 14 hours must be courses numbered above 500. The committee may require additional coursework if the student’s progress or background indicates such need.

3. All students are required to take 2 hours of 501 Seminar in their program and are expected to attend 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 800 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 Forestry 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) Carnoc charactersitics of meat animals, muscle structure and composition, cut identification, curing, freezing and cookery. Prereq: Food Industry or consent of instructor. Sp
469 Meat Science Lab (1) Slaughter and processing methods for beef, pork, lamb and poultry. Coreq: 460. Sp
470 Food Crop Products (3) Food products from plants, types, manufacturing systems, quality attributes and utility. Prereq: Food Preservation and 3 hrs biological science or consent of instructor. Sp, A
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
485 Food Processing System Analysis and Evaluation (3) Design and evaluation of food processing operation to produce safe and acceptable quality food product. Prereq: Food Chemistry, Food Microbiology, Food Preservation or consent of instructor. 2 hrs. and 1 lab. Sp
500 Thesis (1-15) P/NP only. E
501 Seminar (1) Individual reports and discussion on topics from current literature. May be repeated. Maximum 3 hrs. F, Sp
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
503 Problems in Lieu of Thesis (2-3) May be repeated. S/NC only. E
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 colorings in foods. Prereq: Food Chemistry or equivalent. 1 hr and 1 lab. F, A
512 Flavor of Foods (2) Chemical basis, measurements, and reactions involved in flavor changes in foods. Manufacture and application of flavorings in foods. Prereq: Food Chemistry or equivalent. 1 hr and 1 lab. F, A
515 Food Carbohydrates, Proteins and Lipids (4) Advanced study of chemical and physical attributes of carbohydrate, protein, and lipid components of foods; effects of components on production of safe and consistent quality food products; changes during processing and/or distribution of food products. Prereq: Food Chemistry or equivalent. 3 hrs. and 1 lab. Sp
520 Food and Industrial Fermentations (3) Microbiology, biochemistry, and technology of food-related fermentations involving dairy products, meat, cereals, fruits and vegetables. Production of food ingredients 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
521 Advanced Food Microbiology (3) Extraneous and intrinsic factors associated with food and food processing that relate to growth, survival, inhibition, detection, and recovery of foodborne pathogens and spoilage organisms; traditional and current approaches to microbiological food safety and quality. Prereq: Food Microbiology and Lab or equivalent. 2 hrs. and 1 lab. Sp
540 Food Product Development (3) Art, science and technology of developing and marketing new food products. Prereq: Food Preservation. 2 hrs. and 1 lab. Sp
560 Advanced Meat Science (3) Physical and chemical changes that occur in conversion of muscle to meat; effect of postmortem treatments on meat quality, composition and palatability; packaging, preservation and quality control. Prereq: 452. 3 hrs. and 1 lab. Sp, A
580 Food Oils and Fats (2) Chemistry and technology of food fats processing and use. Coreq from courses. Prereq: Food Chemistry or equivalent. 1 hr and 1 lab. Sp
590 Special Topics in Food Technology and Science (3-13) Critical reviews of current research and production concerns of food industry. May be repeated. Maximum 9 hrs. F, Sp
593 Directed Studies (1-3) Research on non-thesis topics chosen by student and major professor. Supervised experience in food industry or governmental laboratory. May be repeated. Maximum 6 hrs. E
600 Doctoral Research and Dissertation (3-15) P/NP only. E
601 Seminar (1) Reports and directed discussion on research topics from current literature. May be repeated. Maximum 3 hrs. F, Sp
620 Food Toxicology (2) Basic and applied concepts in food toxicology; toxicological aspects of processed foods. Mode of action, prevention and control of food toxicants in food supply. Prereq: Food Chemistry, 521, or consent of instructor. Sp
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

FORESTRY, WILDLIFE AND FISHERIES

MAJORS

B.S. in Forestry, Wildlife and Fisheries Science .............................................. M.S.

DEGREES

Forestry .............................................. M.S.
Wildlife and Fisheries Science .............................................. M.S.

Associate Professors:
Hay, R. L., Ph.D. Duke University
Scharburs, S. E., Ph.D. Colorado State University
Wells, G. R. (Liaison), D.F. Duke University

Assistant Professors:
Buehler, D. A., Ph.D. Virginia Polytechnic Institute and State University
Fly, J. M., Ph.D. Michigan State University

Graduate study leading to the Master of Science with majors in Forestry and 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 also have taken the general Graduate Record Examination (GRE). 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.

Thesis 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 requirement above, 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 Forestry 512 or Wildlife and Fisheries Science 512, Seminar, in their programs. This is required of each graduate student in residence fall semester.

4. An oral examination covering the thesis and coursework is required.

Non-Thesis Option (Forestry only)
1. Thirty-five hours of graduate coursework of which 23 must be at the 500 level or above is required.

2. A graduate committee of no fewer than 3 faculty members will be selected. At least one member shall be from outside the department. The committee will meet and schedule the student’s program during the first semester in residence.

3. Three hours of Forestry 511 are required.

4. Nine hours of coursework in the department must be at the 500 level or above, exclusive of Forestry 511.

5. Final comprehensive written and oral examinations shall be taken upon completion of no fewer than 28 hours of approved study.

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 analyses; non-market programs and projects; economic analysis and decision models; investment and financial analysis; managerial economics; taxes; forest products marketing. Prereq: Forest Resource Analysis or consent of instructor. F

422 Forest and Wildland Resource Policy (3) Policy formulation; criteria for policy determination; forest and wildland law and regulation; theory of conflict resolution; formal and informal resolution. Prereq: Senior standing. F

423 Wildland Recreation Planning and Management (3) Planning processes, master and site planning, site design, projects, management strategies, methods of visitor and recreation site management; case studies. Weekend field trips. Prereq: Wildland Recreation or consent of instructor. 2 hrs and 1 lab. Sp

431 Environmental and Resource Economics (3) Environmental and Resource Economics. Prereq: Economic Analysis or consent of instructor. 1 hr and 1 lab. F

432 Wood Adhesives and Glued Wood Products (2) Theory of adhesives and bonding of wood; wood sub-strate-adhesive interface for bonding; principles of adhesion; wood adhesives; gluing of solid wood and composite wood manufacturing practices; laboratory manufacture of bonded wood 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 trips. 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

501 Problem Analysis in Forest Resources (3) Problem identification, analysis and solution in forest resource management. Identify, 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 (1-15) P/NP only. E

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

511 Problem Analysis in Forest Resources (3) Problem identification, analysis and solution in forest resource management. Identify, 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/NC only. F

520 Advanced Forest Tree Biology (3) Growth, reproduction, and physiology of forest trees; wood anatomy; variability and taxonomy of forest trees. Prereq: Graduate standing in forestry or biological science, or consent of instructor. F, A

530 Advanced Forest Resource Management (3) Analysis of forest management problems as exemplified in public agencies and private firms. Forest organization and computerized regulation systems; financial and operational planning tools, as applied to forest and wildlife management. Prereq: Senior-level forest management or consent of instructor. Sp, A

540 Genetics in Forestry (3) Genetic improvement of forest trees; selection of superior phenotypes; field testing for genetic variability; tree breeding; development of seed orchards; hybridization; tree cytology and tissue culture; use of biochemical variation; planning and conducting forest genetics research. Prereq: Silvicultural methods and Biology 220 or consent of instructor. Sp, A

550 Recreation Planning for Forests and Associated Lands (3) Planning process for recreation development on forests and associated lands; analysis and critique of specific contemporary recreation planning processes. 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 cultural, 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, A

580 Advanced Silviculture (3) Silvicultural characteristics, silvicultural practices and systems applied to commercially important hardwoods and softwoods. In-depth analysis of silvicultural principles involved and tools used, prescribed fire, pesticides, in regeneration and management; computer modeling of stand dynamics, structure, growth, yield. Prereq: Undergraduate silviculture course 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; line sampling; Pascoun sampling; regression estimation; multistage and multiscale 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, A

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

Wildlife and Fisheries Science

GRADUATE COURSES

410 Wildlife Habitat Evaluation and Management (3) Ecological relationships between wildlife and habitat. Evaluation, modeling, and management of wildlife habitat. Effects of land-use practices on wildlife habitat. Weekend field trips. Prereq: Principles of Wildlife and Fisheries Management or consent of instructor. Applicable to majors in Forestry and in Wildlife and Fisheries Science. 2 hrs and 1 lab. F

415 Planning and Management of Forest, Wildlife and Fisheries Resources (3) Integrated forest and wildlife resource management through developing land management plans and analyzing case studies including conflict resolution. Applicable to majors in Forestry and in Wildlife and Fisheries Science. Prereq: Senior standing 1 hr and 2 labs. Sp

525 Management of Forestry, Wildlife and Fisheries Resources (3) Ecological and political impacts of forest and wildlife management practices. Critical analysis of current tools and techniques and their application. Applicable to majors in Forestry and in Wildlife and Fisheries Science. 4 hrs and 1 lab for six weeks. Sp

535 Environmental Impacts to Natural Ecosystems (3) Current technologies and management strategies concerning wise use of wildlife, forestry, and fisheries resources necessary for decision making and implementation. Prereq: 6 hours of biological science or consent of instructor. Not available to students in forestry or wildlife and fisheries science. 4 hrs and 1 lab for six weeks. Sp


Wildlife and Fisheries Science

GRADUATE COURSES

440 Wildlife Techniques (2) Methods of wildlife damage control, habitat management, identification of wildlife field sign, wildlife capturing techniques and management plan preparation.
THE DOCTORAL 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 an undergraduate major program. At least two-thirds of the total hours in the degree program must be at or above the 500 level and must include 501 (at each offering during residency) 504 and 3 semester hours at the 600 level. In the thesis option, 6 hours must be Thesis 550. A final examination is required in both programs.

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mapping techniques. Prereq: 310 or consent of instructor.

415 Quantitative Methods in Geography (3) Geographica application of statistical techniques, point pattern analysis, and analysis of variance. Prereq: Mathematics 115 or two semesters of calculus or consent of instructor.

421 Geography of Folk Societies (3) Geographical study of folk culture, traditional material culture and rural settlement, examples from eastern North America and selected foreign areas. Prereq: 101-02 or 320 or consent of instructor.

425 Historical Geography of the United States (3) Survey of changing human geography of the United States during four centuries of settlement and development. Changing population patterns, development of agricultural regions, and patterns of urban-industrial development. Prereq: 361 or consent of instructor.

433 The Land-Surface System (3) Characteristics of surface form, water, vegetation 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 pattern of climates. Climate change and modification, and relationships of climate and human activity. Prereq: Geography of the Natural Environment or Meteorology or consent of instructor.

435 Biogeography (3) Changing distribution patterns of plants and animals. Concepts of space and time at the scales of continental drift, Pliocene climatic change, and human activity on world biota. Prereq: Geography of the Natural Environment or consent of instructor.

436 Water Resources (3) Global water resources and hydrologic processes: water availability, flooding, and water quality issues from physical and economic geographical perspectives. Prereq: Geography of the Natural Environment or consent of instructor.

439 Plant Geography of North America (3) Characteristics and distribution of major plant communities of Canada, the U.S., Mexico, and Central America. Relationships to climate, soil, fire, and human disturbance. Long-term history and future prospects. Prereq: Coursework in geography or botany or consent of instructor.

441 Urban Geography (3) Concepts and theories concerning development and significance of cities and internal morphology of cities. Prereq: 101-02 or 340 or consent of instructor. (Same as Urban Studies 441.)

443 Rural Geography (3) Geographical appraisal of rural areas of the United States: small towns and urban fringes. Problems of rural America. Prereq: 101-02 or 340 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.

448 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. Prereq: 100-02 or 101-02 for resident graduate students whenever offered. May be repeated. Maximum 4 hrs. May be applied toward graduate degree. S/NC only.

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

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 individuals. Prereq: Written consent of instructor and department prior to registration. May be repeated with consent of instructor. Maximum 9 hrs. S/NC 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/NC 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/NC or letter grade.

513 Topics in Remote Sensing (3) Applied research using imagery for interpretation and mapping of geographic data. Prereq: 410 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs. S/NC or letter grade.

515 Topics in Quantitative Geography (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. S/NC or letter grade.

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 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: 434 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

523 Topics in Physical Geography (3) Examination of trends, problems, and methods in geography of land surface system or in modern climatology. Prereq: 433 or 434 and consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

524 Topics in Climatology (3) Trends, problems, and methods in area of climatology. Prereq: 435 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

525 Topics in Biogeography (3) Examination of trends, problems, and methods in biogeography. Prereq: 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 8 hrs.

542 Topics in the Geography of Transportation (3) Examination of trends, problems, and methods in transportation geography and transportation networks. Prereq: 449 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

550 Regional Geomorphology (3) (Same as Geology 550.)

577 Biological Conservation (3) Analytical treatment of politics, policies, and forms of biological conservation 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/NC or letter grade.

592 Off-Campus Study (1-15) See College of Arts and Sciences. Prereq: Written consent of department prior to registration. S/NC or letter grade.

593 Independent Study (1-15) See College of Arts and Sciences. Prereq: Written consent of department prior to registration. S/NC 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.

Geological Sciences

(Colloge of Arts and Sciences)

MAJOR

DEGREES

Geology

M.S., Ph.D.

Harry Y. McSween, Head

Professors:

Broadhead, Thomas W., Ph.D. Iowa
Driese, Steven G., Ph.D. Wisconsin
Dunne, William M., Ph.D. Bristol
Hatcher, Robert D., Jr. (Distinguished Scientist), Ph.D. Tennessee
Kopp, Chas. C., Ph.D. Columbia
Laslocka, Theodore C., Ph.D. Caltech
McLaughlin, Robert E. (Emeritus), Ph.D. Tennessee
McSween, Harry Y., Ph.D. Harvard
Misra, Kula C., Ph.D. Westhamont
Taylor, Lawrence A., Ph.D. Lehigh
Walker, Kenneth R. (Carden Prof.), Ph.D. Yale

Associate Professors:

Byerly, Don W., Ph.D. Pennsylvania
Clark, Michael, Ph.D. Penn State
McKinney, Michael T., Ph.D. Yale
Mora, Claudia L. (Liaison), Ph.D. Wisconsin
Richard, T. II., Ph.D. VPI&SU

Assistant Professor:

McKay, Larry D. (Jones Prof.), Ph.D. Waterloo

The Department of Geological Sciences offers both the M.S. and Ph.D. degrees in Geology. Persons interested in these programs should contact the Director of Graduate Admissions in the department.

For admission, an applicant must provide transcripts of previous undergraduate work, two rating forms or letters of recommendation, and
GRE scores (general). Students are not normally admitted under non-degree status.

Prerequisite for both degrees is a Bachelor’s degree, including coursework in mineralogy, optical mineralogy, petrology, stratigraphy, paleontology, structural geology, and field geology. One year each of coursework in calculus and chemistry and one year of coursework in biology, physics, or statistics are also required. Applicants lacking any of these may be admitted, but the deficiencies must be removed within the first year without graduate credit. Substitutions may also be allowed.

THE MASTER’S PROGRAM

The department offers the thesis option in the master’s program. Graduation requires successful completion of a written thesis and a minimum 3.0 GPA in all graduate coursework.

Course requirements are a minimum of 30 semester hours, including:
1. Six hours of Thesis 500.
2. Registration in 595 during the first two years in residence. Two hours may be counted toward the 30-hour requirement. This requirement may be waived in unusual circumstances.
3. Sixteen hours of geology courses, with at least 14 hours at the 500 or 600 level, including at least one course from any of the following five groups:
   - Group 1: 410, 480, 482, 530, 558, 565.
   - Group 2: 420, 520, 536, 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 the approval of the student’s dissertation committee.
4. Eight hours of additional graduate coursework.

THE DOCTORAL PROGRAM

The prerequisite for the Ph.D. program, in addition to that for the M.S. program, is either a master’s degree in Geology, or a Bachelor’s degree plus completion of 9 hours of coursework from the list in #3, above, including one course from each group. These courses may be taken while completing other course requirements.

Graduation requires passing a comprehensive examination, taken no later than the end of the second year, completion of all course requirements, and successful oral defense of the dissertation.

The comprehensive examination includes both written and oral parts in which the candidate will be tested on his/her knowledge of the area concerning the proposed dissertation and related fields. The candidate is expected to be conversant in a wide field of geological sciences.

A minimum of 24 hours of graded coursework beyond the master’s degree is required in addition to the 24 hours of Dissertation 600. The coursework includes the study of 9 hours of 600-level geology courses, 9 hours of 500-level or higher geology courses, and 6 hours of additional graduate courses. Extra-departmental coursework is encouraged.

The student must demonstrate a reading knowledge of a foreign language in which there is a body of geologic literature, as approved by the student’s dissertation committee. The foreign language requirement may be waived for Ph.D. students whose native language is not English and who have demonstrated mastery of the English language, as determined by the student’s dissertation committee.

GRADUATE COURSES

401 Quantitative Methods in Geology (3) Applications of calculus and differential equations to problems in geosciences. Examples of diffusion equation in hydrogeology; wave equation in geophysics; dynamical modeling and boundary conditions in structural geology and tectonics. Prereq: The Dynamic Earth or Earth, Life, and Time, 2 semesters of Calculus.


420 Paleocology (4) Principles of ecological analysis as applied to fossils and fossil assemblages: data collection and interpretation. Laboratory designed around preparation of scientific reports based on field and laboratory analysis. Writing emphasis course, 3 hrs and 1 lab.

421 Invertebrate Paleontology (4) Survey of invertebrate animal phyla: skeletal structures and preservation, functional morphology, biogeography, and stratigraphic distribution. Prereq: Paleobiology or consent of instructor. 2 hrs and 2 2-hr labs.

440 Field Geology (Summer field course for advanced undergraduate geology majors and first-year graduate students.) 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 geological problems. Prereq: Completion of major core courses and consent of instructor.

450 Process Geomorphology (3) Integrative approach to development of surface of earth based upon case histories in developing imagery. Prereq: 101-02. (Same as Geography 450.) 2 hrs and 1 2-hr lab.

455 Basic Environmental Geology (3) Applications of rockstratigraphic principles to coasts of geologic processes on humans and effects of human activities on earth’s environments. Prereq: 12 hrs of geological courses. 2 hrs and 1 3-hr lab or field period.

460 Principles of Geochemistry (3) Application of chemical principles to geologic problems. Crystal chemistry and relation between basic atomic structure and distribution of elements in units of time and space. Prereq: Chemistry 10-30. Recommend prereq: 330. 2 hrs and 1 lab.


471 Fieldwork in Geophysics (2) Geophysical investigations applied to solution of problems in tectonics, hydrogeology, or environment. Summer field course off-campus. Requires full time for 2 or more weeks. Prereq: 470 or consent of instructor.

475 Physical and Chemical Systems of the Earth (3) Development of physical earth from solar nebula to present. Formation and evolution of atmosphere, crust, mantle, and core. Interdependence of earthquakes, volcanism, plate tectonics, geomagnetism, chemical and isotopic processes of interior, and earth's temperature. Historical perspective on major controversies of past, and problems unresolved today. Prereq: 16 hrs of geology courses numbered 300 and above. 2 hrs and 1 discussion.

480 Principles of Economic Geology (4) Ore-forming processes, classification of mineral deposits, survey of different types of mineral deposits with examples, and mineralogies. Prereq: 310 and 330 or prerequisites. Recommended prereq: 460. 1 hrs and 1 2-hr lab.

485 Principles of Hydrogeology (3) Physical principles of flow, flow equations, geologic controls, aquifer analysis, water well design/installation, introduction to transport processes. Prereq: The Dynamic Earth; Calculus; Fundamentals of Physics or equivalent, or consent of instructor. (Same as Civil Engineering 465.)

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 Appalachians (3) Structural Geology of the Southern and Central Appalachians from extensional Late Proterozoic-Early Paleozoic rift-platform margin through processes related to compressional events producing accretionary wedges that were accreted to the North American plate throughout the Paleozoic. Comparisons to similar orogenies. Prereq: Structural Geology.

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.

525 Biostratigraphy (3) Examination of principles of stratigraphy and biostratigraphy through selected case histories. 1 hr and 1 2-hr seminar.

530 Petrogenesis of Crystalline Rocks (4) Origin and properties of igneous and metamorphic rocks, magmatic and metamorphic processes and mechanisms. Laboratory: petrographic study of crystalline rocks in thin section. Prereq: 410. 3 hrs and 1 lab.

535 Ground Water Hydrology (3) (Same as Environmental Engineering 535.)

540 Seminar in Local Geology (1) Introduction to geology of Southern Appalachians. 1 hr plus field trips.

545 Sandstone Petrology/Physical Sedimentology (4) Field and microscopic analysis of clastic rock types; physical processes of sedimentation, transport, and formation of sedimentary structures. 4 credits or equivalent. 3 hrs and 1 lab.

546 Carbonate Sedimentology (4) Environments of deposition of modern and ancient carbonate sediments and diagenesis of resultant rocks; field and laboratory analysis of sample material and preparation of scientific reports. 3 hrs and 1 lab.

550 Regional Geomorphology (3) Integrative approach to study of natural geomorphological regions stressing links and similarities across boundaries, unique characteristics of major divisions, provinces, sections, and districts. May be repeated with consent of instructor. Maximum 6 hrs. (Same as Geography 550.)

556 Quaternary Geology of North America (3) Interpretation of geomorphic, stratigraphic, and sedimentological evidence in order to reconstruct Quaternary landforms and paleoenvironments for different regions of North America; correlation of major episodes of North American glacial with paleo-oceanographic changes in Atlantic and Pacific Oceans. Prereq: 101 or consent of instructor.

557 Quaternary Paleoclimatology (3) Perturbation, processes, and pattern within Quaternary ecosystems; climate change and vegetational responses during last 2.5 million years. Prereq: Consent of instructor.

563 Stable Isotope Geochemistry (3) Theoretical aspects of isotopic fractionation; isotope geochemistry of geologic systems. Isotope exchange, variations in natural waters, diagenetic, hydrothermal and metamorphic systems. Prereq: General Chemistry or equivalent.


566 Geochemical Analysis (3) Collection and treatment of geochemical data using electron microprobe, x-ray fluorescence, and atomic absorption spectrometric 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-
Germanic and Slavic Languages

(Majors of Arts and Sciences)

MAJORS DEGREES
German .................................................. M.A.
Modern Foreign Languages ........... Ph.D.

David E. Lee, Head

Professors:
Falen, James E. (Emeritus), Ph.D., Pennsylvania
Fiere, Donald M. (Emeritus), Ph.D., Indiana
Hodges, Carolyn R., Ph.D. ....... Chicago
Kratz, Henry (Emeritus), Ph.D., Ohio State
Osborne, J. C. (Emeritus), Ph.D., Northwestern
Ritenhoven, Ursula C. (Emeritus),
Ph.D. ........................................ Pennsylvania

Associate Professors:
Lauckner, Nancy A. (Liaison), Ph.D., Wisconsin
Lee, David E., Ph.D., Stanford
Mellor, C. J., Ph.D. ............... Northwestern
Pervukhin, Natalia K., Ph.D. .......... Bryn Mawr

Assistant Professors:
Blackwell, Stephen H., Ph.D. .... Indiana
Hoeing, Peter, Ph.D. ............... Wisconsin
Livers, Keith A., Ph.D. ............ Michigan
Moser, Beverly, Ph.D. ............... Georgetown
Ohnesorg, Stefanie, Ph.D. ............ Chicago

The Department of Germanic and Slavic Languages offers two advanced degrees: the Master of Arts in German and the Doctor of Philosophy in Modern Foreign Languages. Inquiries should be addressed to the head of the department.

THE MASTER'S PROGRAM

The department requires a minimum of 30 semester hours including 15 hours of coursework numbered 500 and above and 6 hours of Thesis 500.

THE DOCTORAL PROGRAM

The Ph.D. in Modern Foreign Languages is offered jointly by the Department of Germanic and Slavic Languages and the Department of Romance and Asian 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 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 3.0. Consideration will also be given to applicants who do not have an undergraduate degree in one of the three foreign languages but do have the equivalent of an undergraduate major in one of them.

Degree Requirements

Candidates with German as a first concentration must complete a minimum of 53 semester hours of coursework beyond the bachelor's degree in addition to 24 hours of doctoral research and dissertation. The coursework must be distributed as follows:

1. First Concentration: German. A minimum of 39 hours of German courses beyond the bachelor's degree, distributed as follows:
   - 400 level: A maximum of 6 hours of 400-level classes taken for the M.A. may be applied.
   - 500 level: A minimum of 21 hours must be taken.
   - These must include German 512, 519, 520, 521, and 560. Thesis hours are excluded. If 512 is used as part of a second concentration in applied linguistics, another course must be substituted in the first concentration.
   - 600 level: A minimum of 12 hours must be taken, exclusive of dissertation hours.

2. 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.

Students choosing applied linguistics as a second concentration are strongly urged to take their cognate work in a second language.

3. Cognate Field. Six hours in graduate courses numbered 500 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 passage 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. Central emphasis is put on the 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, McClure, Rotary fellowships).

For additional courses, see Romance and Asian Languages.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate credit between approved 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.

German

GRADUATE COURSES

331-32 Elements of German for Upper-Division and Graduate Students (3-3) Exemptions 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. 332 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 pitfalls of periodization.

425 Introduction to Descriptive Linguistics (3) (Same as French 425, Spanish 425, Linguistics 426, 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 and graduate reading courses). (Same as Linguistics 435.)

435 Structure of the German Language (3) Conversational English-German: Intensive and suprasegmental phonetics, 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.)

485 Business German (3) Survey of German used in fields of business, government, administration, and economics. Prereq: 6 hrs of upper-division German excluding courses in translation and graduate reading courses.

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

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

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. Problems and pitfalls of periodization.

519 Bibliographical Methods (1) Bibliographical methods, major reference works and bibliographical problems in language and literature.

520 Proseminar (2) Advanced training in use of bibliographical and reference tools; illustrative problems; paper preparation.

541 Medieval German Language and Literature (3) Introduction to Middle High German.

550 Studies in German Literature (3) Content varies. May be repeated. Maximum 6 hrs.

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 Literature 1945-Present (3) Content varies. May be repeated. Maximum 6 hrs.

560 German Literary Theory and Criticism (3)

561-62 Directed Readings in German Language and Literature (3,3)

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

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

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

Health, Leisure, and Safety Sciences

(Completion of Human Ecology)

MAJORS

DEGREES

Human Ecology ........................................... Ph.D.
Health Promotion and Health Education .......... M.S.
Public Health ............................................. M.P.H.
Recreation, Tourism and Hospitality Management .......... M.S.
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
Hayes, Gene A. (Liaison), ............... Ph.D. ................... North Texas State
Kirk, Robert H., M.S. ......................... Indiana
Wallace, Bill C. (Liaison), ......................... M.S. .......... Northern Colorado

Associate Professors:

Blanton, Mary Dale, Re.D. ............... Indiana
Krick, Ken L., Re.D. ......................... Indiana
Pursley, 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
Hendrick, Francis T. (Liaison), Ph.D. ........ Oregon
Smith, Susan M., Ed.D. ....................... Tennessee

The Health, Leisure, and Safety Sciences Department offers graduate programs leading to the Master of Science with majors in Health Promotion and Health Education; Recreation,
Tourism and Hospitality Management; 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 department.

The department fosters a natural unifying of disciplines that contribute to a holistic approach to healthy living and the enjoyment of life for all citizens. The academic disciplines focus on assisting students, clients, and faculty to (1) develop a healthful and safe lifestyle that considers the dimensions of disease and injury prevention, and the role of leisure as it contributes to mental, social, and physical health; and (2) prepare persons for competent practice of their respective disciplines, including scholarly, creative scholars with research endeavors. The department is committed to the educational value of community-based experiential learning.

Health

A graduate program is available leading to the Master of Science with a major in Health Promotion and Health Education (thesis and non-thesis options), requiring completion of 30 semester hours.

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) S,Sp

405 Alcoholism and Alcohol Education (3) Problems of alcoholism. Factors which make alcoholism serious and public health problems related to alcoholism. Various types of instructional, educational and intervention programs. F

406 Death, Dying and Bereavement (3) Aspects of dying, death and handling of 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 human sexuality education. E

425 Women's Health (3) Factors influencing women's health and women consumers in nation's health service delivery systems. Health problems/concerns of women and techniques for prevention, maintenance and/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 abuse 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

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

520 Sex Education and Human Sexuality (3) Advanced in-depth discussion of educational and health counseling theory, techniques, materials used in school, community, or health care facility. Sp

530 Health Promotion and Health Education Program Development (3) Theories and principles of health promotion, program development, methodology, marketing, public relations. Health education as vehicle for health promotion. Sp

540 Evaluation in Health Promotion and Health Education (3) Evaluation techniques as related to health products, processes and programs. Construction of instruments for use in assessing health education outcomes. Sp

570 Special Topics (1-3) For graduate students, in-service teachers and other health professionals. Health/wellness or health promotion issues. May be repeated. Maximum 12 hrs. E

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

601 Internship/Research in Safety and Health (3-6) (Same as Safety 601) F

610 Critical Analysis of Writing and Research (3) Analysis of writing and research in health related areas. F

620 Advanced Research Techniques in Health (3) Advanced statistical and research techniques, and methodologies in health discipline. Prereq: 590, 510. Sp

650 Health Aspects of Gerontology (3) Knowledge and understanding of biological, psychological and sociological aspects of aging as related to health and wellness of individual. (Same as Public Health 650) F, Sp

655 Seminar in Nutrition (3) Comprehensive study of nutrition, determinants, resources and health status of nation. (Same as Public Health 655) F

660 International Health (3) Study of quality of health promotion and health services in countries throughout 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.), Two professional preparation concentrations are available: community health education 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. Preferred 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 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 knowledge and skills of the nutritionist and public health professional; 2) plan a career in nutrition and want to acquire 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 MS-MPH program must make separate application to, and be competitively and independently accepted by, the Department of Nutrition for the MS, Department of Health, Leisure and Safety Sciences for
MPH, and the Public Health Academic Program committee.

Students who have been accepted by both departments may apply for approval to pursue the dual program within the first semester or two of their courses. Prerequisite coursework and 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 MS and MPH programs.

Curriculum

A dual degree candidate must satisfy the requirements for both the MS (public health nutrition concentration) and the MPH degrees, as well as the requirements for the dual program. All candidates for the dual degree must successfully complete Health and Society (PH 555), two credits of Seminar in Public Health (PH 509), and a minimum of 60 credits. The Department of Nutrition will award a maximum of 9 semester hours of credit toward the MS degree for successful completion of approved graduate level courses offered in the Department of Health, Leisure and Safety Sciences. The Department of Health, Leisure and Safety Sciences will award a maximum of 11 semester hours of credit toward the MPH degree for successful completion of approved courses offered in the Department of Nutrition.

All courses for which such cross-credit is awarded must be approved by the Public Health Academic program Committee and the student's graduate committee. A single block field experience (or public health internship) is required of all students and the analytical field paper incorporates public health nutrition and the student's public health concentration.

Dual degree students who withdraw from the program before completion of the requirements for both degrees will not receive credit toward the MS or MPH degree for courses taken in the other program, except as such courses qualify for credit without regard to the dual program.

Approved Dual Credit

MS courses to be counted toward the MPH 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 550). MPH courses to be counted toward the MS 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, Kentucky, or Louisiana. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

COURSE REGISTRATION

Non-degree students must obtain permission from the department head to register for 500-level public health courses. Prerequisite coursework assigned as a condition of admission to the M.P.H. program must be completed promptly, with a grade of B or better, typically within the first semester or two of enrollment in graduate studies.

GRADUATE COURSES

400 Consumer Health (3) (Same as Health 400.)

410 Health in the Work Environment (3) Fundamental activities in field of health and safety at work. Work-related health hazards and problems of concern to nurses, medical staff, management, engineers and others in industrial health and safety fields. Prerequisite: consent of instructor. May not be taken for credit by those majoring in the field of occupational health concentration.

493 Directed Independent Study (1-3) Individual in-depth study of selected issues. Prerequisite: Consent of instructor. May be repeated. Maximum 6 hrs. E

502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when use of University facilities and/or faculty time before degree is completed. May not be used for graduate requirements. Prerequisite is required. SNC only. E

509 Graduate Seminar in Public Health (1) In-depth discussion of timely topics reflecting scope of public health activity and its interaction with other academic and professional disciplines. Speaks both internal and external. Required. May be repeated. Maximum 4 hrs. (Same as Nutrition 509, Nursing 509, Exercise Science 509 and Social Work 509.) SNC only. F,Sp

510 Environmental and Occupational Health (2) Complexities of personal and ambient environment recognizing health as individual's response to diverse and dynamic world. Principles of occupational health and safety. Survey of current public health problems and applications for healthful living today and in the future. F, Sp

511 Fundamentals of Industrial Hygiene (3) Occupational health theory, practice and regulations: recognition, evaluation and control of workplace hazards. Prerequisite: 2 yrs. of chemistry and biology and consent of department. F

512 Industrial Hygiene Controls (4) Activities in comprehensive practice of industrial hygiene controls: exposure assessment, application of control, cost analysis, tools and techniques in instrumentation of solution of workplace hazards. Prerequisite: 511.

513 Industrial Hygiene Instrumentation and Sampling (3) Instruments and methods for evaluating industrial hazards. Pertinent workplace problems and situations. Prerequisite: 511, MPH (OEHM) major, and consent of department.

514 Industrial Toxicology and Occupational Exposures (3) Principles of industrial toxicology, basic mechanisms, portals of entry, physiologic and biochemical responses. Occupational exposure assessment, physical factors and confined spaces. Control of exposure characterization, statistical aspects of sampling, and transport of chemicals in general environment. Prerequisite: courses in general chemistry and 1 semester of human biology.

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 management concepts/techniques/process. F, Su

521 Organization Theory and Health Care Delivery (3) Administrative and Organization theory related to health facilities; operation and management of community health, case discussions and problem-solving exercises; managerial skills and functions. F

523 Management in Extended Care Settings (3) Managerial concepts and theoretical foundations essential to supervision and administration of domiciliary health service programs. Management and operation of health services programs for patients and clients in settings which provide activities of daily living and special psychosocial environmental needs. Programs for home health agencies, comprehensive medical rehabilitation, nursing homes, congregate living centers and similar health programs. Prerequisite: 521 or consent of instructor. Sp

525 Financial Management of Health Programs (3) Financial management concepts and practices applied to health service programs. Fundamentals of budgeting, costing, financing, rate setting, financial reporting and control. Opportunities in health planning, research, and applied health services research methodology preparatory for first course in epidemiology. Prerequisite: Introductory statistics or consent of instructor, F, Sp

540 Principles of Epidemiology (3) Distribution and determinants of health-related outcomes in specified populations, with application to control of health problems. Historical origins of discipline, hypothesis formulation, research design, data and error sources, measures of frequency and association, etiologic reasoning, disease screening, and injury control. Prerequisite: 530. F, Sp

542 Advanced Epidemiological Methods (3) Nature, collection, analysis and interpretation of data pertaining to cohort and case-control studies. Surveillance and surveys. Analytic methods: multiple logistic and Cox proportional hazards models, regression and survival analysis. Preparation for critical review of professional literature. Prerequisites: 540 or consent of instructor. Sp

550 Principles and Practices of Community Health Education (3) Theoretical foundations for community health education: opportunities for skill development in a number of educational processes; and introduction to community health analysis.

552 Community Health Problem Solving (4) Dynamics of community organization, community needs assessment, educational interventions, and program planning and evaluation techniques. Opportunity to practice skills in realistic setting. Prerequisite: 550 or consent of instructor. Sp


560 Theories and Techniques in Health Planning (4) Overview of health planning concepts and methodologies; system oriented planning process. Major elements of planning: formulation and conceptualization of problem, plan design, evaluation and implementation. Health planning of institutions, communities and selected populations; appropriate diagnoses; and programs for addressing needs. Sp

568 Physical Activity and Positive Health (3) (Same as Exercise Science 568.)

569 Fitness Testing, Programming, and Leadership for Diverse Populations (3) (Same as Exercise Science 569.)

580 Special Topics (3) Prerequisite: Consent of instructor. May be repeated under different topics. Maximum 6 hrs.

585 Seminar in Gerontology (1) (Same as Human Ecology 585, Counseling Education and Counseling Psychology 585, Exercise Science 585, Nursing 585, Psychosocial/Behavioral Studies 585, Social Work 585, and Sociology 585.)

587-88-89 Internship (3,3,3) Internship (community health education or health planning/administration) in either approved organization or research setting under supervision of designated preceptor. Prerequisite: MPH major, one semester advance notice and consent of major advisor. 587: available for required internship placement. 588: available only for approved extended placements. SNC only. E

590 Research Methods in Health (3) (Same as Health 590.)

Health, Leisure, and Safety Sciences 109
Recreation and Tourism Management

Graduate study leads to a Master of Science degree in Recreation, Tourism, and Hospitality Management. Four concentrations are available: therapeutic recreation, recreation administration, tourism, and hospitality management. The thesis option requires 33-36 hours and non-thesis option requires 36-39 hours depending upon the specific concentration. All thesis concentrations, individuals not possessing an undergraduate degree in the discipline or having appropriate full-time work experience will be required to take 590 (graduate internship).

Requirements for each concentration are:

Hospitality Management

- All students: 415 or 440, 510, 515, 540, 541; Nutrition 541; Hotel and Restaurant Administration/Nutrition electives (12 hours); related area (6 hours); statistics (3 hours); Thesis Option (6 hours) 500; Non-Thesis Option (6 hours) 535; Hotel and Restaurant Administration/Nutrition elective (3 hours); elective (3 hours).

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

Recreation Administration

- All students (28 hours): Hotel and Restaurant Administration 532, 537, 542; Nutrition 541; Hotel and Restaurant Administration/Nutrition electives (12 hours); related area (6 hours); statistics (3 hours); Thesis Option (6 hours) 500; Non-Thesis Option (6 hours) 535; Hotel and Restaurant Administration/Nutrition elective (3 hours); elective (3 hours).

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

Therapeutic Recreation

- All students (24 hours): 420 or 425, 510, 515, 520, 521, 522; statistics (3 hours); research methods (3 hours); Thesis Option (9 hours) 500; elective (3 hours).

- Non-Thesis Option (9 hours) 590 (6 hours); elective (3 hours).

Tourism

- All students (30 hours): 470, 510, 515; Hotel and Restaurant Administration 532, 542; Marketing 510; Hotel and Restaurant Administration/Planning 540; Planning 548 or 550; statistics (3 hours); research methods (3 hours); Thesis Option (6 hours) 5TM or HRA 500; Non-Thesis Option (9 hours) 590 (3-6 hours); elective (3-6 hours).

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 Program Development and Evaluation, or consent of instructor. (Same as Sport Management 415). F

430 Organization and Administration of Leisure and Tourism Services (3) Principles of administration applied to provision of leisure services offered by public, private and/or commercial enterprises. Organizational structures, personnel management, evaluation, legal authority, Introduction to budgeting and fiscal procedures. Prereq: 310 or consent of instructor. F


450 Specialized Study in Leisure Education (1-6) Special interest leisure activities; developing positive attitudes toward leisure. Demonstrates how leisure contributes to one's mental and physical health. May be repeated. Maximum 6 hrs. E

470 Tourism and Leisure Industries (3) Symbolic relationship between tourism and various sectors of leisure industry. Use of resources, both natural and developed, and economic impacts of ventures. Socio-cultural impacts on venue as well as venues impact on local population. Sp

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

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

510 Perspectives and Trends in Leisure Services (3) Basic role of 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) Philosophy of leisure and recreation; nature of philosophy, constitutes 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) History, philosophy, nature, purpose, special populations served, programming process, professional aspects of therapeutic recreation. Basic overview of aspects of leisure delivery systems. 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, and leisure planning. Use of classroom and clinical training in therapeutic recreation, relationship of leisure education to therapeutic recreation. Prereq: 520 or 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 practice of therapeutic recreation services. Prereq: 520. 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 as it relates to maintenance 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) Detailed study of theme, issue, or concern. Designed to meet needs of individual students. May be repeated. Maximum 8 hrs. E

601 Internship/Research in Safety and Health (3-6) Field experience. Significant problem identified, re-

592 Special Topics in Recreation & Leisure Studies (1-6) May be repeated. Maximum 6 hrs. E

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.

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 interrelationships in sports injury and control; risk-taking and decision solution strategies; and contributions of sports medicine to safety. 3 hrs and 2 labs.

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 behavioral sciences as related to variation incidence of accidents. F

534 Organization, Administration and Supervision of Safety Programs (3) National and state and local level programs; administrative, supervisory aspects. Implementation of relevant programs. Sp

535 Emergency Management (3) Civil and defense problems: tornadoes, floods, fires, mass civil disorders, and nuclear 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 repeated. Maximum 12 hrs.

590 Special Topics (1-3) Advanced study in selected disciplinary or professional area of safety education management. May be repeated. Maximum 12 hrs.

593 Directed Independent Study (1-3) Individual identification and study of problems/issue in safety. Extensive reading and critical analysis of safety literature. Specific proposal to instructor before registration. May be repeated. Maximum 12 hrs. E

601 Internship/Research in Safety and Health (3-6) Field experience. Significant problem identified, re-
History
(College of Arts and Sciences)

MAJOR       DEGREES
History ........................................ M.A., Ph.D.

Russell Buhite, Head

Professors:
Bergeron, Paul H., Ph.D. .......... Vanderbilt
Buhite, Russell D., Ph.D. ...... Michigan State
Chmielewski, Edward V., Ph.D. ... Harvard
Cutter, Everett W., Ph.D. ...... Texas
Farris, W. Wayne, Ph.D. ...... Harvard
Finger, John R., Ph.D. ......... Washington
Haas, Arthur G., Ph.D. .......... Chicago
Hao, Yan-Ping (Lindsey Young Prof.), Ph.D. ............... Pennsylvania
Liulevicius, Vejas G., Ph.D. .......... Penn
Haskins, Ralph W. (Emeritus), Ph.D. ............... California
Klein, Milton M. (Emeritus) (Distinguished Prof.), Ph.D. ... Columbia
Moser, Harold Ph.D. .......... Wisconsin
Patton, Lorman A., Ph.D. ........ Cornell
Ullman, Jonathan T., Ph.D. .......... Illinois
Wheelbar, W. Bruce, Ph.D. ....... Virginia

Associate Professors:
Becker, Susan D., Ph.D. .......... Case Western
Bing, J. Daniel, Ph.D. .......... Indiana
Bohsch, John Ph.D. .......... Harvard
Brummel, Palmer R. (Liaison), Ph.D. ... Chicago
Diacon, Todd A., Ph.D. ...... Wisconsin
Johnson, Charles W., Ph.D. .... Michigan
Mackenzie, John W., 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, Lorri, Ph.D. .......... Kentucky
Hazen, Nicholas W., Ph.D. .... California (Berkeley)
Higgs, Catherine A., Ph.D. ........ Yale
Lulewicz, Vejas G., Ph.D. .......... Pennsylvania

The Department of History offers graduate study leading to the Master of Arts and Doctor of Philosophy degrees. The M.A. program includes a thesis and non-thesis option. The doctoral program has concentrations in American and European history with special focuses in the areas identified under group II doctoral fields. Detailed information may be obtained from the Director of Graduate Studies in History who also advises all incoming students.

THE MASTER'S PROGRAM

Admission Requirements
1. Successful completion of a baccalaureate degree from an accredited institution, preferably with a major in history.
2. Acceptable scores on the Graduate Record Examination (general).

Non-Thesis Option

A total of 30 hours of coursework is required. At least 6 hours must be completed in each of two M.A. fields. The primary field is examined by a two-hour written examination in one week by a one-hour oral examination with the single grade of pass/fail given at the conclusion of the oral examination. No examination is given on the secondary field.

Thesis Option

Twenty-four hours of coursework and 6 hours of Thesis 500 for a total of 30 hours are required. Thesis students are required to select one M.A. field and write a thesis. At the end of the program the thesis program student will stand for a two-hour oral examination on both the thesis and the field.

Non-Thesis Option

A total of 30 hours of coursework is required. At least 6 hours must be completed in each of two M.A. fields. The primary field is examined by a two-hour written examination followed by a one-hour oral examination with the single grade of pass/fail given at the conclusion of the oral examination. No examination is given on the secondary field.

THE DOCTORAL PROGRAM

Admission Requirements
1. Successful completion of the M.A. degree from an accredited institution.
2. Acceptable scores on the Graduate Record Examination (general).

Residence and Coursework

Before being admitted to doctoral candidacy, a student must:
1. Complete History 510 at UT Knoxville.
2. Complete a minimum of 6 related hours outside the department.
3. Spend two consecutive semesters in residence.
4. Complete 9 hours in each of two Group I doctoral fields. (The courses in the non-examined field must be graded A-F. There is no minimum hours requirement for Group II field. Courses taken to fulfill M.A. requirements may be counted toward this requirement.)
5. Fulfill the foreign language requirement.
6. Complete two 600-level research seminars. (One must be completed at UT Knoxville.) Students who have completed a master's thesis need complete only one research seminar (must be taken at UT Knoxville), and History 621.

7. Maintain a 3.0 overall grade-point average in graduate work attempted.
8. Complete 21 hours of graduate coursework 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 requirements. A student stands examination in one field selected from Group I and one field selected from Group II below. Both parts are 4-hours, written, and taken during the same semester. A general oral exam will be taken following the successful completion of the two written portions. The two written and one oral exams are separate examinations, and Group I must be passed before taking Group II, and the latter passed prior to taking the oral portion. A student who fails any one of the three parts (Group I or Group II or the Oral) which constitute the Comprehensive Exam must repeat the failed exam within two semesters, excluding summer. A second failure on any one of the three parts (regardless of which one) will cause the student to be dropped from the History graduate program. Likewise, a student who does not repeat a failed exam within the allotted time (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:
1. Premodern Europe
2. Modern Europe
3. United States (colonial to present)
4. Modern
5. Asian

Group II:
1. Political and Diplomatic
2. Intellectual and Cultural
3. Social and Economic
4. National Fields

5. United States (colonial to present)

6. European
7. Medieval
8. Early Modern
9. Modern
10. Political and Diplomatic
11. Intellectual and Cultural
12. Social and Economic
13. National Fields
Holistic Teaching/Learning

Dissertation and Defense
Original research forms the basis for the dissertation. Doctoral candidates must register for a minimum of 3 hours of 600 Dissertation Research each semester and must complete 24 hours of dissertation credit. A final oral defense is given on the dissertation in its historical context. The program must be completed within eight years from admission as a potential candidate.

GRADUATE COURSES

415 Western Economic Thought Since the 18th Century (3) Methods of study of doctrinal history. Origins and evolution of major doctrines: classical and neoclassical economics, economics of Keynes and his followers, principal developments of second half of 20th century. Major writing requirement. May not be used toward graduate degree in History. Pre: 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 of all students for each 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 Topics in Modern Europe (3) Reading seminar: secondary sources on movements and trends that are multinational in focus. Focus varies. May be repeated. Maximum 15 hrs.

533 Topics in European National History (3) Reading seminar: secondary sources on intra-national topics, usually British, Russian, German or French. Focus varies. May be repeated. Maximum 15 hrs.

541 Topics in Early American History (3) Reading seminar: secondary sources on early North American history. Focus varies. May be repeated. Maximum 15 hrs.

542 Topics in 19th-Century United States (3) Reading seminar: secondary sources on 19th-century United States. Focus varies. May be repeated. Maximum 15 hrs.

543 Topics in 20th-Century United States (3) Reading seminar: secondary sources on the 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.

555 Topics in U.S. 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 European social and economic history of European nations. Focus varies. May be repeated. Maximum 15 hrs.

557 Topics in Cultural and Intellectual History (3) Reading seminar: secondary sources on cultural and intellectual history. Focus varies. May be repeated. Maximum 15 hrs.

558 Topics in United States Regional and Local History (3) Reading seminar: secondary sources on regions, states and cities of the South. Focus varies. May be repeated. Maximum 15 hrs.

561 Topics in Latin American History (3) Reading seminar: secondary sources in Latin America. Focus varies. May be repeated. Maximum 15 hrs.

562 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.

571 Historical Editing (3) Seminar to develop practical skills applicable to historical editing.

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 9 hrs.

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

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

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

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

621 Directed Readings (3) Directed readings to prepare 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.

641 Seminar in Early American History (3) Research seminar in primary sources culminating in scholarly paper in American 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.

Harris, G. A., Jr., Ph.D. Michigan
Huff, P., 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
Hannum, Michael C., Ed.D. Northern Colorado

Assistant Professors:
Gilrane, Colleen P., Ph.D. Illinois
Hendricks, 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 2-modified and comprehensive special education
Track 1-reading education
Track 2-social science education
Track 2-elementary teaching
Track 2-modified and comprehensive special education
Track 2-secondary teaching

Education Specialist

Education
Elementary education
Reading education
Social science education
Teaching and learning

Doctor of Education

Education
Elementary education
Reading education
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), 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 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 and learning is knowing each individual child's learning style, abilities, and interests.

GRADUATE COURSES

419 Psychology and Education of Students with Mild Disabilities (3) Nature and characteristics of persons with mild handicaps and educational strategies...
appropriate for these persons. Prereq: Special Education Principles and Special Education Strategies, Admission to Teacher Education Program Coreq. 420, F

420 Field Experience in Modified Programs (3) Practicum in teaching in modified programs: planning, development, implementation, and evaluating instruction. Prereq: Special Education Principles and Special Education Strategies, Admission to Teacher Education and Curriculum and Instruction 422. Coreq. 420. S/NC only. F

421 Elementary and Middle School Science and Social Studies Strategies (3) Methods and materials for teaching science and social studies. Development of functional relationships and entities of two fields. Open to students with recent course in reading methods. Prereq: Admission to teacher education. F, Sp

422 Elementary and Middle School Teaching Methods I (6) Methods and materials (knowledge base) for teaching reading methods, science and social studies, and content and curriculum overview. Unit planning, daily planning, evaluation, etc., and language and concept development.

423 Language Arts/Reading Instruction in Elementary and Middle School (3) Language arts and development as applied to teaching of oracy (listening-speaking) and aspects of literacy (reading-writing). Not open to students with recent course in reading 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. 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. S/NC only.

432 Psychology and Education of Students with Moderate/Severe Disabilities (6) Nature and characteristics of persons with moderate/severe disabilities and educational strategies appropriate for those persons. Prereq: Special Education Principles and Special Education Strategies, Admission to Teacher Education and Curriculum and Instruction 422.

434 Topics in Reading Education (1-5) Prereq: Admission to teacher education and 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; directed observation in public schools, preparation of teaching plans and materials; simulated teaching experiences. Prereq: Admission to Teacher Education Program.

468 Speech and Language Basis of Learning Disabilities in the Classroom (3) Normal communication development, understanding of speech and language impairments in school-age students; integration of oral/written communication skills into existing curriculum, especially for high-incidence special education students.

470 Psychology of the Exceptional Child (3) Variables of exceptional children, general characteristics and educational needs. Implications of developmental variations for functioning as adults. Opportunity to expand study upon particular exceptionality. Enrollment limited to non-special education majors.

500 Thesis (1-15) only S/NC

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


504 Studies and Theory in Language Development (3) Studies and theory 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 (6) Content area teaching and development of student teacher, including microteaching models and other innovative assessment approaches. Prereq: Admission to Teacher Education Program. Coreq. 575.

506 Internships in Teaching in Special Education and Rehabilitation (3-15) Placement in professional settings in public schools or agencies under supervision of master practitioners. Enrollment limited to those in fifth-year program. S, Sp

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 learning experiences. Prereq. Coreq. Course in teaching of social studies 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 for the classroom. Prereq. Previous course in teaching of social studies or consent of instructor. Sp


528 Teaching Language Arts Elementary and Middle School (3) Recent trends and current materials and methods in teaching language arts (except reading). Prereq. Course in language arts or consent of instructor. Sp, Su

529 Practicum in Diagnosis and Remediation of Difficulties in Learning Mathematics (3) Assessment and practicum experience with children 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, Sp

534 Seminar in Reading Education (1-6) May be repeated. Maximum 6 hrs. E

536 Psycholology of Reading (3) Reading act, relationship between learning, reading, and memory in child's overall intellectual development. Affective and cultural factors. Prereq. 500-level course in reading education or consent of instructor. F

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 reading experience, or consent of instructor. Sp, Su

538 Practicum in Diagnosis of Reading Problems (3) Thorough practicum in diagnosis of specific reading diagnostic instruments; testing of elementary and/or secondary school students; preparing case study reports, and conducting staff 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 and teaching methodology 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 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 students and other innovative assessment approaches. Prereq: Admission to Teacher Education Program. Coreq. 556. S/NC or letter grade.

555 Characteristics of Affective/Motivational Functioning in Children with Disabilities (3) Definition, methods, identification and symptoms of children with affective/motivational development in disabled youngsters. Comparison to normals and that of children labeled disturbed or behavior disordered.

556 Instructional Systems for Affective/Motivational Education for Children with Disabilities (3) Educational strategies and modes of instruction; simulation, demonstration, and media. Teaching techniques, materials, and teacher/pupil/family interactions. Therapeutic forms of education through art, music, role play, puppetry, librarianship, and group interactions. Prereq. Coreq. 553 or consent of instructor.

557 Positive Preventive Discipline (3) Instructional, classroom and preventive/proactive strategies for use in classroom which positively structure efficient of classroom. Prereq. Research on how curriculum can encourage appropriate interactions of children and youth. Prereq. Admission to graduate program.

579 Special Topics (1-3) Prereq: Admission to graduate program. May be repeated. Maximum 9 hrs. S/NC or letter grade.

585 Teaching Secondary School Social Studies (3) Strategies, projects, methods 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.


590 Application of Microcomputer Technology in Special Education and Vocational Rehabilitation (3) Application of microcomputer technology with all categories of exceptionalities and across all chronological and functioning age ranges. Microcomputer adaptive software, switch access, audio, video, telecommunication, and strategies for cognitive development.

591 Clinical Studies (4) Relationship between educational theory and application during internship; research process, development of portfolio, and capstone experience.

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

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

595 Special Topics (1-3) May be repeated. S/NC or letter grade. E

596 Clinical Experience in Assessment and Instruction (3) Acquire relevant work experience in supervised assessment; tasks related to teaching; assessment, preparation of lessons, and delivery of instruction. Coreq. 553. S/NC or letter grade. F

599 Seminar in Social Studies Education (3) Research, trends, and advances in teaching social studies.

600 Doctoral Research and Dissertation (3-15) May be repeated. Maximum 6 hrs. E

603 Advanced Studies and Theoretical Models of Reading (3) Research on reading processes. Current theoretical models related to language acquisition and reading. Prereq. 500-level course in reading education or consent of instructor. Sp
Human Ecology

(College of Human Ecology)

MAJOR

Human Ecology ......................... Ph.D.

The College of Human Ecology offers the Doctor of Philosophy degrees with a major in Human Ecology.

ADMISSION REQUIREMENTS

A completed file for review includes the Graduate School application form, 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; Health, Leisure, and Safety Sciences; Human Resource Development; Nutrition; and Textile, Retail, and Consumer Sciences. 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. concentrations.

MINOR IN GERONTOLOGY

An interdepartmental/interdisciplinary minor in gerontology gives the graduate student an opportunity for combining the knowledge and experience about aging in American society with his/her own major concentration.

Core courses and a practicum are offered by the College of Social Work and selected departments within the colleges of Human Ecology, Education, and Arts and Sciences. A cross-listed seminar 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 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 four different departments including nine hours taken from outside the major department. Coursework needs to comply with the following framework:

1. Core 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, Health/Public Health 560, Nutrition 518, Public Health 523, Social Work 566, Sociology 415, Psychoeducational Studies 604, 622, 525.
2. Applied practicum: 2 hours required. Students should register under practicum experiences in the "home" department of the supervising faculty.
4. Successful completion of a written comprehensive examination covering subject matter of the minor.

Graduate Committee

At least one faculty member from the Gerontology Policy Committee who is qualified to work with graduate students, must serve on the graduate 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 (1-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be toward degree requirements. May be repeated. S/N 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 frameworks. P 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

545 Evaluation in Home Economics Education (3) Assessment of programs and pupil progress; techniques, methods and purposes. Prereq: 540. Coreq: 575. F, Sp, A

563 Family Life Education Programs (3) (Same as Child and Family Studies 563)

574 Analysis of Teaching for Professional Development (2) Strategies to document and analyze effective teaching and of professional development. Study and application of various approaches. Coreq: 575. F, Sp

575 Professional Internship in Teaching (1-8) Intensive teaching and teaching-related experiences in professional settings in public schools. Enrollment limited to postbaccalaureate students in professional year program. Prereq: Admission to Teacher Education Program. May be repeated. Maximum 12 hrs. S/N only. 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 Human 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 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, Psychoeducational Studies 585, Social Work 585, and Sociology 585.) S/N only.

591Clinical Studies (1-4) Group and individual seminar activities during full-time internship. Application and evalu-
Human Resource Development

(College of Human Ecology)

MAJORS DEGREES
Human Ecology .................................. Ph.D.
Human Resource Development ................. M.S.

Peter J. Dean, Head

Professors:
Campbell, C. P., Ed.D.......................... Maryland
Cheek, Gerald D. (Emeritus), Ph.D........... Kansas State
Coakley, Carroll B. (Emeritus), Ph.D......... Wisconsin
Craig, D. G. (Emeritus), Ed.D............... Cornell
DeJonge, Jacqueline O., Ph.D................. Iowa State
Haskell, R. W., Ph.D.......................... Purdue
Pelty, G. C. (Liaison), Ph.D.................. Missouri
Wagoner, G. A. (Emeritus), M.S.............. Indiana

Associate Professors:
Brewer, Ernest, Ph.D.......................... Tennessee
Dean, Peter J., II, Ph.D....................... Iowa
Hanson, R., Ph.D................................ Purdue
McInnis, Jackie H., Ph.D..................... Florida State
Stout, Vickie J., Ed.D......................... Tennessee

Assistant Professors:
Mimbs, Cheryl, Ph.D.......................... Virginia Tech
Pierce, R., Ph.D................................ Ohio State

THE MASTER'S PROGRAM

The Department of Human Resource Development offers a graduate program leading to the Master of Science with a major in Human Resource Development. The program is designed to provide opportunities for graduate students to achieve professional objectives, develop needed competencies, and gain desirable experiences and understanding of human resource development. In addition, a teacher licensure concentration is available. Both thesis and non-thesis options are offered.

General degree requirements are 39 hours (36 hours if statistics is waived) and 36 hours for the thesis option (33 hours if statistics is waived).

Departmental Core: Students must complete 504, 510, 511, and 512. The required departmental core for teacher licensure concentration is 504, 521, 522, Human Ecology 574, Human Ecology 591.

Concentration: Students must complete 12 hours (9 hours for thesis option) from one of the following concentration areas: education (business administration, education, family and consumer sciences education, industrial education, vocational-technical education), organizational learning systems, workforce training.

Teacher licensure concentration students must complete 12 hours (4 hours for thesis option) from one of the following concentration areas: business education, family and consumer sciences education, marketing education, technology education.

Statistics (3 hours): May be waived upon committee approval.

Cognitive or Related Studies (6 hours): Must support specialization or can consist of additional specialization courses. Not required for teacher licensure concentration.

Culminating Experiences: Thesis Option (6 hours): Problems in Lieu of Thesis Option (6 hours); Internship 509 (6 hours) for students changing career path; Internship Human Ecology 575 (12 hours) required for non-thesis option teacher licensure concentration.

Note: For students in the Nashville area, only the Workforce Training (formerly Industrial Training) is available.

THE PH.D. CONCENTRATION

The Doctor of Philosophy degree with a major in Human Resource Development and a concentration in human resource development is designed to provide opportunities for graduate 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 55 hours above the baccalaureate is required.

Concentration (21 hours): Must include courses to support Human Resource Development and may be taken from the Master's degree.

Departmental Core (11 hours): Must include 510, 511, 512 or equivalents and 604.

Specialization (12 hours): Must support career path of either university faculty member or manager of education/training.

Cognitive (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 the theoretical framework.

Research and Statistics (15 hours).

Statistics must include advanced statistics such as multivariate analysis and computer applications, 9 hours minimum; research methodology must include 504 and 610 or equivalents, 6 hours minimum.

Internship (0-6 hours): Required for those changing career path.

Dissertation (24 hours): Must be original research project.

Detailed information regarding the Ph.D. concentration program of study may be obtained from the departmental liaison for graduate studies.

GRADUATE COURSES

401 Utilization of Community Resources (3) Strategies of developing linkages between vocational education and private sector through advisory committees, councils, and working partnerships. Development and management of public relations programs. Prereq: 3 yrs teaching experience. Sp

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.

432 Methods and Materials in Business and Marketing Education (3) Teaching techniques, aids and evaluation in subject matter fields. Prereq: Consent of instructor. F, Su

436 Supervised Occupational Experience (3-9) Practicum experience in business and marketing settings under supervision of practitioner and departmental representative. May be repeated. Maximum 9 hrs.

439 Aides of Marketing (3) Marketing, personnel development, design, and management, as related to instructor's instructional leadership program in marketing education. Prereq: 432. F, Su

451 Adapting Vocational Instruction for Special Needs Learners (3) Modification of vocational-technical programs for special needs learners. Economic, social, educational, and legal considerations for providing relevant vocational-technical education for special needs learners.

454 Training Aids Development (3) Study and preparation of instructional aids and non-print media commonly used by technical instructors and trainers. Prereq: Senior standing or consent of instructor. F, Su

455 Performance-Based Evaluation (3) Assessing effectiveness of training through development of performance-based measures. Evaluation of incumbent worker job performance. Prereq: Senior standing or consent of instructor. Sp, Su

456 Organization and Operation of VICA/HOSA (3) Planning, organizing and implementing youth-club activities in vocational-technical programs. Prereq: Senior standing or consent of instructor. Sp, Su

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

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

503 Problems in Lieu of Thesis (3) May be repeated. Maximum 6 hrs. S/NC only. E


505 Selection, Placement, and Follow-Up Procedures in Industrial Training (3) Methods and procedures utilized in establishing criteria for trainee selection and placement in instructional programs and job. 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 training. 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 practitioners or representatives. 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 adult education and human resource development; fundamental principles and contemporary objectives. Prereq: Consent of instructor. F


512 Human Resource Management (3) Process-systems approach to human resource management: interdependent human resource activities (planning, work design, staff development, training and development, compensation, etc.) and organizational goals.
513 Special Topics in Human Resource Development (1-3) Specific objectives, activities, and evaluation. Prereq.: Consent of instructor. May be repeated. Maximum 9 hrs. E

514 Individual Study in Human Resource Development (3) Prereq.: Consent of supervising instructor. Approval form must be filed in office of department head. May be repeated. Maximum 6 hrs. E

515 Microcomputer Operations and Programming in Education (3) Operating procedures and BASIC programming for education and training applications. Hands-on experience in operating and programming microcomputers, writing, debugging, and running educational programs using sequential data files. Prereq.: Teaching, administrative, or supervisory experience in education or training, or consent of instructor. E

516 Microcomputer Software Development (3) Advanced software design in BASIC: random access and binary files, search and sort algorithms, and bitmapped graphics for educational environment. Hands-on learning and program development. Prereq.: S/NC only or consent of instructor. E

518 Education Specialist Research and Thesis (3) May be repeated. Maximum 9 hrs. P/NP only. E

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


530 Methods and Materials for VOE Programs (3) Development of instructional aids, recent developments and research, individualized instructions, and occupational clusters. Prereq.: 510 or equivalent. Sp, Su

531 Organization and Supervision of VOE and Marketing Program (1-3) Development of office and marketing occupations, guidance 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

540 Special Topics in Business and Marketing Education (1-3) Specific objectives, activities, and evaluation vary. Prereq.: Consent of instructor. May be repeated. Maximum 6 hrs. E

542 Problems in Business and Marketing Education (3) Selective research problems in teaching of business and marketing education and related areas. Prereq.: Consent of instructor. E

550 Administration of Industrial Education Programs (3) Developing, staffing, administering and evaluating programs using sequential data files. Prereq.: Teaching, administrative, or supervisory experience in education or training, or consent of instructor. E

551 Supervision of Industrial Education Programs (3) Techniques used to improve industrial education programs. Staff development, curriculum improvement, and program updating techniques. Prereq.: 455 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: justification, values, principles and concepts of industrial education. Prereq.: Consent of instructor. F, Su

553 Planning Technical Education Facilities (3) Preparation of educational plans, site selection, and working relationships with other professionals involved in process of planning technical-education facilities. Prereq.: Consent of instructor. F, Su

554 Technical Program Planning (3) Instructional systems and strategies related to analysis, design, development, implementation, and evaluation of trade, technical, supervisory, and related training. Prereq.: Curriculum development course and consent of instructor. F, Su

555 Curriculum Planning for Industrial Education Programs (3) Developing performance-based, criteria-referenced instructional programs. Prereq.: 374 or 554 or consent of instructor. Sp, Su

556 Organizational Development (3) Strategies and interactions for organizational development: training and development of staff, Models, assessment, organizational change and consultant’s role. Prereq.: 512 or consent of instructor. F

557 Advanced Methods of Teaching Technical Subjects (3) Specific methodology and effective application of innovative methods and teaching specialized skills and technical information. Diversifying and individualizing teaching of technical subjects. Prereq.: 373. Sp, Su

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. F, Su

559 Evaluation of Technical Training Programs (3) Internal and external evaluation of training programs to maintain quality control and/or to justify revisions. Prereq.: 455 and consent of instructor. Sp, Su

560 International Perspective of Workforce Training (3) Examination and comparison of workforce systems in highly industrialized countries. In-school training programs, out-of-school training systems, updating training of incumbent workers, training displaced workers, transfer of new technologies, and role and responsibilities of businesses, private sector organizations/agencies, and state and federal government agencies. F

562 Grant Writing and Project Implementation (3) Writing grant proposals, negotiating with funding sources, implementing and maintaining funded programs, and closing out funded projects at end of funding support. Prereq.: Consent of instructor. F

564 Self-Directed Work Teams (3) Theory and practice of implementing self-directed work teams, motivating employees, increasing productivity through 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, content, planning evaluation and implementation of specialized program areas. Prereq.: 555 or equivalent. Sp, Su


610 Research Development in Human Resource Development (3) Proposal development, research base, research design, sampling, application of statistics, and evaluation of research in human resource development. Prereq.: A grade of B or better in all degree requirements. E

611 Internship in Human Resource Development (3) Field experience in relevant organizations. Prereq.: Consent of instructor. May be repeated. Maximum 6 hrs. F

613 Special Topics in Human Resource Development (3) Prereq.: Consent of instructor. May be repeated. Maximum 9 hrs. E

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Inclusive Early Childhood Education

(Majors of College) Education

MAJORS: DEGREES

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, major, and concentrations in:

- Master of Science Education
  - Track 1-early childhood special education
  - Track 1-elementary education
  - Track 2-early childhood special education
  - Track 2-elementary teaching

Doctor of Philosophy Education

- Early childhood education

See Education under Fields of Instruction for full description of all 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, of 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. F

454 Education of the Gifted and Talented Children (3) Orientation to psychometric and behavioral studies of giftedness. Analysis of past and present school practices in reference to curriculum and program implementation. Sp

471 Early Childhood Special Education (6) Assessment, curriculum planning and development and teaching approaches used in early childhood special education. Prereq.: Admission to teacher education. Sp

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

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

503 Problems in Lieu of Thesis (2-3) May be repeated. Maximum 8 hrs. S/NC only. E

504 Clinical Experience in Teaching and Supervision of Exceptional Children (3-9) Placement in educational settings. May be repeated. Maximum 9 hrs. S/NC or letter grade. (Same as Rehabilitation and Deafness 504.)

515 Seminar (1-3) Curriculum, instructional technology, 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. Prerequisites: 553 or consent of instructor.

558 Neuromotoric and Health Disorders: Educational Implications (3) Neuromotoric impairments, physical disabilities and special health conditions; autism: investigation of instructional techniques and adaptations.

564 Psychosocial Development of Gifted and Talented Children (3) Phenomena of talent development in context of home, school, and society. Implications of maladjustment. Practices for promoting social and emotional development. Prerequisites: 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. Prerequisite: 451 or consent of instructor.

566 Curriculum for Early Childhood Education (K-3) (3) Theoretical foundations and current research in content and skill areas of curriculum for kindergarten-grade 3; application to local school setting. Prerequisite: Consent of instructor. May be repeated. Maximum 9 hrs. S, Su.

567 Application of Theory in Early Childhood Education (K-3) (3) Principles and practices from selected theoretical orientations. Prerequisite: Course in early childhood education or consent of instructor. May be repeated. Maximum 6 hrs. F, Su.

568 Early Childhood Special Education: Theories and Interventions (3) Theoretical perspectives of early childhood special education: exploration of programmatic models, family-focused concepts and curriculum development.

575 Creative Problem-Solving Strategies for Special Educators (3) Techniques for solving problems encountered by special educators in any setting.

579 Special Topics (1-3) Prerequisite: Admission to graduate program. May be repeated. Maximum 9 hrs. S, NC or letter grade.


591 Clinical Studies (4) Relationship between educational theory and application during internship; research project, development of portfolio, and capstone experience.

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

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

595 Special Topics (1-3) May be repeated. S, NC or letter grade. E

600 Doctoral Research and Dissertation (3-15) PINP 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. Prerequisite: Admission to doctoral program or consent of instructor. May be repeated. Maximum 9 hrs. S, NC only.

620 Internship in Research in Special Education and Rehabilitation (3-9) Placement with professional engaged in theoretically-based research: public school, institutions, agencies or university settings. Prerequisite: 593hr. in statistical and research methodologies. May be repeated. Maximum 9 hrs. S, NC only.

630 Internship in Institutional Leadership in Special Education and Rehabilitation (3-9) Advanced level field experiences under supervision of practitioner. Prerequisite: Consent of instructor. May be repeated. Maximum 9 hrs. S, NC only.


650 Advanced Studies in Early Childhood Education (3) Prerequisite: 2 graduate courses in early childhood education and consent of instructor. May be repeated. Maximum 6 hrs. S, NC only. E

659 Special Topics (1-3) Prerequisite: Admission to doctoral program. May be repeated. Maximum 9 hrs. S, NC or letter grade.

669 Internship (1-3) Experience in application of principles and practices of curriculum development and instructional improvement. Prerequisites: 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

Industrial and Organizational Psychology ......................................................... M.S., Ph.D.

Robert T. Ladd (Liaison), Director

Committee:

Fowler, Oscar S., Management
James, Lawrence R., Management
Larsen, John M., Jr. (Emeritus), Management
Russ, Michael C., Management
Russell, Joyce E. A., Management
Schumann, David W., Marketing, Logistics & Transportation

The master's and doctoral programs are designed to prepare students for personnel, managerial, and organizational research; for university teaching; and for consulting relationships with industry. The program emphasizes a scientist/practitioner model in applying and conducting research based on accepted theory, organizational behavior, psychology, management, and statistics. The degree programs are administered by a committee appointed by the Associate Vice Chancellor and Dean of The Graduate School on recommendations from the 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, sciences, 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 the Office of Graduate Admissions and Records (218 Student Services Building) and the Director, Industrial and Organizational Psychology Program, (405 Stokely 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.

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. A student 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, students admitted to the program have performed at or above the 60th-70th percentile on the general tests. (This corresponds to a raw score of approximately 600 on each of the tests.)

THE DOCTORAL PROGRAM

A thesis is required with 6 semester hours of Management or Psychology 500.

The master's degree can be completed with a minimum of 33 semester hours in the major as follows:

Management 567, 568 or Psychology 517-18; Psychology 557; Statistics 537, 538.

Twelve hours of additional coursework to be selected primarily from the following with the approval of the student's advisor: Management 511, 522, 610; Management/Psychology 625, 626, 627, 638; Psychology 505, 550, 610, 620, 624.

Electives, as approved for an individual's plan of study, may be selected from graduate courses in psychology, social work, sociology, management, education, planning, etc. Students who wish to pursue special research interests aside from their thesis may register for Management 525, 526 (Maximum 6 hrs per term; courses may be repeated) or Management/Psychology 690.

An internship, practicum, or field experience is recommended; a student is expected to be in residence full time one year (two years recommended).

A master's candidate must pass a final oral examination.

In addition to course requirements, a master's student must complete a comprehensive examination in general psychology within no more than two years by attaining a score of 630 (or 85th percentile) on the Subject GRE (Psychology-81).

An overall "B" average is required in the course sequence Management 567-68 or Psychology 517-18 to continue in the program beyond the first year.

THE DOCTORAL PROGRAM

Any student in the doctoral program may be required to prepare a master's thesis by the Industrial and Organizational Psychology Committee. This policy will be implemented by the committee at such time as a review of the student's record suggests that additional data on
the qualifications for pursuing a Ph.D. are required.

A dissertation is required with a minimum of 24 semester hours of Management or Psychology 600.

The doctoral degree can be completed with a minimum of 54 semester hours in the major as follows:

Management 567-68 or Psychology 517-18, Psychology 557, Statistics 537-38.

A minimum of five doctoral seminars (15 hours) selected from: Management 610; Management/Psychology 625, 626, 627, 638; Psychology 620, 624. (Five doctoral seminars are viewed as the absolute minimum; more are recommended. Statistics 671 and Psychology 665 are also recommended.)

Elections, as approved for an individual's plan of study, may be selected from graduate courses in psychology, social work, sociology, management, education, planning, etc. Students who wish to pursue special research interests aside from their dissertation may register for Management 525, 526 (Maximum 6 hrs per term; courses may be repeated) or Management/Psychology 690.

An internship, practicum, or field experience is recommended. A student is expected to be in residence full-time one year (two years are recommended).

Doctoral candidates must pass a final oral examination on their dissertation research.

In addition to course requirements, a doctoral student must attain a score of 650 (90th percentile) on the Subject GRE (Psychology 81) within two years of entry, successfully complete the qualifying examination covering scientific methodology before or during the third fall semester, and successfully complete the comprehensive examination in the areas of the student's major research and professional interests.

An overall B average is required in the course sequence Management 567-68 or Psychology 517-18 to continue in the program beyond the first year.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of each state to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S. program in Industrial and Organizational Psychology is available to residents of the states of Alabama or West Virginia. 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.

Industrial Engineering

(Granted by the School of Industrial and Engineering Management)

MAJOR

Industrial Engineering

C. H. Aikens, Head

Professors:

Bontadelli, J. A., P.E., Ph.D. ................ Ohio State

Claycombe, W. W., Ph.D. ..................... VPI

Devine, Michael D., Ph.D. ............... Texas

Garrison, G. W. (UTSI), Ph.D. .......... NC State

Loveless, 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:

Ford, R. E., Ph.D. ........................... Tennessee

Kress, T. A., Ph.D. ......................... Tennessee

Sawhney, Rupy S., Ph.D. ................. Tennessee

The Department of Industrial Engineering offers a graduate program leading to the Master of Science degree with a major in Industrial Engineering, concentrations in traditional industrial engineering and engineering management. 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 either industrial engineering or engineering management. Admission is open to graduates of ABET-accredited undergraduate programs 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, manufacturing and production systems, human factors engineering, information systems engineering, maintenance and reliability engineering, or general industrial engineering.

Engineering Management

The engineering management concentration has an additional admission requirement of two years' U.S. industrial experience as a practicing engineer or scientist, or current full-time employment in an appropriate engineering or applied science position. The program is non-thesis and requires 33 hours of coursework plus a 3-hour capstone project. This concentration is fully supported on-campus utilizing electronic media for video taping and interactive distance teaching methods.

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


402 Production System Planning and Control (3) Theory and application of forecasting systems, regression analysis, and time series models. Independent study of inventory models, scheduling, capacity planning, shop floor control. Prereq: 400.

410 Production Facilities Design and Material Handling (3) Design of production facilities: plant layout, analysis and planning for overhead 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.

411 Development of a planning system. Methods and problems in selection, or replacement of equipment. Decisions among engineering alternatives involving capital recovery, economic life of equipment, and rate of return on investment.


413 Quantitative Methods in Project Management (2) Project planning, scheduling, and control based on network and precedence diagramming methods. Resource allocation and time-cost trade-off algorithms, multi-project control, computer applications, and PERT methods of handling uncertainty in activity time estimates.


421 Informational Systems I (3) Systems engineering approach to design, development, implementation, and evaluation of systems of information. Informational aspects of IE systems. Data structures and databases and management systems. Prereq: Senior standing.

422 Senior Industrial Engineering Problems Analysis (3) Application of industrial engineering to field assignments in local organizations, problem definitions, analysis and presentation. Prereq: 422, 423, and 405.


440 Total Quality Management (3) Philosophy of continuous improvement in organizations: management and implementation issues; definition, identification and analysis of problems, root cause identification, process mapping and control, 5S, control charts, Pareto diagrams, cause and effect diagrams, and other tools; data collection and analysis; control and management of measuring systems; issues related to continuous processes; managing quality in short-run environments; use of statistical tools.
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Information Sciences

(Office of the Vice Chancellor for Academic Affairs)

MAJOR DEGREE

Information Sciences ........................................ M.S.

W. David Penniman, Interim Director
Kim P. Atwood, Assistant Director
Shawn Collins, Budget Officer and Computing Services Coordinator
George Hoemann, Distance Education Coordinator

Professors:

Penniman, W. David, Ph.D. ............. Ohio State
Purcell, Gary R. (Emeritus). Ph.D............... Case Western
Tennopoulous, Ph.D. Elementary Education: Illinois
Wilson, P. (Emeritus), Ph.D. ............. Michigan

Associate Professors:

Fisher, Patricia L., Ph.D. .............. Florida State
Pemberton, J. Michael, Ph.D. ............ Tennessee
Pollard, Richard, Ph.D. ................. Brunel (UK)
Robinson, William C., Ph.D. .......... Illinois
Sinkankas, George M., Ph.D. .......... Pittsburgh

Assistant Professors:

Rabear, Douglas, Ph.D. ................. Indiana
Wang, Pelling, 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:

1. 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.

8. To provide services to the state, region, and nation in association, consulting and continuing education activities which will promote the development and improvement of information systems and services such that the school's contributions exceed 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, resources, 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 submitted 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 8 from outside the University.

Core Curriculum

The core curriculum is a 16 semester hour sequence of six courses required of all students: 490, 520, 530, 560, 580, 585. These courses address the evolving information environment; foundations of information sciences and technologies; information resources selection, acquisition and evaluation; information content representation; information access and retrieval. The 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 first semester of core course work with permission of the advisor and the instructor of each elective course selected.

Concentrations

Upon completion of the core curriculum, students may select a concentration from one of the following:

Corporate Information Systems and Services: The concentration includes the following:

Corporate Information Systems and Services: The concentration includes the following:

Electronic Publishing: The concentration includes 15 hours (537, 561, 563, 565, 585) of required courses plus 3 hours of 587 for non-thesis option students and six required hours of 500 for thesis option students, as well as 9 hours of elective courses, one selected from each of these groups or all electives selected. Additional course hours may substitute 3 hours of 500 for an elective.

Information Systems and Technology: The concentration includes 12 hours (540, 553, 554, 586, 588, 589) of required courses plus 9 hours of elective courses.

Scientific and Technical Information: The concentration includes 12 hours (450, 532, 535, 540, 555, 599) of required courses and students must be registered for 5IS 500 in the semester they complete and defend their thesis. The oral
defense of the thesis (final comprehensive examination) substitutes for the written examination that is taken by non-thesis students. The writing of the master’s thesis serves as the culminating experience.

Non-Thesis Option: Upon completion of the program, all students who elect the non-thesis option must take and pass a written comprehensive examination. This examination is comprised of 20 questions, usually work at least 20 hours each week and 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.

FINANCIAL ASSISTANCE OPPORTUNITIES

Employment with the University of Tennessee Libraries may provide a work-study opportunity for selected students who wish to obtain experience in academic librarianship while pursuing the degree. Such students usually work at least 20 hours each week and thus may extend the period required for the degree. Similar opportunities exist with other libraries and information agencies in the Knoxville area.

Work opportunities in a scientific-technical environment are available through subcontracts with Oak Ridge National Laboratory and the Department of Energy. A limited number of graduate teaching assistantships are available through the school. Assistantships 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 school, M.S. in Information Sciences, write to Admissions, School of Information Sciences, University of Tennessee, 804 Volunteer Blvd., Knoxville, TN 37996-4330

ACADEMIC COMMON MARKET

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

GRADUATE COURSES

430 History of the Book (3) History of writing and various methods of bookmaking.
450 Writing About Science, Technology and Medicine (3) (Same as Journalism 450.)
475 Utilization of Instructional Media (3) (Same as Education in the Sciences, Mathematics, Research and Technology 475.) E
485 Electronic Communications and Information Resources on Internet (3) Exploration of worldwide information online resources, including e-mail, gopher, Archie, Veronica, WAIS, WWW, and newsgroups.
490 Information Environment (3) Generation, production, management, dissemination, and use of information.
500 Thesis (1-15) P/NP only. E
502 Registration and Use of Facilities (3-15) Required for the student not otherwise registered during the semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. SP, FA, SU.
504 Electronic Information and Communications Laboratory (1) Methods for creating and managing information in electronic form. Communication of electronic information in networked environment. Location and use of electronic information resources. For GSLIS graduate students only; must be completed satisfactorily in first semester. SNC only. F, Sp.
520 Information Content Representation (3) Principles of distinguishing, describing, and indexing intellectual works: current approaches; citation systems, descriptive cataloging, non-subject indexing, pre- and post-coordinate subject indexing, classification and categorization; 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 index, general classification, authority control, bibliographic utilities, online library catalog.
523 Abstracting and Indexing (3) Philosophies, standards, and procedures for manual and automatic document indexing, back-of-the-book indexing, vocabulary control, thesaurus construction, and abstracting.
530 Information Access and Retrieval (3) Media for information storage, logical and physical information structures, query logic and 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, bibliographical, F, Sp, Su, A.
531 Sources and Services for the Social Sciences (3) Information sources in political science, sociology, psychology, geography, history, anthropology, business, and education.
532 Sources and Services for Science and Engineering (3) Information sources in engineering, physical and life sciences.
533 Sources and Services for the Humanities (3) Information sources in philosophy, religion, fine arts, performing arts, literature and language. Organization and management of regional collections.
534 Government Information Sources (3) Selection, acquisition, organization, and utilization of government information in variety of formats from legislative, judicial and executive branches of federal, state, local, and international government agencies. F, Sp.
535 Advanced Information Retrieval (3) Bibliographic, non-bibliographic, full-text databases, e.g., non-bibliographic formulas and full-text databases, patent, user delivery alternatives, evaluation, and testing.
536 Creation and Distribution of Information and Knowledge Resources (3) Historical, political, and societal dimensions of creating, utilizing, and sharing information and knowledge from Aristotle’s Lyceum to twentieth-century university and research environments.
537 Information Industry (3) Issues and trends concerning information industry, economics of information products and services, technological and organizational change, information professions, and issues. F, Sp, Su, A.
538 Economics of Information (3) Costing and pricing of information; value of information and various added services; cost-benefit analysis and tradeoffs; policy issues related to economic aspects of information exchange and transfer.
539 Information Policy (3) Role of government in creation and management of information; federal and international policy areas relevant to information creation, production, and distribution; development of information policy for organizations.
540 Research Methods (3) Research methods in variety of information environments; primary and secondary research; research project design; research results interpretation; analysis of published research; techniques supporting research process.
550 Management of Information Organizations (3) Supervision and management concepts, strategies, and techniques applicable to information professional working in libraries, archives, records management, and other information organizations.
551 School Library Media Centers (3) Planning, implementing, and evaluating school library programs. Curricular involvement, role of technology, site-based management, relationships with district and state services.
552 Information Centers in Higher Education (3) Development, mission, trends, issues, users, services, and evaluation of campus information centers including libraries and alternatives; learning resources center and library-computer center models.
553 Corporate Information Services (3) Development and present status, scope and objectives. Information resources external to organizations.
554 Public Library Management and Services (3) Development, roles, political environment, governance, organization, fiscal management, services, marketing, and performance evaluations.
555 Scientific and Technical Communications (3) Evaluation of scientific and technical communication; current trends, role of formal and informal communications; major STI organizations and their roles.
557 User Instruction (3) Theory, strategy, design, and practice in providing instructional services and technology for end users of information and information systems. Includes practical experience.
560 Information Resources Selection, Acquisition, and Evaluation (3) Principles of development and management of collections in information agencies; community analysis, users and uses, policies and procedures; evaluation of items and collections; selecting items to meet particular needs. F, Sp, Su, A.
561 Contemporary Book Publishing (3) Creation, design, production, marketing, and distribution, various types of publishers.
563 Graphic Design and Media (3) Principles and practice in visual aspects of communications. Graphic design, typography, production techniques and publication design, as these apply to electronic information delivery systems.
564 Corporate Information Systems (3) Objectives and function elements of records systems, archival programs, management information systems and techniques within various types of organizations. Management of information internal to organizations.
566 Environmental Scanning for Information Professionals (3) Principles and practice of environmental scanning; information evaluation and synthesis; role of strategic information in modern organization.
567 Information Network Applications (3) Scholarly and community based electronic communications. National and international standards, tools, resources; identification, analysis, evaluation, and management of tools and agencies; sources, constraints, caveats to local technologies as developed and applicable.
569 Advanced Production of Audiovisual Software (3) (Same as Research in the Sciences, Mathematics, Research and Technology 569.) 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. Su.

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 infometrics; 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 integration 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; associations, relations, and hyper-text.

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.

589 Information Networking Technologies (3) Concepts and terminology of information transmission, information network architecture and standards. Contemporarv and emerging information networking technologies. F.

590 Problems in Information Sciences (3-6) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

591 Supervised Readings in Information Sciences (3-6) Prereq: Consent of instructor. May be repeated with consent of advisor. Maximum 6 hrs.

592 Seminar in Information Sciences (3-6) 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 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 6 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.

Interdisciplinary Programs

(College of Arts and Sciences)

The College of Arts and Sciences offers a series of interdisciplinary undergraduate majors and minors through its Interdisciplinary Programs. These programs include African and African-American Studies, American Studies, Ancient Mediterranean Civilizations, Asian Studies, Cinema Studies, Comparative Literature, Latin American Studies, Linguistics, Medieval Studies, Russian and East European Studies, Urban Studies, and Women's Studies. Certain courses within these programs are available for graduate credit as listed below. See the Undergraduate Catalog for program descriptions and directors.

African and African-American Studies

GRADUATE COURSES


450 Issues and Topics in African-American Studies (3) Problems, topics, issues, and individuals. May be repeated. Maximum 6 hrs.

452 Black African Politics (3) (Same as Political Science 452.)


483 African-American Women in American Society (3) Historical and contemporary socio-eco-political factors in American society as related to Black women. (Same as Women's Studies 483.)

510 Special Topics (3) May be repeated. Maximum 6 hrs.

American Studies

GRADUATE COURSES

510 Special Topics (3) May be repeated. Maximum 6 hrs.

Ancient Mediterranean Civilizations

GRADUATE COURSES

510 Special Topics (3) May be repeated. Maximum 6 hrs.

Asian Studies

GRADUATE COURSES

510 Special Topics (3) May be repeated. Maximum 6 hrs.

Cinema Studies

GRADUATE COURSES

400 Special Topics in Comparative Literature (3,3) Content varies. 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.)

423 Modern Art and Film (3) (Same as Art Media/Photography 423.)

489 Special Topics in Film (3) (Same as English 499.)

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 9 hrs.

510 Special Topics (3) May be repeated. Maximum 6 hrs.

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.)

420 The Development of Historical Linguistics as a Science (3) Scientific understanding of language change. Emergence of Neogrammarian paradigm from 19th-century intellectual trends. Impact of synchronic, descriptive, structural and transformational-generative linguistics on contemporary diachronic theory. Prereq: 6 hrs of courses required for linguistics concentration 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 (Same as German 426, French 426, Russian 426, and Spanish 426.)

429 Romance Linguistics (Same as French 429 and Spanish 429.)


435 Structure of the German Language (Same as German 435.)

485 Special Topics in Language (Same as English 485.)

476 Second Language Acquisition (Same as English 476.)

475 Teaching English as a Second or Foreign Language I (3) (Same as English 475.)

474 Teaching English as a Second or Foreign Language II (3) (Same as English 474.)

472 American English (Same as English 472.)

464 Urban Ecology (Same as Sociology 464.)

441 Urban Geography (Same as Geography 441.)

510 Special Topics (3) May be repeated. Maximum 6 hrs.

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**Medieval Studies**

**GRADUATE COURSES**

510 Special Topics (3) May be repeated. Maximum 6 hrs.

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**Russian and East European Studies**

**GRADUATE COURSES**

401-02 Advanced Grammar, Conversation, and Composition (3,3) Prereq: Russian Composition and conversation or equivalent. (Same as Russian 401-02.)

451 Senior Seminar (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 451-52.)

510 Special Topics (3) May be repeated. Maximum 6 hrs.

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**Urban Studies**

**GRADUATE COURSES**

401 The City in the U.S. (3) (Same as Planning 401.)

441 Urban Geography (3) (Same as Geography 441.)

464 Urban Ecology (3) (Same as Sociology 464.)

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**Women’s Studies**

**GRADUATE COURSES**

400 Topics in Women’s Studies (3) Content varies. May be repeated.

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**Journalism**

(College of Communications)

**MAJOR**

**DEGREES**

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

James A. Crook, Director

Professors:

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
Cauldil, C. Edward, Ph.D. ............... North Carolina
Crook, James A., Ph.D. ..................... Iowa State
Everett, George A. (Emeritus), Ph.D. .... Iowa State
Haskins, Jack B. (Emeritus), Ph.D. ..... Minnesota
Lain, John L. (Emeritus), M.A. .......... Iowa
Leiter, B. Kelly (Emeritus), Ph.D. ...... Southern Illinois
Littmann, Mark (Chair of Excellence), Ph.D. 

Northwestern

Muller, M. Mark, Ph.D. ................. Michigan State
Singleton, Michael, Ph.D. ............. Southern Illinois
Teeter, Dwight L., Jr., Ph.D. .......... Wisconsin
Tenopir, Carol (Adjunct), Ph.D. ...... Illinois
Tucker, Willis C. (Emeritus), M.S. ..... Kentucky

Associate Professors:

Dimmick, Susan L., Ph.D. .............. Tennessee
Heller, Robert B., M.A. ................. Syracuse
Morrow, Jerry L., Ph.D. ................. Toledo

Assistant Professors:

Foley, Daniel, M.S. ....................... 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.

**Journalism**

**GRADUATE COURSES**

403 International Communications (3) Development and operations of world mass communications channels and agencies. Comparative analysis of media, media practices, and flow of news throughout world. Print and broadcast systems in terms of relevant social, political, economic, and cultural factors. Relation of communication practices to international affairs and understanding. Sp

412 Opinion Writing (3) Analysis of editorial positions, practices, and techniques. Writing of editorials and columns for newspapers, magazines and company publications; study and use of rhetorical devices and logic. Prereq: Writing for Mass Communication or consent of instructor. (Same as Public Relations 412.)

414 Magazine Article Writing (3) Techniques of writing in-depth articles of mass circulation and specialized magazines. Organizing and presenting material, problems in specialized areas; business, science, agriculture, humanities. Prereq: Communications 200, or consent of instructor.

416 Issues in Journalism (3) Topics vary. Prereq: of instructor. May be repeated. Maximum 6 hrs.

420 Print Media Management (3) Current business practices among print news media, especially newspapers. Problems in management and production and outlook for new technologies. Prereq: 6 hrs mathematics and/or accounting and senior standing. Sp

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: 300. E

433 Advanced Editing (3) Sensitivity to language and editing skills. Deadline writing, layout, and production. Prereq: 203.

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) Writing workshop to analyze examples of successful science writing and write series of articles for general public based on scientific journals, news conferences, technical meetings, and interviews. Prereq: Consent of instructor. (Same as Information Sciences 450.) F,Sp

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 science and reporting. Example of popular literature in environmental reporting. Prereq: Editing for 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 of some enduring writing successes. Prereq: Consent of instructor.

460 Mass Communications History (3) Development of press and role of mass communications in American history. Newspapers, radio, television, and magazines. F


520 Press-Government Relations (3) Development of adversary relationship between journalists and government officials. Philosophical and legal basis for open government. Use of press by candidates and incumbent officials. (Same as Political Science 520.) F

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 Political Science 525.)

535 Publications Management (3) Problems in management, production, marketing, and design, techniques of writing, editing, and presenting comprehensive articles and other material; regional and specialized magazines, individual editorial projects. Prereq: 420 or consent of instructor.

550 Writing and Editing Projects (3) Specialized writing or editing interests: agriculture, politics, labor, finance, science; technical, general publications. Prereq:
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 evaluation of major 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
516 Seminar in Public Relations Issues (3) Topics vary. May be repeated. Maximum of 6 hrs.
520 Press-Government Relations (3) (Same as Journalism 520.)
525 Public Opinion (3) (Same as Journalism 525.)
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 journalism supervised by editor or manager with faculty approval. No retroactive credit for previous work experience. Prereq: Completion of core curriculum.

At Education

GRADUATE COURSES

510 Islay and Isology o Art Education (3) United States from 1860's to present. Prereq: Consent of instructor.
520 Studies in Art Education (3) Issues and topics current to the field of art education. Prereq: Consent of instructor.
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.

Associate Professors:
Hodge, R. L., Ph.D. ...................... Texas
Ryan, Thomas K., Ed.D. .............. Ball State

The Language, Communication, and Humanities Education unit participates in graduate programs leading to degrees, majors, and concentrations in:

Master of Science

Education
Track 1-art education
Track 1-English education
Track 1-language education
Track 2-art education
Track 2-secondary teaching

Educational Specialist

Education
English education
Foreign language/ESL education

Doctor of Education

Education
English education
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 different contexts of cultures.

Language, Communication, and Humanities Education

(Graduate of Education)

MAJORS

Degree

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, M.S. .................. Tennessee

Language, Communication, and Humanities Education

GRADUATE COURSES

455 Teaching of Foreign Languages, Grades 7-12 (3) Instructional methods, lesson planning, peer-teaching, materials for teaching foreign language and culture: evaluation techniques. Required for certification in modern foreign language and Latin. Prereq: Completion or near completion of foreign language hours for certification and Admission to Teacher Education Program.

459 Teaching English in the Secondary School (3) Techniques of teaching composition, language, and literature. Prereq: Admission to Teacher Education Program.

460 Teaching Reading and Literature in the Secondary School (3) Approaches for teaching basic reading skills and ways of teaching literature. Sp

461 Developing Reading Skills in Content Fields (3) Techniques for teaching reading and study skills in content areas of school program. Extensive assessment of textbooks: Middle and high school. 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. P/NP only. E


507 Teaching Poetry Grades 7-12 (3) Research and theory in application to teaching of poetry. Design of strategies and materials for teaching and writing and reading of poetry. Review of texts and materials. F

508 Teaching Composition in the Secondary School (3) Teaching narration, description, exposition, and argumentation; writing process and marking of student papers. Sp

509 Teaching Fiction in the Secondary School (3) Teaching of novels and short stories. F

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

521 Interdisciplinary Aesthetics (3) Discussions, visual and audio presentations concerned with aesthetic considerations of art: geography, history, physics, literature, languages, music, visual arts and drama.

533 Reading in Community College: Research and Theory (3) Analysis of components of effective community college reading programs. Attention to research and theoretical bases. Prereq: Course in reading education or consent of instructor. Su

555 Foreign Language in the Elementary Schools Practicum (3) Experiences designing, implementing and assessing second language instruction in elementary schools. Prereq: 587 or consent of instructor. F

560 English as a Second Language Practicum (3) Experiences designing, implementing and assessing English instruction to non-native English speakers. Required course for ESL certification. Prereq: Consent of instructor. F

562 English Language as a Second Language (3) Experiences designing, implementing and assessing English instruction in ESL and EFL classrooms. Required for Tennessee ESL (K-12) licensure. Prereq: Consent of instructor. F

587 Teaching English as a Second Language (3) Instructional methods, utilization of assessment procedures to diagnose English proficiency; materials for non-native speakers in K-12 classroom. Required for Tennessee ESL (K-12) licensure. Prereq: Consent of instructor. Sp


590 Seminar in Teaching English in Secondary Schools (3) Content varies. Theoretical and practical approaches to teaching English in secondary school. May be repeated. Su

592 Linguistics and the Teaching of English (3) Grammar, usage, semantics, dialectology, history of language, and lexicography. Su

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

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

595 Special Topics (1-3) May be repeated. S/NC or letter grade. E

597 Teaching Drama Grades 7-12 (3) Strategies and materials for teaching drama: acting, directing, and writing of plays, reading of scripts. Sp

598 Developing Speaking and Listening Skills, Grades 7-12 (3) Teaching approaches to nonverbal communication, interpersonal and group communication, public address and listening. Review of texts and materials. Sp
Large Animal Clinical Sciences

See College of Veterinary Medicine and Comparative and Experimental Medicine

Law

(College of Law)

MAJOR DEGREES

Law J.D., J.D.-MBA, J.D.-M.P.A.

Richard S. Wirtz, Dean

Professors:

Askan, Frances Lee, LL.M. Harvard
Best, Reba, M.L.S. Florida
Blaze, Douglas A., J.D. Georgetown
Cohen, Neil P., LL.M. Harvard
Cook, Joseph G., LL.M. Yale
Hardin, Patrick, J.D. Chicago
Hess, Amy M., J.D. Virginia
Jones, Duane E. Duke, J.D.
King, Joseph H., J.D. North Carolina
Lacey, Forrest W. (Emeritus), S.J.D.

Le Clerc, Frederic S., LLB. Duke
Loyd, Robert M., J.D. Michigan
Overton, Elvin E. (Emeritus), S.J.D. Harvard
Phillips, Jerry J., J.D. Yale
Picquet, Chayin, H.S.L.S. Tennessee
Reynolds, Glenn H., J.D. Yale
Rykin, Dean H., J.D. Vanderbilt
Sewell, Toxey H. (Emeritus), S.J.D.

LL.M. George Washington

Sobieski, John L., J.D. Michigan
Wirtz, Richard S., J.D. Stanford

Associate Professors:

Aarons, Dwight, J.D. Hawaii
Anderson, Gary L., LL.M. Harvard
Beinert, William J., J.D. Harvard
Black, Jerry P., J.D. Vanderbilt
Bunker, Mary Garber, J.D. George Washington
Cormet, Judy M., J.D. Temple
Davies, Thomas Y., J.D. Northwestern
Gray, Fred B., J.D. Vanderbilt
Kennedy, Deseree A., LL.M. Temple
Leatherman, Don A., LL.M. New York
Medill, Colleen E., J.D. Michigan
Parker, Carol M., J.D. Illinois
Pierce, Carl A., J.D. Yale
Plank, Thomas E., J.D. Maryland
Stein, Gregory M., J.D. Columbia
Thorpe, Steven R., J.D. Mercer
Wertheimer, Barry M., J.D. Duke

Assistant Professors:

Brown, Kelly K., J.D. Cincinnati
Davis, Melinda D., M.S.L.S. North Carolina

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, experiential activities, and student services is available from the Admissions Office, The University of Tennessee, College of Law, 104 Aconda Court, 802 Volunteer Blvd., Knoxville, Tennessee 37996-4070. Completed application should be received before February 1 of the year of request application.

DEGREE OF DOCTOR OF JURISPRUDENCE

The degree of Doctor of Jurisprudence will be conferred upon candidates who complete, with the required average, six semesters of resident law study and who have 88 semester hours of credit, including all required courses. The required average is 2.0 and that average must be maintained on the work of all six semesters and also for the combined work of the grading periods in which the last 28 credit hours taken in residence were earned. Averages are computed on weighted grades. Grades are on an alphabetical scale from A+ to F. No credit toward the J.D. degree is awarded for grades of D- or F.

Eligible law students may receive up to six (6) semester hours of credit toward the J.D. degree for acceptable performance in upper-level courses that materially contribute to the study of law and which are taken in other departments at The University of Tennessee. Course selection and registration are subject to guidelines approved by the law faculty which include the requirement that any such course be acceptable for credit toward a graduate degree in the department offering the course.

Refer to the Law Catalog and Student Handbook for current degree requirements. Concentration in Business Transactions

Students interested in a concentration in business transactions must complete all of the following law courses:

818 Fundamental Concepts of Income Taxation
826 Introduction to Business Transactions*
827 Business Associations
972 Income Taxation of Business Organizations
940 Land Finance Law
430 Commercial Law
433 Contract Drafting Seminar
433A Representing Enterprises

None of the above courses may be taken on an S/N basis (with the exception of 826).

*This course is not required for students who have an undergraduate major in accounting, finance, or business administration, who hold the MBA degree, or who are enrolled in the dual J.D.-MBA program. Students 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/N basis.

DUAL J.D.-MBA DEGREE PROGRAM

The College of Business Administration and the College of Law offer a coordinated dual degree program leading to the conferment of both the Doctor of Jurisprudence and the Master of Business Administration degrees. A student pursuing the dual program is required to take additional credit hours than would be required if the two degrees were to be earned separately.

Admissions

Applicants for the J.D.-MBA program must complete application to, 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 satisfy the graduation requirements of each college. Dual degree students withdrawing from the dual degree program before completion of both degrees will not receive credit toward graduation from either college for courses in the other.
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.

Awards of Grades

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

Non-Law Elective Course Credit

Students enrolled in the J.D.-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 conferral of both the Doctor of Jurisprudence and the Master of Public Administration degrees. In this program, a student may earn the M.P.A. and J.D. degrees in about four years rather than the five years that otherwise would be required. Students pursuing the dual degree program should plan to be enrolled in coursework or an internship for one summer term in addition to taking normal course loads for four academic years.

Admission

Applicants for the J.D.-M.P.A. program must make separate application to, and be independently accepted by, the College of Law for the J.D. degree and the Department of Political Science and The Graduate School for the M.P.A. degree. Applicants must also be accepted by the Dual Degree Committee. All applicants must submit a Law School Admission Test (LSAT) score. An applicant's LSAT score may be substituted for the Graduate Record Examination (GRE) score, which is normally required for admission to the M.P.A. program. Application may be made prior to, or after, matriculation in either the J.D. or the M.P.A. program, but application to the dual program must be made prior to entry into the last 29 semester hours required for the J.D. degree and prior to entry into the last 16 hours required for the M.P.A. degree.

Curriculum

A dual degree candidate must satisfy the requirements for both the J.D. and the M.P.A. degrees, as well as the requirements for the dual program. The College of Law will award a maximum of 9 semester hours of credit toward the J.D. degree for successful completion of approved graduate level courses (500 or 600 level) offered in the Department of Political Science. The M.P.A. program will award a maximum of 9 semester hours of credit toward the M.P.A. degree for successful completion of approved courses offered in the College of Law. All courses for which such cross-credit is awarded must be approved by the J.D.-M.P.A. coordinators in the College of Law and the Department of Political Science. All candidates for the dual degree must successfully complete the J.D. degree (Law 821) and are encouraged to take Local Government (Law 824). An internship is strongly recommended for students in the dual 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 solely in the other program except as such courses qualify for credit without regard to the dual program.

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.

Awards of Grades

For grade recording purposes in the College of Law and the Department of Political Science, grades awarded in courses in the other unit will be converted to either Satisfactory or No Credit and will not be included 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 student must register for the law course during regular registration at the College of Law requesting an S/NC grade only. If a C or above is earned in a law course, an S will be recorded on the transcript. If a student earns below a C, an NC will be recorded, and the course cannot be used toward meeting degree requirements. Grades for law courses will not be reflected in the cumulative average. Law courses may be taken for credit only by students enrolled in a graduate degree program. Different rules apply to the student enrolled in the Dual J.D.-M.B.A. or J.D.-M.P.A. Programs.

Grades must be earned according to the grading system of the respective college, e.g., numerical grades for law courses, letter grades for graduate courses. Refer to section on Grades for the grading scale acceptable toward meeting degree requirements. Cumulative GPA for law courses only will be carried until graduation, at which time both the graduate and the law cumulative will be shown on the permanent record.

PROFESSIONAL COURSES

1206 Law
emmenal employees, charities and family members, and damages.

809 Criminal Law (3) Substantive aspects of criminal law; general principles applicable to all criminal conduct; specific analysis of particular crimes; defenses to crimes.

810 Property (4) Introductory course treating issues of ownership, possession, and control in the areas of landlord-tenant relations; estates in land and future interests; co-ownership and marital property; real estate sales agreements and conveyances; title assurance and recording statutes; environmental aspects of nuisance law, eminent domain and zoning.

812 Constitutional Law I (3) Judicial review, limits on judicial power; national legislative power; regulation of commerce; power to tax and spend; other sources of national power. Treats critical legal issues: taxation, regulation of commerce, intergovernmental immunities.

813 Evidence (4) Rules regulating introduction and exclusion of oral, written and demonstrative evidence at trials and other proceedings, including relevance, competency, impeachment, hearsay, privilege, expert testimony, authentication, and judicial notice. Coreq: 920 for students electing concentration in advocacy.

814 Legal Profession (3) Legal, professional and ethical standards applicable to lawyers. Not open to students who have taken 813, 827 or 829.

815 Introduction to Advocacy and Professional Responsibility (3) Theory and morality of advocacy in adversarial system, and legal, ethical, and professional standards applicable to lawyers and especially lawyers as advocates.

816 Fundamental Concepts of Income Taxation (3) An introduction to statutory analysis and the substantive principles of federal individual income tax. A study of income tax law that arises in practice. Federal concepts of gross income, pattern of exemptions, exclusions and deductions from gross income used to arrive at taxable income; special treatment of capital gains and losses; and rate structure.


821 Administrative Law (3) Administrative agency decision-making processes and judicial review of administrative determinations: procedural standards for informal and formal administrative adjudication and rule-making (attention to Federal Administrative Procedure Act); constitutional due process standards in administrative settings; and availability, scope and timing of judicial review of action agencies.

822 Legislation (3) Interpretation and drafting of statutes, legislative process, and legislative power; comparison of judicial views on legislative process with both realities of legislative process and applicable constitutional principles.

824 Local Government (3) Topics of local government central issue to county, city, and the principles in financial in sewage system. Taxation of employment compensation arrangements and of various financial arrangements and products, and introduction to tax accounting. Prereq: 818.

826 Introduction to Business Transactions (2) Non-technical introduction to accountancy, finance, and the functional relationships among the various actors in business transactions. Analysis of business transactions with view toward means of business clients. Not available to students with business background.

827 Business Associations (4) Legal problems associated with formation, operation, and dissolution of unincorporated and incorporated business firms; legal rights of duty of filed members; principals and agents, partners and limited partners; shareholders, directors, and officers; and with the business associations in which they are involved. Prereq: 228.

828 Corporate Finance (3) Legal issues arising in conjunction with corporate financial transactions; issuance of debt and various types of equity securities; distributions to shareholders, mergers and other corporate acquisitions. Valuation of corporate securities.

830 Securities Regulation (3) Basic structure of federal securities law. Legal problems associated with raising of capital by new and growing enterprises; securities transactions by promoters, officers, directors and other insiders; regulation of public held companies; listing under Rule 10b-5 and other antifraud provisions; and provision of legal and other professional services in connection with securities transactions. Recommended prereq: 827.

833 Representing Enterprises (3-5) Capstone course for concentration in business transactions. Simulated business transactions and completion of major planning drafting project. Topics: initial business, acquisition of existing business, development of real estate project, various financing transactions and corporate reorganization. Exploration of all courses for concentration in business transactions.

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

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


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

846 Constitutional Law II (3) Third Amendment rights to freedom of religion, expression, association and press; Fourth Amendment rights against unreasonable searches and seizures; rights to reasonable searches and seizures; prior restraint; rights to parades and demonstrations; rights to assemble; and free exercise of religion as a fundamental right.

847 Civil Procedure (3) Constitutional and statutory rights in civil procedure and remedies for violations of constitutional and other civil rights.

848 Civil Rights Actions (3) Litigation to vindicate constitutional rights in private actions against the government and its officials and agents. Constitutions: state and federal courts; federal courts; district courts; and federal district courts.

849 Discrimination and the Law (3) Comparison of race, sex, and other forms of discrimination with respect to civil rights and relevant state and federal statutes; remedial and other legal rights under federal and state court in Civil Rights case.

850 Supreme Court (3) History of Supreme Court and of proceedings by and in the Court. Constitutional amendments in the context of Supreme Court decisions.


859 Criminal Law Seminar (2) Advanced problems in criminal law and administration of justice. Prereq: 809.

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

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

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

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

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

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

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

887 International Business Transactions (3) Legal status of persons abroad; acquisition and use of property within a foreign country; doing business abroad as a foreign corporation; engaging in business within a foreign country; incorporation or annulment of contracts or concessions.

889 International Law Seminar (2) Current international law problems. Prereq: 886 or 887.

896 Employment Law (3) Legal regulation of employer-employee relationship; employment discrimination; legally prescribed minimum standards of compensation and safety; regulations of employment; regulation of retirement systems.

898 Arbitration Seminar (2) Arbitration of labor agreement disputes: judicial and legislative developments; nature of procedures and mechanisms of self-regulation and resolution of arbitration problems on various topics under collective agreements; and role of arbitrators and arbitrators. Prereq: 895.

896 Employment Law (3) Legal regulation of employment relationship; legal, social and economic influences in development of labor relations; employee rights; union and employer unfair labor practices; strikes, lockouts, boycotts, and collective bargaining processes; enforcement of collective agreements; individual rights of employer; federal regulation and implementation.

896 Employment Law (3) Legal regulation of employment relationship; legal, social and economic influences in development of labor relations; employee rights; union and employer unfair labor practices; strikes, lockouts, boycotts, and collective bargaining processes; enforcement of collective agreements; individual rights of employer; federal regulation and implementation.

898 Arbitration Seminar (2) Arbitration of labor agreements between union and employer, labor relations laws; organized labor; union and employer unfair labor practices; strikes, lockouts, boycotts, and collective bargaining processes; enforcement of collective agreements; individual rights of employers; federal regulation and implementation.

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

950 Computers and Law (3) Impact of computers on law, practice of law: expert systems; legal rules required in building expert systems; common law office uses of computers; and computerized research. Preparation of computer research reports and written arguments.

956 Entertainment Law (3) Role of law and lawyer in entertainment industry. Course content varies. Music industry; music copyright laws; artist/manager relationships; recording contract negotiations; industry labor unions; and performing right organizations.

957 Law, Science and Technology (3) Legal implications of advanced technologies: adaptation of law to challenges posed by new kinds of knowledge and new ways of doing things. Biotechnology, regulation of scientific research, space law, legal policy, computer ethics, and laws regulating the Internet and other technologies used to disseminate information.

959 Intellectual Property (3) Intellectual property and related interests under federal and state law; patents; trademarks; trade secrets; copyright; right of publicity; unfair competition.

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

970 Income Tax II (3) Corporate reorganizations and distributions; transactions among corporations and shareholders. Prereq: 818.


973 Wealth Transfer Taxation (3) Taxation of gratuitous transfers of wealth during life (gift tax) and at death (estate tax) and of generation skipping transfers. Prereq or coreq: 933.

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


980 Insurance (3) Types of insurance: life, property, health, accident and liability insurance; regulation of insurance industry; interpretation of insurance contracts; insurable interest requirements; warranties and representations; coverage and exclusions; duties of agents; excess liability; subrogation; and bad faith actions against insureds. Liability insurance defense problems.

985 Social Legislation (3) Systems other than torts for compensating victims of work-related accidents and diseases, and for compensating disabled persons. Workers’ compensation: requirements and defenses; status of workers; statutory and contractual limitations on recovery; damages; causation; and defenses.

990 Issues in the Law (3) Selected topics. May be repeated.

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

992 Advanced Trial Advocacy (3) Study and development of trial skills: direct and cross examination, expert witness accommodation, jury instruction, and courtroom practice. Prereq: 920.

993 Complex Litigation (3) Advanced procedure course dealing with multiple claimants, multiple parties, class actions, and complex business litigation involving multiple claims and multiple parties; pre-trial evidence; discovery and preparation of evidence; trial organization and argument. Required written assignments on complex and multiple party problems.

995 Appellate Practice Seminar (2) Federal and Tennessee Rules of Appellate Procedure, local rules of federal courts; review of complete records of several United States Supreme Court cases and preparation of an appellate brief based on record of actual case.

997 Most Court (1) Participation as member of faculty-supervised intercollegiate moot court competition. May be repeated. S/NC only.

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

GRADUATE COURSES

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

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

536 Seminar on Policy Issues in Quality Assurance (3) Exploration of historic and contemporary approaches to definition and demonstration of quality in higher education and examination of contemporary policy issues related to quality assurance in colleges and universities.

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

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

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

570 Introduction to Student Personnel Work in Higher Education (3) Historical, philosophical and organizational perspective. Functional areas comprising field and major issues.

572 Theory and Practice in Student Personnel Services (3) Theoretical framework of college student personnel services and practical application of theory in student services environment. Applicable administrative theory, human development theory and evaluation assessment techniques.

599 Practicum in College Student Personnel (1-6) Prereq: Consent of Instructor. May be repeated. S/N only. E

619 Administration and Governance of Higher Education (3) Trends, structures and processes of collegiate governance. Development of understanding of administrative theory and practice in higher education. Prereq: 543 or consent of Instructor.

620 College and University Law (3) Legal precedent affecting organizations, administration, and finance of higher education. Academic freedom, faculty tenure, religion, tort liability, administrative law, academic due process and affirmative action in employment.

645 Curriculum and Instruction in Undergraduate Higher Education (3) Content and organization of institutional strategies and curricular structure in higher education.

650 Fiscal Problems in Higher Education (3) Revenue sources, appropriations process, budget procedures, cost analysis, and fiscal management in public and independent colleges and universities.

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

695 Practicum in Higher Education (1-6) Supervised practice in selected areas of higher education administration. Prereq: Consent of Instructor. May be repeated. S/N only. E

698 Seminar in Higher Education (3) Capstone experience for doctoral students. Examination of major philosophical concepts and policy principles distinctive to American higher education, review of significant and current policy reports and critiques, exploration of contemporary policy issues, and evaluation of recommended reforms in higher education. Travel to state, regional, and national policy agencies for higher education.

Life Sciences

(College of Arts and Sciences)

MAJOR

DEGREES

Life Sciences ........................................ M.S., Ph.D.

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 interdisciplinary and are designed to augment offerings of individual departments in the following concentrations: biotechnology, M.S. only, and plant physiology and genetics. Students interested in these areas should contact either the Life Sciences chairperson or the director of the area of interest. Each program is overseen by a committee and may have unique admission requirements.

ADMISSION REQUIREMENTS

1. A Bachelor's degree with a major in a biological, behavioral, or physical science.

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, bioproducts 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 an industrial co-op experience plus an area of specialization will also be an important part of the training experience.

Required courses: 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/N 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, molecular, and developmental biology; environmental toxicology; ethology; plant, physiology and genetics; and physiology. May be repeated. Maximum 9 hrs.

511 Advanced Cellular Biology (3) Cell structures and functions at the molecular and subcellular levels: cell membrane structure, function, and biogenesis; cellular communication; receptors and membrane flow; growth regulation and oncogenes; plant cell structure and function; contractility and motility; mitosis and meiosis; blood and immune cells.

512 Advanced Molecular Biology (4) (Same as Biochemistry and Cellular and Molecular Biology 512.)

525 Research Practicum in Life Sciences (1-3) Individual sections for each of biotechnology; cellular, mo-
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, 531, 541, 542, 551, 571, 581, 593. Business Administration 510, 596. Students must be approved by the Management Department MBA advisor. For forest industries management--511; Forestry 560, 566. Environmental management: 581 plus two approved courses from the following list: Ecology and Evolutionary Biology 520, 556; Environmental Engineering 510, 555, 556; Chemical Engineering. 581; Economics 677, 678; Agricultural Economics 570; Sociology 560, 665; Law 866, 867; Geography 577. Additional courses may be approved subject to approval by 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/NC only, E

504 Management of Organizational Behavior (3) Integration of individual and group differences, organization, theory and design, motivation, leadership, human resources planning, and career implications with strategy, planning, and decision making.

511 Organizational Theory: Integrated Structure and Behavior (3) Cases, group projects, discussion; organizational theories, organizational effectiveness; contextual factors of organizations: environment, size, technology; organizational structure configurations, organization design; social influences on organization effectiveness: motivation, leadership, group behavior, intergroup relations, organization change and development.

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

522 Labor Relations and Collective Bargaining (3) American labor history, structure and philosophy of bargaining, dispute settlement, and contract administration. (Same as Economics 562.)

525-26 Industrial and Organizational Psychology (1-3, 1-3) Readings in industrial and organizational psychology. Available only with supervising faculty member. May be repeated. Maximum 6 hrs. S/NC or letter grade.

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 situations.

551 Management of New Ventures (3) Integration of various functional disciplines and their application to general management of firms formed in-house by large corporations and independently. Preparation of a business plan, case analysis.

See Marketing, Logistics, and Transportation Management

Logistics

See Marketing, Logistics, and Transportation Management

Management

(Ph.D. in Commerce Administration)

MAJOR DEGREES

Business Administration MBA, Ph.D.

Oscar Fowler, Head

Professors:


Associate Professors:


Assistant Professors:

Cielland, Iain J., Ph.D. ................. Southern California Dean, Thomas J., Ph.D. ............... Colorado Edirisinghe, Chanaka F., Ph.D. British Columbia

Economics for program description.

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 Management of Organizational Behavior (3) Integration of individual and group differences, organization, theory and design, motivation, leadership, human resources planning, and career implications with strategy, planning, and decision making.

511 Organizational Theory: Integrated Structure and Behavior (3) Cases, group projects, discussion; organizational theories, organizational effectiveness; contextual factors of organizations: environment, size, technology; organizational structure configurations, organization design; social influences on organization effectiveness: motivation, leadership, group behavior, intergroup relations, organization change and development.

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

522 Labor Relations and Collective Bargaining (3) American labor history, structure and philosophy of bargaining, dispute settlement, and contract administration. (Same as Economics 562.)

525-26 Industrial and Organizational Psychology (1-3, 1-3) Readings in industrial and organizational psychology. Available only with supervising faculty member. May be repeated. Maximum 6 hrs. S/NC or letter grade.

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 situations.

551 Management of New Ventures (3) Integration of various functional disciplines and their application to general management of firms formed in-house by large corporations and independently. Preparation of a business plan, case analysis.

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 in sequence during student's first year of study in industrial and organizational psychology program. Consent of instructor required for all non-industrial/organizational psychology program students. (Same as Psychology 517-18.)

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

581 Environmental Management (3) Managerial framework for addressing environmental issues. Most pressing environmental challenges: options compatible with sustained business performance. 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. Minimum 6 hrs. S/NC or letter grade.

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

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

601 Research Methods (3) Seminar covering a 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. Classic and open systems models, organization growth and change, organizational effectiveness and design of complex organizations.

611 Seminar in Strategic Management (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. Evolution of thought and emergence of distinct paradigms.

625 Seminar in Organizational Psychology (3) In-depth analysis of current theories, concepts, and issues associated with psychology of organizational leadership and work motivation. Prereq: 567, 588, consent of instructor. May be repeated. (Same as Psychology 625.)

626 Seminar in Industrial Psychology (3) In-depth analysis of current issues and problems: performance appraisal/evaluation, development, and training and development. Prereq: 567, 588, consent of instructor. May be repeated. (Same as Psychology 626.)

627 Seminar in Applied Industrial Psychology (3) In-depth analysis of the current issues, concerns, and methods: advanced quantitative psychometrics and empirical selection. Prereq: 567, 588, consent of instructor. May be repeated. (Same as Psychology 627.)

638 Current Topics in Industrial/Organizational Psychology (3) In-depth analysis of various topics: organizational change and development, psychology and problems of intercultural, consumer behavior. Prereq: 567, 588, consent of instructor. May be repeated. (Same as Psychology 638.)

690 Field Work in Industrial and Organizational Psychology (1-12) Supervised field exercise in industrial and organizational psychology. 1 hr per 30 hrs of practice. May be repeated. Maximum 12 hrs. (Same as Psychology 690.)
Management Science

(College of Business Administration)

MAJORS DEGREES
Management Science ................. M.S., Ph.D.
Business Administration ............... MBA

Melissa R. Bowers, Chairperson

Committee Members:
Bowers, Melissa R.; Management; Bozdogan, Hamparsum; Statistics; Edirisinghe, Chanaka F.; Management; Fowler, Oscar S.; Management; Gilbert, Kenneth C.; Management; Leitaker, Mary G.; Statistics; Noon, Charles E.; Management; Ralston, Bruce A.; Geography; Srivinasa, 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, ecology, and other areas, subject to approval by the Management Science Committee.

Admission Requirements

The master's program requires three applicant recommendation forms and the GRE or GMAT. Applications are encouraged from all majors, but a mathematics background equivalent to the completion of at least two years of college calculus and proficiency in a computer language is required. The program is designed to be completed in four semesters by full-time students. However, students may start the program in any semester and may pursue an M.S. degree program in Management Science on a part-time basis.

Course Requirements

<table>
<thead>
<tr>
<th>Course Requirements</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Requirements</td>
<td>16</td>
</tr>
<tr>
<td>Management Science</td>
<td>531, 532, 533, 534, and 691 or 692</td>
</tr>
<tr>
<td>Applied specialization area (approved by advisor)</td>
<td>9</td>
</tr>
<tr>
<td>Technical elective</td>
<td>6</td>
</tr>
<tr>
<td>Statistics (500 level or above as approved by advisor)</td>
<td>6</td>
</tr>
<tr>
<td>Mathematics (400 level or above as approved by advisor)</td>
<td>6</td>
</tr>
<tr>
<td>Industrial Engineering (400 level or above as approved by advisor)</td>
<td>6</td>
</tr>
<tr>
<td>Other elective (as approved by advisor)</td>
<td>6</td>
</tr>
</tbody>
</table>

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/her needs. The committee must approve a tentative overall program during the student's first semester and must approve all courses on a semester-by-semester basis.

Recognizing the diverse backgrounds and needs of Management Science M.S. students, the Management Science Committee is prepared to waive some of the above requirements on an individual basis. The total course load will remain 40 hours for all students.

THE DOCTORAL PROGRAM

The Ph.D. program in Management Science is designed to prepare students for research related to the application of mathematical tools to complex decision making. Three primary objectives of the program are:

1. to provide, through management science coursework, a thorough knowledge of common Management Science/Operations Research mathematical models and their uses;
2. to provide sufficient advanced study in a supporting area to qualify the graduate for a joint faculty position in the supporting area and management science.
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 doctoral. 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, 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.

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

Graduate students 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 meet the prerequisites are encouraged to seek the instructor's guidance and consent to enroll.

BUSINESS ADMINISTRATION

Concentration

For complete listing of MBA program requirements, see Business Administration.

MBA Concentration: Management Science, Minimum core requirements are 531, 532, and 534.

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
Marketing, Logistics and Transportation

MAJOR

Business Administration 

MBA, Ph.D.

David W. Schumann, Head

Professors:

Barney, 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
Langley, C. J., Jr., Ph.D. ....... Penn State
Mentzer, J. T. (Business Administration Chair of Excellence), Ph.D. ....... Michigan State
Mundy, R. A., Ph.D. ....... Penn State
Patton, E. P., Ph.D. ....... North Carolina
Woodruff, R. B., DBA .......... Indiana

Associate Professors:

Foggin, J. H. (Liaison), DBA .......... Indiana
Gardiel, S. F., Ph.D. ....... Houston
Reizenstein, R. C., Ph.D. ....... Cornell
Rentz, J. O. (Liaison), Ph.D. ....... Georgia
Schumann, D. W., Ph.D. ....... Missouri

Assistant Professors:

Debhokar, P. A., Ph.D. ....... Georgia State
Helcomb, M. C., Ph.D. ....... Tennessee
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

Minimum course requirements for logistics and transportation--501, 506, and one course from the following: 504, 506, 507, 593, and 599.

For management--511 and 512.

Ph.D. Concentration: Logistics and Transportation

Minimum course requirements for logistics and transportation--12 hours to develop an area in 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 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/NC only.

503 Buyer Behavior--Analysis for Marketing (3) Consumer behavior concepts and processes developed and applied to market analysis and design, and control of marketing programs. Social psychology and demographic factors that affect consumer product, brand and patronage decisions. Prereq: Business Administration 504 and 505 or consent of instructor.

504 Analyzing Market Opportunity for Marketing Decisions (3) Major determinants of opportunity in markets. Framework for finding markets and analyzing them for opportunity. Application of market opportunity analysis to marketing strategy decisions. Prereq: Business Administration 504 and 505 or consent of instructor.

505 Marketing Research and Information Planning (3) Design 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 program. Prereq: Business Administration 504 and 505 or consent of instructor.

507 Global Marketing (3) Strategic issues related to international and multi-national marketing operations; identification and evaluation of opportunities in overseas markets; coordination of strategies in world markets.

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

511 MBA Marketing Concentration I (6) Determination of customer value. Principles of consumer behavior, marketing research, and building customer value. Prereq: Business Administration 504 and 505 or consent of instructor.

512 MBA Marketing Concentration II (6) Delivery of customer value. Communication of customer value, marketing strategy, and building customer value. Prereq: Business Administration 504 and 505 or consent of instructor.

593 Independent Study (3) Directed research and study. Prereq: MBA Core and consent of instructor. May be repeated. Maximum 6 hrs.

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

601 Marketing Theory (3) Nature and scope of marketing, role of theory development and theory testing important to marketing research.

602 Research Methods I (3) Research process: problem formulation, research and experimental design, measurement and implementation of results. Design: experimental design, survey research, and measurement.

603 Marketing Thought (3) Marketing literature across number of research areas. Evaluate individual works, determine state of research in each area, and identify areas that merit further study.

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, marketing strategy, 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, marketing, maintaining, and enhancing U.S. transport infrastructure.

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

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 market analysis, decision making, 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 carrier management and operations and comparative national transport systems analysis.
from a wide range of disciplines; these include physics, chemistry, chemical engineering, mechanical engineering, electrical engineering, materials engineering, and engineering science programs. Prospective students should consult materials science and engineering faculty concerning development of individual concentrations or special programs compatible with their backgrounds and goals.

Areas of concentration within the metallurgical engineering program include physical metallurgy; materials processing; welding metallurgy and materials joining; corrosion behavior; failure analysis; and mechanical and physical behavior of materials. Specializations in electronic and ceramic materials are available. Areas of concentration within the polymer engineering program include rheology and polymer processing; polymer morphology; mechanical, physical and chemical behavior of polymers; and composite materials.

THE MASTER’S PROGRAM

Thesis Option

A total of 30 semester hours is required for the M.S. degree in either Metallurgical Engineering or Polymer Engineering. Additional requirements include:

1. A major consisting of 12 to 18 semester hours in graduate courses in metallurgical engineering or polymer engineering. The polymer engineering major must include 540, 541, 543, 546, 549, 550 and 572 unless similar material has been covered in prior coursework.

2. Additional courses amounting to 6 to 12 hours total in any approved engineering, chemistry, mathematics, physics, or other related fields.

3. Master’s thesis, 500 totaling 6 to 12 hours. All resident students are required to register for and participate in the graduate seminar in metallurgical engineering or polymer engineering, as appropriate, during each semester in which it is offered. Credits for the seminar do not count towards satisfying the coursework requirements.

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 33 hours in graduate courses in metallurgical engineering, polymer engineering and related areas. The minimum requirements are 24 hours in the Department of Materials Science and Engineering. The remaining 12 hours must be in graduate courses in engineering and related areas.

2. Satisfactory completion of a critique of the student’s dissertation research proposal.

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 demonstrate evidence of ability to perform and report independent research to the satisfaction of the department. The master’s thesis may be offered as such evidence.

Department requirements consist of the satisfactory completion of:

1. Graduate courses in materials science and engineering amounting to approximately 24 semester hours, at least 8 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, chemistry, and other related fields.

4. Active participation in graduate seminars conducted by the department. Resident students must register for the appropriate 503 or 504 every semester offered.

CADEMIC 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 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, Louisiana, or Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE COURSES

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

421 Mechanical Behavior of Materials II (3) Description of stress and strain; linear elastic constitutive equations; isotropic and anisotropic moduli in various materials; yield criteria; brittle fracture; crazing; plastic strain; constitutive equations, forming operations and form limits. Prereq: Mechanical Behavior of Materials, Mechanics of Materials I, sophomore mathematics.


426 Materials Joining (3) Processes for joining metals, polymers and ceramics: mechanical, adhesive, fusion, solidification; crystallization; surface characteristics necessary for joining and chemical bonding; thermal effects on structure and properties of joints; design of joints. Prereq: Introduction to Materials Science and Engineering.

429 Introduction to Ceramic Matrix Composites (3) Characteristics of composites: ceramic matrix composites; macromechanics and materials design; overview of fabrication techniques; microstructural characterization; physical and mechanical property evaluation; current and potential applications. Prereq: Introduction to Materials Science and Engineering and Mechanics of Materials.
443 Polymer Processing (3) Rheological measurements; flow through tubes and slits, and effects and extrudate swell; selected application, screw extrusion, injection molding, extrusion, calendering, extrudate formation, structure development, properties.

444 Plastics Fabrication and Design (3) Lectures, laboratories and field trips; unit operations of plastics fabrication; plastics classification; design and selection criteria; processing techniques; characterization laboratory. So


472 Fundamental Principles of Composite Materials (3) Establishment of physical principles basic to design, manufacture and application of fiber reinforced polymers, metals and ceramics. Prereq: 302 or equivalent. (Same as Engineering Science 429.)

474 Biomaterials (3) Metals, polymers and ceramics used in orthopaedic, cardiovascular, and dental surgical implant devices; corrosion and degradation problems; material properties of primary importance: tissue response to synthetic materials. Prereq: 201. Prerequisites for engineering science and mechanics majors.

475 Fracture-Safe Design (3) (Same as Engineering Science and Mechanics 423.)

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. May not be used toward degree requirements. May be repeated. S/N C only. E

503 Graduate Seminar in Metallurgical Engineering (1) Prereq: Admission to graduate program. May be repeated. S/N C only. E

504 Graduate Seminar in Polymer Engineering (1) Prereq: Admission to graduate program. May be repeated. S/N C only. E

505 Engineering Analysis (3) (Same as Chemical Engineering 505.)

522 Defects in Crystals (3) Analytical and experimental analysis of defect interactions in solids. Prereq: 421 or consent of instructor.

523 Plastic Deformation of Metals (3) Geometry and mechanisms of single crystal plastic deformation; slip, twinning, and cleavage, work hardening, effect of temperature, loading rate effects; effect of order of solid solution alloying; polycrystalline behavior in terms of single crystal deformation mechanisms; texture formation. Prereq: 301, 320 or consent of instructor.

524 Metallurgical Thermodynamics (3) Applications of chemical thermodynamics to metallurgical problems: refining, oxidation, surface treatments, alloy systems. Prereq: 570 or equivalent.

525-26 Welding Metallurgy (3.3) Welding processes; physical metallurgy of welding; phase transformations; heat flow; residual stresses; theories of hot cracking, cold cracking and porosity formation; applications to process utilization.

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 solid state. Solution and applications of diffusion equations: random walk problem and mean time of diffusion; diffusion in dilute and concentrated alloys; Kirkendall effect; high diffusivity path.

530 Phase Transformations in Metallic Materials (3) Thermodynamics, kinetics and characterization of structure transformation in solids; kinetics and morphology of diffusion controlled growth; kinetics of interface controlled phase transformations; crystallography and kinetics of martensitic transformations.

531 Advanced Corrosion (3) Analyses of corrosion processes in terms of 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, reaction 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 extrusion, fiber spinning, injection molding. (Same as Chemical Engineering 541.)

542 Further Topics in Polymer Processing (3) Description and analysis of selected polymer processing operations. Prereq: 541.


544 Polymer Solution Thermodynamics and Characterization (3) Theories of solutions, statistical thermodynamics; characterization methods; viscosity, light scattering and viscosity. Prereq: Undergraduate physical chemistry.

546 Mechanical Properties of Solid Polymers (3) Types of mechanical behavior: Hookean and rubber-like elasticity; plastic deformation; fracture; linear viscoelasticity; dynamic mechanical behavior and testing; loss tangent; experimental methods. Introduction to mechanical properties of polymeric composites.

549-50 Laboratory Methods in Polymer Engineering (1,1) Basic experimental techniques and instrumentation associated with characterization, x-ray and light scattering, calorimetry, rheometry, mechanical properties of solid polymers, polymer processing operations. Coreq: 540 or consent of instructor.

560 Principles of Ceramic Processing (3) Treatment of ceramic processing: raw materials preparation and characterization; powder consolidation; drying, firing, sintering techniques, mechanisms and kinetics. Prereq: 300 or equivalent.

561 Inorganic Glass Forming Systems (3) Physical and chemical nature of inorganic glasses; structural theories of glass formation; major glass forming systems: silica, other oxide glasses, nitrate glasses, water glasses, and chesoege glasses. Prereq: 360. Chemistry 371.

562 Experimental Mechanics of Composite Materials (3) (Same as Engineering Science 562.)

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 x-ray and neutron 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: crystalline and noncrystalline 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.


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

621-22 Theoretical Metallurgy (3.3) Topics in solid state physics as applied to metallurgy: Introduction to quantum theory, specific heat, electron theory of solids, electrical and thermal conductivity, magnetic properties, theories of alloy formation. Prereq: Consent of instructor.

623-24 Solidification and Crystal Growth (3.3) Theories of solidification, fluid flow effects, mag netohydrodynamics of incompressible fluids, growth stability theory, thermodynamic applications, rapid solidification theory, metastability. Prereq: Consent of instructor.

641 Advanced Rheology and Viscoelastic Theory (3) Continuum mechanics, formulation of viscoelastic theories for describing deformation and flow of polymeric materials. Application to polymer processing problems. Recommended for MS candidates working in rheological areas. Prereq: 541.

642 Advanced Topics in Polymer Processing (3) Application of theories of rheological behavior and structure 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 polygon glasses; crystallization of powder and nucleation, growth, and morphology; secondary nucleation theory; solidification of copolymers; crystallization under stress. Prereq: 543.

671 Quantitative Microscopy (3) Principal acoustic, optical and electrical and field-ion microscopy 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.
THE MASTER OF MATHEMATICS

Before admission to the Master of Mathematics program, the applicant must have either (a) certification for teaching secondary mathematics in at least one state, or (b) three years of elementary school, secondary school, or community college teaching experience. Applicants must have successfully completed one year of calculus (141-42 or equivalent) and one course in matrix algebra (251 or equivalent). The following requirements must be met:

1. Complete 30 hours of coursework of which 21 must be graduate level. The coursework must include 504, 505, 506, 507, and 6 hours in 509. At most, 6 hours may be taken outside the Department of Mathematics (selected in consultation with the advisor).
2. Pass a final examination upon completion of all coursework.

In exceptional circumstances, part of admission requirement (b) might be satisfied concurrently with coursework. Normally Master of Mathematics degree students will start the program by taking 504 during the summer.

THE MASTER OF SCIENCE PROGRAM

For this concentration, available under the standard program, the student must complete the following:

1. Demonstrate knowledge in five subjects
2. Complete 30 hours of coursework
3. Pass a one-year, 600-level sequence in mathematics

THE DOCTORAL PROGRAM

For the Ph.D. program in Mathematics, the student must meet the following four requirements in addition to those of The Graduate School:

1. Satisfy either the standard program or the interdisciplinary mathematical ecology concentration. The student's doctoral committee may decide which concentration to award. The student may elect to switch from one to the other provided the constraints of the latter option have not been violated.
2. Satisfy other requirements specified by the student's doctoral committee.
3. The student may take a collection of written examinations a maximum of three times, but no one

ecology concentration. Descriptions of both programs are given below.

1. Complete 30 hours of coursework
2. Demonstrate proficiency in one foreign language, normally French, German or Russian. This requirement must be met prior to the examination in the area of specialization. A student's doctoral committee may require the student to pass a second language examination.
3. Pass an examination in the field of specialization. After the requirements in 1. and 2. have been met, this examination will be given by a committee appointed by the department head. A student may take this examination only twice.
4. Pass a one-year, 600-level sequence in mathematics outside the student's area of specialization. The 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.)

After one semester of graduate study, a student whose advisory committee gives its approval may choose the non-thesis option, for which 30 hours in courses numbered above 400 are required. Of these, at least 15 hours must be in mathematics. This must be in courses numbered above 500. Of the 30 hours, 9 in courses approved by the advisory committee may be taken in fields other than mathematics. For this option it is also required that a written final examination be passed and that credit be received for a reading course (598) in which a term paper or project is required.

Concentration in Applied Mathematics

For this concentration, available under the standard program, the student must complete the following:

1. In addition to the standard program, the student must complete 30 hours of coursework in mathematics.
2. One course from each of the following five areas:
   a. Foundations of Mathematics (Mathematics 511 and corequisite Applied Mathematics Laboratory 510)
   b. Analytical Applied Mathematics 515
   c. Mathematical Analysis 516
   d. Optimization - Linear Programming 554
   e. Optimal Control Theory 585

THE DOCTORAL PROGRAM

For the Ph.D. program in Mathematics, the student must meet the following four requirements in addition to those of The Graduate School:

1. Satisfy either the standard program or the interdisciplinary mathematical ecology concentration. A student's doctoral committee may decide which concentration to award. The student may elect to switch from one to the other provided the constraints of the latter option have not been violated.
2. Satisfy other requirements specified by the student's doctoral committee.
3. The student may take a collection of written examinations a maximum of three times, but no
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 examinations or any incurred failure(s) counted against 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 examination is taken so that the sitting for the examination and any failure are not counted toward the limits in condition c.

Mathematical Ecology Concentration

The student must pass written examinations in three subjects:

2. A subject from Groups I, II, and III of the standard program.
3. A subject represented by a year-long graduate-level sequence from outside the Department of Mathematics. The sequence must be approved in advance by the mathematical ecology faculty and by the departmental Graduate Committee. At least one member of the mathematical ecology faculty must be involved in the grading of the examination. The examination in this subject may be taken only 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 Groups I and II.

Except for the privilege of utilizing as a Group IV course a course from outside the department, this concentration is subject to the constraints and privileges specified in the standard program, including the restrictions on related subjects, the conditions a. through d. placed on the taking of written examinations, and the option to pass a written examination in lieu of earning a grade of B+ or better each semester in a sequence from Group I, II, or III.

GRADUATE COURSES

400 History of Mathematics (3) Development of major ideas in mathematics from ancient to modern times and influence of ideas in science, technology, philosophy, art, and other areas. Writing emphasis course: at least one in-class essay examination and 3000 words of writing outside class. Prereq: Calculus I, II, or III.

401 Mathematics and Microcomputers (3) Primarily for students seeking certification as mathematics teachers at secondary level. Use of microcomputers to study concepts and applications of mathematics. Does not satisfy the major requirements for a B.S. or M.S. in mathematics. Prereq: Calculus I, II, or III.

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 Biocullus II.


421 Combinatorics (3) Introduction to problems of construction and enumeration for discrete structures: 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, conditional probability and expectations, methods of moment generating characteristic functions, Laws of large numbers and central limit theorem. Prereq: 300-level probability or consent of instructor.

424 Probability II (3) Elements of stochastic processes: Random walk, Markov chains and Poisson processes. Other topics as selected by instructor. Prereq: 423.

425 Statistics (3) Derivation of standard statistical distributions; F and χ², independence of sample mean and variance; basic limit theorems; point and interval estimation, Bayesian estimates; statistical hypotheses, Neyman-Pearson theorem; likelihood ratio and other parametric and non-parametric sufficient statistics. Prereq: Probability I or consent of instructor.


443 Complex Variables I (3) Theory of functions of complex variables: 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 steady-state, temperature, electrostatics, and fluid flow. Prereq: 443.

445-46 Advanced Calculus I, II (3, 3) Theory of sequences, series, differentiation, and Riemann integration of functions of one or more variables. Prereq: Calculus III and Introduction to Abstract Mathematics, or consent of instructor.

447-48 Honors: Advanced Calculus I, II (3, 3), Honors version of 445-46. Prereq: Calculus III and Introduction to Abstract Mathematics, or consent of instructor.

453 Matrix Algebra II (3) Matrix theory including Jordan canonical form. Prereq: Matrix Algebra I.

456 Analytic Geometry and Calculus I, II (3, 3) Analytic geometry and calculus of functions of one or more variables, and vectors in 2- and 3-dimensional space. Prereq: 453 or consent of instructor.

458 Analytic Geometry and Calculus III (3) Analytic geometry and calculus of functions of one or more variables, and vectors in 2- and 3-dimensional space. Prereq: 453 or consent of instructor.

459 Analytic Geometry and Calculus IV (3) Analytic geometry and calculus of functions of one or more variables, and vectors in 2- and 3-dimensional space. Prereq: 453 or consent of instructor.

472 Numerical Algebra (3) Direct and iterative methods for solving linear and nonlinear systems. Orthogonal decomposition, least squares and algebraic eigenvalue problem. Prereq: Numerical Algorithms I or consent of instructor. Recommended prereq: 453. (Same as Computer Science 472.)

475 Industrial Mathematics (3) Modeling, analysis, and computation applied to scientific/technological and industrial problems. Prereq: Differential Equations I and either Computer Science 471 or Probability and Statistics or Numerical Algorithms or consent of instructor.

500 Readings in Mathematics (1-3) Topic may be selected by students with consent of department head. Independent study with faculty guidance. Prereq: Consent of faculty mentor to supervise independent work. May be repeated. Maximum 9 hrs.

501 Seminar in Mathematics (1-3) Topic may be selected by students with consent of department head. Independent study with faculty guidance. Prereq: Consent of faculty mentor to supervise independent work. May be repeated. Maximum 9 hrs.

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

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

503-505 Analysis for Teachers (3) Development of differential and integral calculus, proofs of basic theorems. 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.

504 Discrete Mathematics for Teachers (3) Mathematical logic and methods of argument, sets and relations, combinatorial theory, first order logical statements. Prereq: for students seeking M.M. degree. 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.


509 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: Consent of instructor. May be repeated. Maximum 12 hrs.

510 Applied Mathematics Laboratory (1) Computer applications in applied mathematics: software packages for matrix analysis, symbolic algebra, and differential equations. Coreq: 511 or 512. May be repeated.


513-14 Mathematical Principles of Fluid Mechanics (3,3) Equations of motion, compressible and incompressible flow, shock waves, vortices, Navier-Stokes equations, Prereq: 431, 435, and 445-46 or 404, or consent of instructor.

515-16 Analytical Applied Mathematics (3,3) Analysis of advanced techniques in modern applications for applied mathematics: dimensional scaling, perturbation theory, variational approaches, transform theory, wave phenomena and conservation laws, stability and bifurcation, distributions, integral equations. Prereq: 445 or 447, and 511-12 or both 431 and 435.

517-18 Mathematical Methods in Physics (3,3) (Same as Physics 571-72)
551 Seminar in Applied Mathematics (1-3) May be repeated. Maximum 12 hrs.

552-22 Enumerative Combinatorics (3,3) Sieve methods, recursion, generating functions, and permutation groups applied to enumeration of discrete structures. Incidence algebras and combinatorics of partially ordered sets.

552-24 Probability (3,3) Pertinent facts from measure theory, definition of abstract probability spaces; Kolmogorov's existence theorem; series of independent random variables and laws of large numbers; general theory of distributions of random vectors and their characteristic functions; weak convergence concept, weak compactness and Levy's continuity theorem in Euclidean spaces; L1 convergence and central limit problem; general concept and properties of conditional expectation, martingales, Doob's martingale and optional sampling theorems. Prereq: 445-46. Recommended prereq: 423.

552-26 Statistics (3,3) Pertinent facts from probability theory; formulation of statistical models; sufficiency, Fisher-Neyman factorization theorem, exponential families, Bayes models; methods of estimation and optimality; theory; uniform minimum variance unbiased estimates, asymptotic efficiency and optimality; the confidence intervals; Neyman-Pearson lemma, uniformly most powerful tests; general linear models, estimation and tests in linear models; non-parametric methods, rank methods for comparison, linear regression and independence, robust tests; topics from decision theory. Prereq: 445-46. Recommended prereq: 425.

557 Stochastic Modeling (3) Models in probability applied to real world situations; queuing theory; branching processes; Markov chains; Monte Carlo simulation. Prereq: 445-46 or consent of instructor.


553-35 Partial Differential Equations (3,3) First order equations, classification of equations and properties of elliptic, hyperbolic and parabolic equations in several variables. Prereq: 445-46 and 231 or consent of instructor.

553-37 Mathematical Principles of Continuum Mechanics (3,3) Conservation principles, equations of equilibrium of solids, constitutive relations and stress, convexity properties, bifurcation phenomena, existence theory. Prereq: 431, 435, 445 or 446, or consent of instructor.

553 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: 456-66 or consent of instructor.

555 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: 456-66 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; metricization; homeomorphic invariants of point sets. Mappings and homeomorphisms; compactness; connectedness; geodesics; Jacobian fields, sectional curvature. Differential forms and moving frames. Prereq: 445-46 or consent of instructor.

659 Seminar in Topology (1-3) May be repeated. Maximum 12 hrs.


619 Seminar in Applied Mathematics (1-3) May be repeated. 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 interest and preparation of graduate students. Prereq: 531-32 or consent of instructor. May be repeated with consent of department. Maximum 12 hrs.


643-44 Harmonic Analysis (3,3) Fourier series and Fourier transforms on Euclidean spaces and topological groups; convergence, summability, uniqueness, inversion, duality, Plancherel transform, Hilbert transform, Hardy-Littlewood maximal function, interpolation of operators, or Fefferman-Stein duality. Prereq: 541-42 and 443. May be repeated with consent of department. Maximum 12 hrs.

649 Seminar in Analysis (1-3) May be repeated with consent of department. Maximum 12 hrs.

651-52 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 Hurwitz's theorem on polynomials, 561-562 and 1 yr of abstract algebra, 455-56 or 561-52. May be repeated with consent of department. Maximum 12 hrs.

667-68 Advanced Differential Geometry (3,3) Selected topics from differential geometry and analysis on manifolds and Lie groups, methods of Lie theory, the spectrum of Laplacian, Hodge Theorem, variational problems, curvature and topology of manifolds. Prereq: 587-68 or consent of instructor. May be repeated with consent of department. Maximum 12 hrs.

669 Seminar in Topology (3) May be repeated with consent of department. Maximum 12 hrs.


679 Seminar in Numerical Mathematics (1-3) May be repeated with consent of department. Maximum 12 hrs.
Mechanical and Aerospace Engineering and Engineering Science
(College of Engineering)

MAJOR

Aerospace Engineering ................. M.S., Ph.D.
Engineering Science ..................... M.S., Ph.D.
Mechanical Engineering .................. M.S., Ph.D.

D. W. Daring, Head

Professors:

Antar, B. (UTSI), Ph.D. .................. Texas
Arimilli, R. V., Ph.D. .................. VPI
Baker, A. J., PE, Ph.D. ............... New York
Braun, G. W. (Emeritus) (UTSI), Ph.D. .......... Gottingen
Carley, T. G. (Liaison), PE, Ph.D. ....... Illinois
Collins, F. G. (UTSI), Ph.D. ............... California
Crawford, R. A. (UTSI), Ph.D. .......... Tennessee
Darling, D. W., PE, Ph.D. ............... Illinois
Dube, R. V., Ph.D. ...................... Clemson
Edmondson, A. J., PE, Ph.D. .......... Texas A&M
Flandro, G. A (UTSI), Ph.D. ............ Cal Tech
Fortester, J. H., PE, Ph.D. .............. Iowa State
Fortey, J. W. (Emeritus), Ph.D. ......... Georgia Tech
Frankel, J. J., Ph.D. ..................... VPI
Garrison, G. W. (UTSI), Ph.D. .......... NC State
Hodgeon, J. W. (Fisher Prof.), PE, Ph.D. .......... Georgia Tech
Holland, R. W. (Emeritus), PE, M.S. ...... Tennessee
Jendrucko, R. J., PE, Ph.D. .............. Virginia
Johnson, S. W., PE, Ph.D. .......... Clemson
Keeler, D. R. (UTSI), Ph.D. ............ Florida
Keyhani, M. (Liaison), Ph.D. .......... Ohio State
Kim, K. H., Ph.D. ..................... NC State
Krae, R. J., Ph.D. ..................... Oklahoma
Krieg, R. D. (Condra Chair of Excellence), Ph.D. .......... New Mexico
Landes, J. D., PE, Ph.D. ............... Lehigh
Lee, C. W. (Emeritus), Ph.D. .............. Illinois IT
Liston, H., Jr. (Emeritus), M.E.A. ............ George Washington
Lo, C. F. (UTSI), Ph.D. ................... Cornell
McCay, M. H. (UTSI), PE, Ph.D. ........ Florida
McCay, T. D. (UTSI), PE, Ph.D. ........ Auburn
Maxwell, R. L. (Emeritus), PE, M.S. ...... Case Western
Milligan, M. W., PE, Ph.D. ............. Tennessee
Newman, M. K. (Emeritus) (UTSI), PE, Ph.D. .......... Columbia
Parang, M., PE, Ph.D. .................. Oklahoma
Parsons, J. R., PE, Ph.D. .............. NC State
Peters, C. E. (UTSI), D.A.S. .......... Brussels

Pitts, D. R. (Emeritus) Ph.D. .......... Illinois IT
Remenyik, C. J. (Emeritus), Ph.D. ....... Johns Hopkins
Schultz, R. J. (UTSI), Ph.D. ............. Tennessee
Scott, W. E. (Emeritus), Ph.D. .......... Johns Hopkins
Shahroki, F. (UTSI), Ph.D. .......... Cleveland
Shibue, R. L. (Emeritus), Ph.D. ......... Northwestern
Smith, G. V., PE, Ph.D. ............... Penn State
Snyder, W. T., Ph.D. .................. Northwestern
Soliman, O., PE, Ph.D. ............... Tennessee
Speckhart, F. H. (IBM Prof.), PE, Ph.D. .......... Georgia Tech
Stair, W. K. (Emeritus), M.S. .......... Tennessee
Stoneking, J. E., PE, Ph.D. .............. Illinois
Tucker, J. M. (Emeritus), M.S. .......... Illinois
Wasserman, J., PE, Ph.D. .......... Cincinnati
Weitman, Y. J., Ph.D. ................ Rensselaer
Wilson, K. J., PE, Ph.D. .......... Tennessee
Wilson, C. C. (Emeritus), Ph.D. ...... Purdue
Wu, J. M. (UTSI), Ph.D. .............. Cal Tech
Young, R. L. (Emeritus) (UTSI), PE, Ph.D. .......... Northwestern

Associate Professors:

Goulet, J. A. M., Ph.D. .......... Stanford
Guarneri, J. U. (UTSI), Ph.D. .......... Georgia Tech
Hamel, W. R., Ph.D. .................. VPI
Kawiecki, G., Ph.D. .................. West Virginia
Madhukar, M.S., Ph.D. .......... Drexel
Mathews, A., PE, Ph.D. .......... Illinois
Moulden, T. H. (UTSI), Ph.D. .......... Tennessee
Nguyen, K. Ph.D. ................ Colorado
Steinhoff, J. S. (UTSI), Ph.D. .......... Chicago
Vakili, A. D. (UTSI), Ph.D. .......... Tennessee

Assistant Professors:

Cezeaux, J. L., Ph.D. .......... Rensselaer
Iannelli, G. S., Ph.D. .......... Tennessee
Lyna, J. E., M.D., Ph.D. .......... NC State
Pionke, C. D., PE, Ph.D. .......... Georgia Tech
Rosch, R. L. (UTSI), Ph.D. .......... Georgia Tech
Yun, N., Ph.D. ................ California (San Diego)

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. Changing from one of these programs to another requires 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; aeroacoustics; and structures and stress analysis. In Engineering Science, program concentrations include solid mechanics, fluid mechanics, computational mechanics, mechanics of composite materials, biomechanical 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) be at one of the interfaces between science and engineering and can best be met by interdisciplinary study in engineering. The program's course offerings and research activities are also intended to meet the needs of students who seek preparation for employment in engineering areas requiring specialization in mechanics or in related interdisciplinary studies such as biomechanics.

In Mechanical Engineering or Aerospace Engineering, entrance into the Master of Science program is available to qualified graduates of recognized undergraduate curricula in mechanical or aerospace engineering and to qualified graduates of other curricula who satisfy the necessary prerequisites. Admission into the doctoral program will be granted to those applicants who have demonstrated superior achievement in their engineering backgrounds. The general GRE is required of all international applicants for admission.

In Engineering Science, entrance into the graduate program is available to graduates of recognized curricula in engineering, mathematics, or one of the physical or biological sciences. A program application is required in addition to the Graduate School application. The names and addresses of four references must be included with the program application. The general GRE is required of all international applicants for admission.

Each student must satisfactorily complete a program of study that has been approved by his/her advisory committee and complies with the requirements of the Graduate School. In Engineering Science, the student's major professor may be selected from a department other than the Department of Mechanical and Aerospace Engineering and Engineering Science; however, at least one member of the student's graduate advisory committee must be on the faculty of the Department of Mechanical and Aerospace Engineering and Engineering Science.

THE MASTER'S PROGRAM

In both Mechanical Engineering and Aerospace Engineering, three M.S. options are offered. Option I requires a thesis, while options II and III do not. Option I is the normal program for recent graduates. Options II and III provide graduate students with significant professional work experience the opportunity to focus their programs in special areas through either greater course work 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</td>
</tr>
<tr>
<td>Option II</td>
<td>2</td>
</tr>
<tr>
<td>Option III</td>
<td>3</td>
</tr>
<tr>
<td>Coursework</td>
<td>24</td>
</tr>
<tr>
<td>Courses in department (500 level or above)</td>
<td>20</td>
</tr>
<tr>
<td>(minimum)</td>
<td>12</td>
</tr>
<tr>
<td>Mathematics (400 level or above)</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>
All three program options require participation in the departmental graduate seminars program, and passing a final examination on all work submitted for the degree. Option II final examination will cover all course work. Option III final examination will cover all the selected engineering problems.

The 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 semester 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>24</td>
</tr>
<tr>
<td>Coursework</td>
<td>30</td>
</tr>
<tr>
<td>Mathematics</td>
<td>6</td>
</tr>
<tr>
<td>Engineering courses*</td>
<td>12</td>
</tr>
<tr>
<td>Related courses</td>
<td>15</td>
</tr>
<tr>
<td>Thesis</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
</tr>
</tbody>
</table>

*Engineering courses under Option II may include advanced laboratory work or special problem work, for example, MAES 591 or analogous courses in other departments.

Both program options require participation in the departmental graduate seminars program, and passing a final examination on all work submitted for the degree.

THE DOCTORAL PROGRAM

All students must complete a minimum of 72 semester hours beyond the Bachelor's degree, exclusive of credit for the master's thesis. These shall include a minimum of 24 semester hours in Doctoral Research and Dissertation and a minimum of 48 semester hours in other courses.

In Mechanical Engineering or Aerospace Engineering, the courses must include:

1. A minimum of 12 semester hours of graduate credit in mathematics in courses numbered 400 or above with a minimum of 6 semester hours numbered 500 or above.
2. A minimum of 24 semester hours in the department in courses numbered 500 and above, with at least 12 of these semester hours in the major. A minimum of 9 semester hours of courses is required at the 600 level. These are exclusive of thesis, problems, or dissertation credit. The student's advisory committee can approve a student's petition to replace one 600-level course with one or more 500-level courses(s) that are more appropriate.

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.
3. 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 the state of Florida (concentration in biomedical engineering only). Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE CREDIT FOR UNDERGRADUATE COURSES

Students majoring in Mechanical Engineering or Aerospace Engineering may not normally use more than one 400-level engineering course to meet their advanced degree requirements. For students majoring in Engineering Science, four hundred-level courses in engineering may be used for graduate credit at the discretion of the advising committee. However, at least two-thirds of minimum required credit hours in a master's degree program must be at or above the 500 level. With the approval of the student's major department, a student whose major is outside the Department of Mechanical and Aerospace Engineering and Engineering Science may take senior (400-level) courses in the Department for graduate credit. Such students should consult with instructors regarding prerequisites for undergraduate courses.

Aerospace Engineering

NOTE: Not all the courses listed below are available at both the UT Knoxville and the UT Space campuses.

GRADUATE COURSES

422 Aerodynamics (3) Theory and design of aerodynamic bodies for desired characteristics. Potential flow theory, viscous effects, compressibility effects, Subsonic, transonic, and supersonic airfoils. Prereq: MATH 307, F

423 Viscous Flow (3) Boundary layer theory; laminar and turbulent flow; computation, numerical solution methods. Prereq: 422 or Heat Transfer or consent of instructor. Sp

424 Astronautics (3) Propulsion, trajectories, guidance, control, and atmospheric reentry of space vehicle systems. Prereq: Thermodynamics, Mechanical Vibrations. Sp

425 Propulsion (3) Principles of propulsion devices; turbojet, ramjet and rocket engines. Prereq: 351. F


429 Aerospace System Design (4) Synthesis and design of complete aerospace system, economic and technical aspects. Participation in team design effort, formal presentations and design report. Prereq: 425, 426. Sp

449 Aerospace Engineering Laboratory (3) Design, conducting, and reporting results of experimental exercises. Prereq: successful completion of undergraduate courses. Prereq: 345, 351, 352, 353. F

495 Selected Topics in Aerospace Science (1-4) Current problems and topics in aerospace science. Prereq: Consent of Instructor.

511 Inviscid Flow (3) Kinematics and dynamics of inviscid fluids; potential flow about body, conformal mapping. Prereq: 422 or Mechanical Engineering 351, Mathematics 425 or equivalent.

513 Experimental Methods in Fluid Mechanics (3) Experimental techniques with laboratory experiments; representative exercises with flow visualization, turbulence measurements, Navier-Stokes equations, boundary layer measurements, laser-optical measurements. Prereq: 423 or Mechanical Engineering 351.

515-16 Air Vehicle Aerodynamics and Performance (3,3) Application of aerodynamics principles to air vehicles; provides estimates of performance, stability, and control characteristics for subsonic to hypersonic speeds. Relations among thrust, drag, lift and altitude, propulsion systems, vehicle performance characteristics, and trajectory optimization. Prereq: 422; 515 for 516.

521-22 Aerodynamics of Compressible Fluids (3,3) One-dimensional internal and external flow; waves; small perturbation theory; slender body theory; similarity rules; methods of characteristics. Prereq: 422 for 521; 521 for 522.

525 Hypersonic Flow (3) Slender body flow; similarity; Newtonian theory; blunt body flow; viscous interactions; free molecular and rarefied gas flow. Prereq: 512.

527-28 Aerospace Ground Test Facilities (3,3) Atmospheric models and similarity considerations; aerodynamic test facilities: continuous and intermittent wind tunnels and ballistic ranges; propulsion test facilities or all breathing and rocket engines; space environment and spacecraft test facilities. Prereq: 512 and 521, Mechanical Engineering 513 and 522.

529 Rarefied Gasdynamics (3) Binary elastic collisions; kinetic theory; flow regimes; Boltzmann and model equations, transport equation, gas-surface interactions, slip and transition flow; Monte Carlo simulation; experimental techniques; introduction to hypersonic rarefied flows. Prereq: 522, Mechanical Engineering 529.

531 Magnetohydrodynamics (3) Electromagnetic field theory; chemical kinetics; thermonuclear and thermophysical properties of gas plasmas; governing equations and applications. Prereq: 422 and Mathematics 471.

532 Introduction to Turbulence (3) Macroscopic effects, turbulence, statistical treatment, correlation functions, energy spectrum, diffusion; application of turbulent jets and pipe flow. Prereq: 511-12.
Engineering Science

**GRADUATE COURSES**

421 Materials of Engineering (3) Mechanical properties of engineering materials; data collection and processing; time-dependent and cyclic dependent properties. Prereq: 321, Materials Science and Engineering 201. 3 hrs or 2 hrs and 1 lab.

423 Fracture-Safe Design (3) Critical review of variables controlling fracture toughness: part crack geometry, crack size, material, characterization of fracture toughness by stress intensity factors, strain energy release rates, J integral, COD data, transfer toughness data. Prereq: Materials Science and Engineering 201. (Same as Materials Science and Engineering 475.) 3 hrs or 2 hrs and 1 lab.

426 Fundamental Principles of Composite Materials (3) (Same as Materials Science 472.)

429 Introduction to Ceramic Matrix Composites (3) (Same as Materials Science 474.)

433 Dynamic Systems (3) Three-dimensional dynamics of rigid bodies; gyroscopes; variable mass systems; central force motion; Lagrange's equations; stability; transfer functions. Prereq: Dynamics.

435 Engineering Acoustics (3) Concepts of acoustics, measures of sound and their units; noise generation and transmission, noise control principles and applications, materials and procedures for noise abatement. Prereq: Senior standing or consent of instructor.

442 Fluid Mechanics II (3) Integral forms of linear and angular momentum; fluid properties; fluid dynamics; turbulence; fluid and turbomachinery; performance analysis; differential conservation equations; internal one-dimensional incompressible and compressible flows; potential flow; methods of flow measurement; laboratory experiments. Prereq: Fluid Mechanics I, Differential Equations I, Calculus III. Sp

461 Experimental Stress Analysis (3) Theory, techniques, and instrumentation of resistance strain gauges; theory and techniques of brittle fracture testing; instrumentation of transducers. Prereq: 321, Electrical and Computer Engineering 301. 2 hrs and 1 lab.

465 Dynamic Data Acquisition (3) Use and calibration of instrumentation for measuring and recording dynamic events. Fourier analysis, digital signal processing, transient analysis, parameter estimation with applications to modal vibration analysis. Prereq: Computer and Electrical Components, Mechanical Vibration. 2 hrs and 1 lab.

471 Clinical Engineering and Bioinstrumentation (3) Function and characteristics of health care delivery systems; hospital organization and health care economics; development and testing and use of hospital-based clinical engineering program. Biomedical instrumentation systems operational characteristics; performance, equipment selection and application, troubleshooting, on-line read-out and storage devices; evaluation of commercially available systems, selection and procurement methods, custom-designed systems, equipment maintenance and control programs. Prereq: 322, Mechanical Engineering 522.

485 Theory of Turbulence (3) (Same as Engineering Science and Mechanics 645.)

501 Advanced Aerodynamics (3,3) Subsonic, transonic, supersonic, and hypersonic flows in generalized and specialized coordinate systems; combined viscous and inviscid effects. Relationships among various regimes of fluid flows. Fundamental assumptions, limitations of approximations and consequences. Foundations of gas dynamics, applications to airplane, rocket, ground-

547 Design of Artificial Internal Organs (3) Design, development, and evaluation of artificial internal organs; analysis of transport processes in living devices for design optimization; review of currently available devices; federal regulation and ethical considerations. Prereq: 341, Mathematics 231.

548 Transport Phenomena in Living and Life Support Systems (3) (Same as Materials Science 473.) Airflow and heat transfer to quantitative analysis of in-vivo physiological function; introduction to analysis of transport phenomena in life support systems, design considerations for artificial organs; application to blood and tissue engineering, cardiovascular dynamics, mass diffusion in bio-membrane systems, and heat transfer in living systems and extracorporeal blood flow devices. Prereq: 271, Mathematics 231.

594-96 Special Engineering Science Topics (1-3) Problems related to recent developments and practice. Open to juniors or seniors. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

523 Theory of Elasticity (3) Equations of equilibrium; strain-displacement relations compatibility; constitutive equations in three-dimensions. Beams, disks, thick-walled tubes, plates with holes, stress concentrations. Air and composite material properties, transient plane stress and plane strain in rectangular and polar coordinates. Thermal stresses in beams, rings, plates, and shells; thermal buckling problems.

525 Theory of Plates (3) Classical bending theory of thin plates; thick plates; buckling and large deflection problems. Prereq: 523 or 535.


528 Ceramic Matrix Composites: Material and Mechanics (3) Micromechanics and microstructural design; fabrication of ceramic matrix composites; interface characterization and mechanics; electron microscopy and nondestructive evaluation. Prereq: Consent of instructor. (Same as Materials Science and Engineering 525.)

529 Fatigue of Engineering Materials (3) Fatigue life prediction, crack initiation, crack propagation. Variable amplitude loading, multiaxial loading, environmental fatigue, creep fatigue, metallurgical and microstructural variables, fatigue crack growth, non-metals. Prereq: Consent of instructor.


536 Advanced Engineering Acoustics (3) Introduction to theory and application of acoustic analysis; vibration of continuous systems, plane and spherical waves, transmission characteristics, wave propagation, reflection, refraction, resonance, filters, absorption mechanisms, microphones, ultrasonic, sonar transducers. Prereq: 435 or undergraduate vibrations course.

539 Continuum Mechanics (3) Cartesian tensors, transformation of coordinates, stress, strain, deformation, constitutive equations. Conservation laws for mass, momentum, energy. Applications in solid and fluid mechanics.

582 Experimental Mechanics of Composite Materials (3) Stress-strain relationships for orthotropic and transversely isotropic materials; analysis of composite laminates and sandwich; stress and strain transformation; Lamb vector theory; fiber-matrix interface, and composite mechanical properties (tensile, flexure, compressive, shear); physical properties; notch-tip stress field, strain concentration factor, notch sensitivity; strain energy release rate, composite fracture toughness, failure...
461 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, averaging, large scale structures; high speed flow; reacting, nonreacting, excitation, ionization. Applications to propulsion, lasers, aerodynamics. Prereq: 542.

465 Theory of Turbulence (3) Mathematical descriptions of turbulence, kinetic energy spectra, Kolmogoroff's hypothesis, large and small eddy structures for turbulent flows; turbulent diffusion by continuous movement; applications to turbulent jets, wakes, pipe flow, and boundary layers. Prereq: 542. (Same as Aerospace Engineering 645.)

567 Computational Mechanics Seminar (1) Current developments in computational fluid/thermal/mechanical mechanics. For departmental thesis students only. May be repeated for credit.

581 Advanced Topics in Engineering Mechanics (3) Advanced problems in mechanics, group or individually. Prereq: Consent of instructor. May be repeated for credit.

582 Special Topics in Thermodynamics (3) Application of thermodynamics to topics of current interest in mechanical engineering. Prereq: Instructor consent.

586 Combustion and Chemically Reacting Flows (3) Fundamentals of high-speed chemical engineering; fuels and combustion; heat and mass transfer; turbulence; chemical and thermal nonequilibrium; stability, combustion, detonation. Applications to aerodynamics, propulsion, fire and explosion. Prereq: 581 or consent of instructor.

601 Rocket Propulsion (3) Rocket propulsion fundamentals, engineering principles, analysis of rocket engines, rocket nozzle design, applied thermodynamics, aerodynamics, propulsion systems, mission analysis. Prereq: 581 or consent of instructor.

603 Rocket Propulsion (3) Rocket propulsion fundamentals, engineering principles, analysis of rocket engines, rocket nozzle design, applied thermodynamics, aerodynamics, propulsion systems, mission analysis. Prereq: 581 or consent of instructor.

621 Thermodynamics I (3) Statistical thermodynamics; laws of thermodynamics; entropy and equilibrium; statistical mechanics; physical properties of matter; phase changes; thermodynamic potentials; irreversible processes; heat engines and refrigerators; Green's theorem; conservation laws. Prereq: 532 or consent of instructor.
582 Rocket Propulsion II (3) Solids propelled rocket performance, homogeneous and heterogeneous propellant chemistry and combustion system performance, thermal decomposition and gas phase reaction models; effect of chamber pressure, temperature, oxidizer and fuel on solid propellant burn rates, erosive burning, analysis of two-phase solid propellant exhaust flow. Introduction to nuclear and electric propulsion. Electromagnetic and electric field (ion) engine performance, magnetohydrodynamic thrusters, traveling wave thrusters; exotic propulsion systems. Prereq: Consent of instructor.

584-85 Turbomachinery Systems I, II (3, 3.2) Ideal cycle analysis of a single and multiple turbines, cycle analysis, component performance analysis, design and systems integration (inlets, nozzles, combustors, compressors, turbines), fluid flow through theory, turbine engine component matching, transient operation, and rotating stall, engine control systems, structural considerations. Prereq: First year graduate standing and consent of instructor.


590 Selected Engineering Problems (2-6) Enrollment 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 6 hrs.

610 Advanced Topics in Fluid Mechanics and Heat Transfer (3) Advanced theory and application of fluid mechanics and heat transfer; natural convection, multi-phase flow, high speed reacting and nonreacting flows; advanced boundary layer techniques, combustion, perturbation and variational methods of analysis, heat exchange theory and design. May be repeated. Maximum 9 hrs. Prereq: Consent of instructor.

611 Advanced Convective Heat Transfer, Fluid Mechanics and Mass Transfer (3) Stagnation point and high speed viscous boundary layer flows; problems in heat transfer at high speeds and hypersonic speeds; laminar and turbulent boundary layer heat transfer with surface melting, ablation, sublimation, effects of gas species recombination, stagnation point heat transfer, Lavoisier's integral solution for high speed boundary layers; heat flux scaling rules; mass transfer and radiation cooling techniques. Preq: 512 and consent of instructor.


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


651-52 Advanced Topics in Computational Fluid Dynamics (3, 3) Approximation theory; analysis of accuracy, convergence, and stability for smooth and non-smooth solutions: shocks, artificial dissipation; two- and three-dimensional, compressible viscous and inviscid flows; potential, Euler and complete Navier-Stokes descriptions; mixed subsonic-supersonic flows. Algorithm constructions: finite difference, finite element, approximate factorization, flux vector splitting, finite volume, generalized coordinate and adaptive grids; steady flows including second-order turbulence closure. Thin layer and parabolic Navier-Stokes equations, reports on current research at UT and US. May be repeated. S/NC only.

653-54 Advanced Topics in Computational Solid Mechanics (3, 3) Fracture mechanics, singularities solutions, non-linear constitutive problems, variable stiffness, initial strain and initial stress methods, plasticity, creep, unified creep-plasticity theory; geometrically nonlinear problems, large deflection, stability, shell structures; analysis of accuracy, convergence, adaptive grids. Preq: 553.

671 Advanced Topics in Applied Artificial Intelligence (3) (Same as Nuclear Engineering 671.)
sequence in biochemistry or molecular biology; (5) presentation of a research thesis and its oral defense.

THE DOCTORAL PROGRAM

The program leading to the Ph.D. is designed to develop the student’s ability to pursue independent and original research in microbiology and allied fields, to teach both oral and written communication of the results of research to the scientific community, and to train effective teachers. Students may enter the program after receiving either a bachelor's or master's degree. Students who enter with a bachelor's degree usually receive the Ph.D. after four or five years; those with the master’s degree usually take three or four years to complete the degree. Departmental requirements are: (1) a 3.0 GPA in all courses taken for graduate credit after 12 hours of credit have been earned in courses graded on the A-F scale; (2) a 3.0 GPA in courses taken in the department; (3) satisfactory performance in at least one semester as a teaching assistant; (4) one semester of physical chemistry; (5) one course in statistics; (6) two semesters of biochemistry or molecular biology; (7) satisfactory performance in a comprehensive examination that must be attempted before the end of the fifth semester in the program and passed before admission to candidacy; and (8) the presentation of a research dissertation and its oral defense.

GRADUATE COURSES

410 Bacterial Physiology (3) Modern concepts of structure and function of bacterial cell. Prereq: Introduction to Microbiology. F

411 Bacterial Genetics (3) Transmission and expression of genetic information by bacteria. Prereq: Introduction to Microbiology. Sp

420 Medical Microbiology (3) Disease-producing microorganisms, including bacteria, rickettsia, chlamydia, and fungi. Prereq: Introduction to Microbiology. Sp

429 Medical Microbiology Laboratory (2) Laboratory exercises in medical importance of microorganisms: microorganisms, pathogenesis and immunity. Prereq: Introduction to Microbiology Lab. 430. Coreq: 420. Sp

430 Immunology (3) Principles of inflammation and immunity; immunoglobulin structure and theories of formation and diversity; complement, hypersensitivities, cell cooperation and recognition 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 (1-15) Required for the student not otherwise registered during any semester in the program. May be used toward degree requirements. May be repeated. 5/N/C only. E

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

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

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

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

595 General Seminar (1) Lectures and seminars by invited speakers, faculty, and graduate students. May be repeated. Maximum 18 hrs. 5/N/C only. E

596 Laboratory Rotation (1) Familiarization with research areas in department through series of rotations in laboratories of individual faculty members. May be repeated. Maximum 3 hrs. 5/N/C only.

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

601 Journal Club in Microbial Physiology (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. 5/N/C only. E

602 Journal Club in Microbial Pathogenesis (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. 5/N/C only. E

603 Journal Club in Immunology (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. 5/N/C only. E

604 Journal Club in Virology (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. 5/N/C only. E

605 Journal Club in Microbial Genetics (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. 5/N/C only. E

610 Topics in Microbial Physiology (1-3) Prereq: 410 or consent of instructor. May be repeated. Maximum 12 hrs.

620 Topics in Microbial Pathogenesis (1-3) Prereq: 420, 430 or consent of instructor. May be repeated. Maximum 12 hrs.

630 Topics in Immunology (1-3) Prereq: 430 or consent of instructor. May be repeated. Maximum 12 hrs.

640 Topics in Virology (1-3) Prereq: 440 or consent of instructor. May be repeated. Maximum 12 hrs.

650 Topics in Microbial and Molecular Genetics (1-3) Prereq: 411 or consent of instructor. May be repeated. Maximum 12 hrs.

670 Advanced Topics in Environmental Microbiology (1-3) Prereq: 570 or consent of instructor. May be repeated. Maximum 12 hrs.

Microbiology-Veterinary Medicine

See College of Veterinary Medicine and Comparative and Experimental Medicine

Music

(College of Arts and Sciences)

MAJOR DEGREES

Music.........................................M.M.

Dolly Davis, Acting Head

Professors:

Ball, Charles H. (Emeritus), Ph.D. Peabody
Blizas, George C., M.M. Converse
Brock, John P. (Liaison), M.M. Alabama
Carter, W. J. (Emeritus), D.M.A. Eastern
Coker, J., M.A. Sam Houston
Combs, F. M., M.A. Missouri
DeVine, George F. (Emeritus), Diploma
Dorn, W. (Emeritus), M.A. Columbia
Fred, Herbert W. (Emeritus), Ph.D. Northwestern
Hoford, A. G. (Emeritus), M.M. North Carolina
Applicants for admission to training, and music history/literature. These Diagnostic Examinations in music theory, ear training, and tape recordings of representative works. The program in composition must submit scores required to audition before the appropriate area of concentration in performance or music education are degrees conferred by UT Knoxville, appropriate 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 520: 9 hours of music education electives at the 500 level; 6 hours of Thesis S/NC; 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

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 Foundations of Music Education (3) Historical, philosophical and aesthetic bases. Prereq: Consent of instructor. E

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

530 Advanced Band Literature and Conducting (3) Reading, conducting, and interpreting band scores suitable for school, college, and community bands; contemporary and standard band literature. Prereq: Consent of instructor. E

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

560 Psychology of Music Teaching (3) Research on musical perception and cognition and its application to teaching of music. Definition and measurement of musical ability. Prereq: Course in general psychology and 1 yr of music theory or consent of instructor. E

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

590 Special Topics in Music Education (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

593 Special Problems in Music Education (3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

Music Ensemble

GRADUATE COURSES

503 Small Jazz Ensemble (1) May be repeated. Maximum 12 hrs. E

504 Jazz Ensemble (1) May be repeated. Maximum 12 hrs. E

505 Studio Orchestra (1) May be repeated. Maximum 12 hrs. E

506 Trombone Choir (1) May be repeated. E

510 Percussion Ensemble (1) May be repeated. E

511 Marimba Choir (1) May be repeated. E

515 Chamber Music Ensemble (1) May be repeated. Maximum 12 hrs. E

520 UT Singers (1) May be repeated. E

530 Chamber Singers (1) May be repeated. E

540 Opera Theatre (1) May be repeated. E

550 Concert Band (1) May be repeated. E

552 Campus Band (1) May be repeated. E

554 Varsity Band (1) May be repeated. E

566 Laboratory Band (1) May be repeated. E

559 Marching Band (1) May be repeated. E

570 Symphony Orchestra (1) May be repeated. E

590 Concert Choir (1) May be repeated. E

599 Women's Chorale (1) May be repeated. E

599 Accompanying (1) May be repeated. E

Music General

GRADUATE COURSES

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

501 Graduate Recital (2) E

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when 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 Lecture Recital (2) E

521 Special Topics in Performance (1-3) Prereq: Consent of department head. E

540 Secondary Applied Music (1) May be taken by music majors declaring applied study on a 2nd or 3rd instrument. May be repeated for a maximum of 4 hours credit on each instrument. Admission by audition. Requires payment of Applied music fee. E

561 Church Music Performance Project (1-2) May be repeated. Maximum 3 hrs. E

Music History

GRADUATE COURSES

410 Music History Genre (3) Topics vary. May be repeated. Maximum 6 hrs. E

420 History of Opera (3) Dramatic, vocal, and orchestral elements in opera of Italian, French, and German schools, 1600-present.
Music

GRADUATE COURSES

400 Advanced Improvisation (3) Further development of individual skills and solving individual problems in jazz improvisation. Prereq: 210 and 220.

Music Jazz

GRADUATE COURSES

410 Advanced Improvisation (3) Further development of individual skills and solving individual problems in jazz improvisation. Prereq: 210 and 220.
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
Mihalczco, J. T., Ph.D. ................. Pennsylvania
Miller, L. F., PE, Ph.D. .................. Texas A&M
Uhrig, R. E. (Distinguished Prof.), PE, Ph.D. .... Iowa
Upadhyaya, B. R., Ph.D. ................. California

Associate Professors:
Groer, P. G., Ph.D. ...................... Vienna
Katz, E. M., PE, Ph.D. .................. Tennessee
Peway, R. E., Ph.D. ..................... Tennessee
Ruggles, A. E., Ph.D. .................. Rensselaer
Scott, T. H., PE, Ph.D. .................. Florida
Townsend, L. W., Ph.D. ................ Idaho

Assistant Professor:
Hines, J. W., Ph.D. ...................... Ohio State

The Department of Nuclear Engineering offers programs leading to the Master of Science and Doctor of Philosophy degrees.

Students may elect a traditional nuclear engineering M.S. or Ph.D. program (focusing on fission energy or fusion energy) or a radiological engineering concentration at the master's level. The radiological engineering concentration prepares students for careers in the radiation safety field (health physics). The program is designed for graduates of undergraduate programs in engineering, physics, biology, and chemistry.

All entering students must have, as a minimum, competency in mathematics through ordinary differential equations, competency in atomic and nuclear physics, and competency consistent with a course in introductory nuclear engineering. If these competencies do not exist, the student must take appropriate courses for undergraduate credit. The department head is the contact for all interested students, both those with nuclear engineering degrees and those from other disciplines.

THE MASTER'S PROGRAM

A graduate program leading to the Master of Science is available to graduates of recognized undergraduate curricula in engineering and physics. Each applicant will be advised as to the necessary prerequisite courses before he/she enters the program.

The student must complete 24 semester hours of coursework approved by the student's advisory committee that includes the following:

1. A major consisting of a minimum of 12 semester hours of graduate courses in nuclear engineering. This must include at least one of the following sequences: 511, 512; 551, 552; 571, 572.

2. A minor of 6 semester hours of elective courses in mathematics, statistics or computer science.

3. Six semester hours in either nuclear engineering or a related field.

The M.S. candidate must also demonstrate research or design capability. This requirement may be satisfied by a thesis project or engineering practice projects as described below:

Thesis - The student performs independent research on a topic approved by the graduate committee. He/she submits a thesis on the research. The student then must pass an oral examination on the thesis and all graduate coursework. The student must enroll for six semester hours of NE 500 (Thesis).

Engineering Practice - The student performs independent research on two to four separate topics approved by his/her graduate committee. Each project is similar to a thesis project but smaller in scope. He/She submits a report, in thesis format, on each project. The student must then pass an oral examination on his/her engineering practice reports and all graduate coursework. The student must enroll for six semester hours of NE 598 (Nuclear Engineering Practice).

THE DOCTORAL PROGRAM

Students in the field of nuclear engineering desiring to study for the Doctor of Philosophy must have a Bachelor of Science or Master of Science from a recognized university, with a major in engineering or physics. All candidates will be required to demonstrate general competence in a comprehensive examination in the areas of engineering science, mathematics, physics, and nuclear engineering.

Specific course requirements for the Ph.D. in Nuclear Engineering include:

1. A minimum of 24 semester hours beyond the Bachelor's degree, exclusive of credit for the M.S. thesis or Nuclear Engineering Practice.

2. A minimum of 24 semester hours in doctoral research, NE 600.

3. A minimum of 30 semester hours in nuclear engineering courses numbered 500 and above (or the equivalent), with at least 6 semester hours of 600-level courses. These are exclusive of thesis or dissertation credit.

4. A minimum of 12 semester hours in mathematics, computer science, or statistics courses beyond nuclear engineering undergraduate requirements numbered 400 or above.

5. A minimum of 6 semester hours in courses numbered 500 or above from a department other than nuclear engineering. The choice depends on the student's overall program and should expand his/her knowledge in a given field.

6. A reading knowledge of one foreign language may be specified by the student's doctoral committee.

The comprehensive examination is prepared by the nuclear engineering faculty and consists of 12 hours of written examinations. All past examinations are filed in the library, and students are encouraged to review them. Students are invited to take the comprehensive examination after completing approximately 30 semester hours of coursework. A student who fails the written part of the examination must take and pass the examination the next time it is offered to remain in the Ph.D. program. Registration for NE 600 is not permitted until the written examination is passed. The comprehensive examination is completed with a successful oral defense of the dissertation proposal. A candidate must successfully defend, in an oral examination, all work presented for the degree—all coursework and the dissertation.

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 requirements for the student's degree (30 in a master's degree program must be taken in courses numbered 500 or above.

GRADUATE COURSES

403 Nuclear Engineering Laboratory (3) Cross-section measurement, diffusion properties of neutrons, criticality, control, stability, shielding, xenon poisoning, dynamics and controls experiments. Prereq: Nuclear Engineering Laboratory or equivalent. Coreq: 471, 405.


405 Reactor Dynamics, Control and Safety (3) Reactor systems, steam generator, control rods, core, fuel cycle, core control, fuel fabrication, in-core fuel management, reprocessing and waste disposal. Prereq: 403.


432 Radiation Risk Analysis (3) Radiation risk estimates for external and internal radiation, dose-response models, dose rate effects, prediction of radiation risks, radiation safety standards.


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: neutrons, fission cross-sections, kinematics, elastic scattering, reactor kinetics, reactor systems and nuclear data. Analytical and numerical methods applicable to general criticality problems, eigenvalue searches, perturbation theory, and multigroup diffusion equations. Prereq: Introduction to Nuclear Engineering.

471 Nuclear Reactor Theory II (3) Thermal spectrum computational methods: heterogeneous effects in fast and thermal reactor core calculations; equations that relate thermal and neutron variables; power distribution calculations and reactivity control methods. Prereq: 470.

494 Special Topics in Nuclear Engineering (3) Problems related to specific developments and practice. Prereq: Senior standing and consent of instructor. May be repeated. Maximum 6 hrs.

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

502 Registration for Use of Facilities (3-15) Required for the student 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. 15 credits maximum. 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 solutions of equations of motion; boundary layer analysis; numerical analysis of fluid flow and heat transfer.

521 Nuclear Systems Dynamics and Control (3) Introduction to state variable methods for system dynamics and control analysis of nuclear reactor systems. Prereq: Nuclear Reactor Theory I or consent of instructor. May be repeated. Maximum 6 hrs.


541 Reactor Fuel Management (3) Topics relative to core fuel management. Applicable topics in reactor physics, fuel depletion, isotopic inventories, and numerical methods. Prereq: 401.


543 Selected Topics in Nuclear Criticality Safety (3) Criticality safety computational and experimental methods for enrichment, fabrication, storage, reprocessing, and transport applications; overview of safety practices and regulatory requirements. Prereq: 421 or consent of instructor.

550 Nuclear Instrumentation (3) Physics and electronics associated with radiation detection, methods of data analysis, application of particular instrument measurement techniques and fundamentals of nuclear instrumentation operation.

551 Radiation Protection (3) Interactions of photons, neutrons, beta particles, and heavy charged particles with matter, with emphasis on fast neutron detection, internal and external radiation dosimetry; chemical and biological effects of radiation; radiation protection. Prereq: Introduction to Nuclear Engineering and Differential Equations I or equivalent.

552 Radiation Monitoring and Dose Assessment (3) Methods for work area and area monitoring; dosimeters, pathways analysis, risk projections and regulations. Prereq: 551.

571 Reactor Theory and Design (3) Analytical and numerical techniques for neutronics modeling of nuclear systems. Forward and adjoint transport equations. Prereq: 511 or consent of instructor.

572 Nuclear System Design (3) Design and analysis of a nuclear system, interface with non-nuclear aspects of system design: system reliability and economics; class project. Prereq: 571 or consent of instructor.

576 Expert Systems in Engineering (3) Application of expert systems in engineering: logic and rationale, developing expert systems, programming, advanced topics. Prereq: 511 or consent of instructor. (Same as Mechanical and Aerospace Engineering and Engineering Science 576.)

577 Neural Networks in Engineering (3) Neural 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.)

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

581 Reactor Shielding (3) Application of analytic/deterministic solutions of Boltzmann transport equation to shield design problems. Spherical harmonics, monodimensional solutions, coupled analysis, and fast reactor shield design. Prereq: 406 or equivalent.

582 Monte Carlo (3) Analysis of radiation transport problems in radiation shielding by Monte Carlo method, description of MORSE code. Random sampling, evaluation of integrals, analog particle transport, techniques of variance reduction, forward and adjoint modes of analysis, importance function biasing, splitting, collapse, window survival biasing and contribution theory. Prereq: 581.

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

588 Measurement Science I (3) Principles of measurement, introduction to measuring devices. Prereq: Consent of instructor. (Same as Mechanical and Aerospace Engineering and Engineering Science 588, Aviation Systems 588.)

589 Measurement Science II (3) Modern industrial measurement systems, advanced topics in measurement. Prereq: 588. (Same as Aviation Systems 589.)

597 Special Topics in Nuclear Engineering (3) Lectures and recitation on recent advances in nuclear engineering. Prereq: Consent of instructor. May be repeated with consent of department.

598 Nuclear Engineering Practice (3-9) Experience in solving and reporting nuclear engineering problems. Prereq: Approval of department. May be repeated. Enrollment limited to alternate plan students. SNC only.

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

611-12 Selected Topics in Reactor Theory (3,3) Transport theory, control rod theory, stochastic methods. Selected topics from literature. Prereq: 572.

621 Selected Topics in Radiation Protection (3) Prereq: 551, 552. May be repeated with consent of department.

653 Theory of Information Processing (3) Modern system theoretical methods for evaluating system performance from dynamic measurements. Prereq: 522 or equivalent.

657 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.)

697 Special Topics in Nuclear Engineering (3) Investigation of new developments. Prereq: Consent of instructor.

Nursing

(Course of Study)

MAJOR

DEGREE

Nursing ........................................... M.S.N., Ph.D.

Joan L. Creasia, Dean

Sandra Thomas, Director of Ph.D. Program

Martha Alligood, Director of MSN Program

Professors:

Alligood, Martha R. (Liaison), Ph.D., M.S.N. New York City Creasia, Joan L., Ph.D., M.S.N. Manhattan Droppelman, Patricia G., Ed.D., M.S.N. Manhattan Dyer, Theresa, Ed.D., M.S.N. Manhattan Fenske, Mildred M., Ph.D., M.S. New York City McGuire, Sandra, Ed.D., M.S.N. Manhattan Medlin-McCarthy, Mary Anne, Ph.D., M.S.N.

Associate Professors:

Brown, Allie J., M.S.N., Ph.D. New York City Conlon, Kathleen P., M.S.N., Ph.D. SUNY Buffalo Evans, Ginger W., M.S.N., Ph.D. Manhattan Evans, Maude M., M.S.N., Ph.D. Manhattan Fox, Marie X., M.S.N., Ph.D. Manhattan Heiton, Sally M., M.S.N., Ph.D. Texas Women's College, Mary P., Ph.D. Manhattan Pierce, Margaret, M.S.N., Ph.D. Manhattan Pullen, Lisa, Ph.D., M.S.N. Mississippi State

Assistant Professors:

Brown, Allie J., M.S.N., Ph.D. New York City Conlon, Kathleen P., M.S.N., Ph.D. SUNY Buffalo Evans, Ginger W., M.S.N., Ph.D. Manhattan Evans, Maude M., M.S.N., Ph.D. Manhattan Fox, Marie X., M.S.N., Ph.D. Manhattan Heiton, Sally M., M.S.N., Ph.D. Texas Women's College, Mary P., Ph.D. Manhattan Pierce, Margaret, M.S.N., Ph.D. Manhattan Pullen, Lisa, Ph.D., M.S.N. Mississippi State

THE MASTER'S PROGRAM

The College of Nursing offers the Master of Science in Nursing degree with concentrations in adult health nursing, family nurse practitioner, mental health nursing, nursing administration, and nursing of women and children. The program is accredited by the National League for Nursing 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 with 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. Hold a Bachelor's degree in Nursing from a National League for Nursing accredited program or complete the equivalent of an upper division undergraduate major in nursing in addition to meeting all M.S.N. degree requirements.
3. Have an undergraduate GPA of 3.0 or higher or a GPA of 3.3 for courses in the undergraduate major.
4. Submit scores of the general portion of the Graduate Record Examination.
5. Submit Graduate Program Data Form.
6. Submit Graduate School Rating Forms from three individuals familiar with the applicant's current work performance or academic aptitude.
7. 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 for fall admission must be received by February 1.

**Special Requirements**

1. Each student must hold personal professional liability insurance.
2. Registered nurses must be licensed to practice nursing in Tennessee.
3. Each student must present proof of hepatitis B vaccination and rubella and rubeola immunization or sufficient titer for immunity; TB status.
4. Each student must present evidence of current 2-person CPR certification.
5. Non-registered nurse students must have completed courses in chemistry, nutrition, microbiology, anatomy, and physiology plus 12 semester hours of behavioral science courses.

**Thesis and Non-Thesis Options**

The thesis option is available for interested students and is especially encouraged for those who are considering pursuit of doctoral degrees sometime in the future. Students who choose the non-thesis option must register for 580 Nursing Project or 582 Supervised Research.

**Program Requirements**

All students must complete a minimum of 36 semester hours distributed as follows:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core</td>
<td>12</td>
</tr>
<tr>
<td>503-04 Advanced Clinical Reasoning I, II</td>
<td>6</td>
</tr>
<tr>
<td>510 Theoretical Foundations of Nursing</td>
<td>3</td>
</tr>
<tr>
<td>520 Advanced Practice Nursing and Health Delivery Systems</td>
<td>3</td>
</tr>
<tr>
<td>Research</td>
<td>9-12</td>
</tr>
<tr>
<td>501 Graduate level statistics course</td>
<td></td>
</tr>
<tr>
<td>508 Nursing Project</td>
<td>3</td>
</tr>
<tr>
<td>582 Supervised Research</td>
<td>3</td>
</tr>
<tr>
<td>Concentration</td>
<td>12-17</td>
</tr>
<tr>
<td>530-31 Adult Health Nursing I,II</td>
<td>12</td>
</tr>
</tbody>
</table>

540-41-42 Family Nurse Practitioner I,II,III 17
550-51 Nursing of Women and Children I,II 12
560-61 Mental Health Nursing I,II 12
590-91 Nursing Administration I,II 12

**Elective (3 credits)—waived for those who choose the thesis option except for 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: 3
- Students who enter the program as non-RNs must complete the following under the thesis option: 3

**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 is 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/she will not be permitted to repeat the course and will be required to withdraw from the program.

**THE DOCTORAL PROGRAM**

The College of Nursing offers a doctoral program leading to the Doctor of Philosophy degree with a major in Nursing. This is a unified program offered jointly with The University of Tennessee, Memphis, College of Nursing. Students may complete all or part of the program at either site. The dissertation must be completed in its entirety at one site.

The doctoral program prepares nursing scholars capable of integrating research, theory, and practice into their roles as researchers, educators, and/or administrators. Specifically, the graduate of this program should be able to:

1. Analyze, test, refine, extend, and expand the theoretical basis of nursing practice.
2. Conduct nursing research that generates knowledge and advances nursing as a discipline.
3. Provide leadership as nurse researchers, educators, and/or administrators in current and emerging health care settings.
4. Collaborate with members of other disciplines in health-related research of mutual concern.
5. Analyze, develop, and recommend health care policy at various levels.

**Admission Requirements**

1. Meet requirements for admission to The Graduate School.
2. Hold a master's degree in nursing from a program accredited by the National League for Nursing. Some outstanding applicants who are prepared at the bachelor's level in nursing may be considered. In such cases, graduate level courses in nursing theory, concentration specialty, and/or research will be integrated into the formal program of doctoral degree 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 cumulative score of at least 400 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 the doctoral level courses.
6. Have TOEFL scores of at least 550 if native language is not English.
7. Complete Graduate Program Data Form, College of Nursing.
8. Submit Graduate School Rating Forms from three college level instructors and/or nurses and administrators who have supervised the 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 February 15.
12. Schedule a personal interview with the College of Nursing PhD Student Admissions Committee prior to March 15 of the year preceding Fall admission.

Program Requirements

The following courses are required for all students:

- 620 Directed Research
- 601 Theory Analysis & Construction I, II
- 605-66 Nursing Research Seminar
- 607 Qualitative Nursing Research
- 608 Quantitative Nursing Research
- 609 Research Practicum
- 610 Nursing Science Seminar
- 611 Advanced Nursing Seminar
- 612 Health and Nursing Policy Planning
- 614 Nursing Preceptorship
- Statistics
- Cognates
- Electives
- Dissertation

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 interdisciplinary/interdisciplinary minor gives the student an opportunity for combining the knowledge and skills in 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, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Texas, and 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 Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>Thesis (1-15)</td>
<td>PNP only, E</td>
</tr>
<tr>
<td>501</td>
<td>Nursing Research: Methods, Design, and Analysis (3)</td>
<td></td>
</tr>
<tr>
<td>502</td>
<td>Registration for Uses of Facilities (3-15)</td>
<td>Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated.</td>
</tr>
<tr>
<td>503</td>
<td>Advanced Clinical Reasoning I (3)</td>
<td>Principles of health promotion, education, and innovative strategies for achievement of wellness: health habits, psychological, cultural, and other dimensions of whole person as related to risk for disease. May be applied toward the degree.</td>
</tr>
<tr>
<td>504</td>
<td>Advanced Clinical Reasoning II (3)</td>
<td>Development of advanced clinical reasoning skills for assessment of client health status and needs: physiological and pathophysiologic concepts as dimensions of whole person. Implication for specific nursing interventions.</td>
</tr>
<tr>
<td>505</td>
<td>Advanced Clinical Pharmacology (3)</td>
<td>Pharmacologic agents utilized to treat common, recurrent health problems: indications, contraindications, side and interactive effects, and prescription criteria. May be repeated.</td>
</tr>
<tr>
<td>506</td>
<td>Graduate Seminar in Public Health (1) (Same as Sociology 585, Exercise Science 585, Public Health 585)</td>
<td></td>
</tr>
<tr>
<td>510</td>
<td>Theoretical Foundations of Nursing (3)</td>
<td>Historical evolution of nursing science; nursing's metaphoric and selected philosophies, conceptual models and theories as structures which guide critical thinking in analysis, reasoning, and decision making for advanced practice nursing.</td>
</tr>
<tr>
<td>515</td>
<td>Advanced Pathophysiology for Nursing Practice (3)</td>
<td>Advanced physiologic and pathophysiologic concepts, principles, and theories applied to deviations of human systems.</td>
</tr>
<tr>
<td>520</td>
<td>Advanced Practice Nursing and Health Delivery Systems (3)</td>
<td>Nursing's role in dynamic health care system: health policy and organizational, social, ethical, political, economic and technological factors which impact advanced practice nursing and delivery of health care.</td>
</tr>
<tr>
<td>530</td>
<td>Adult Health Nursing I (6)</td>
<td>Advanced nursing practice for health promotion, restoration, and maintenance of young, middle-aged, and older adults. Theories and research to advanced practice with individual clients in variety of settings.</td>
</tr>
<tr>
<td>531</td>
<td>Adult Health Nursing II (6)</td>
<td>Continuation of 530. Delivered in 8 hours, 12 labs, 4 seminars, and 6 labs. Staff development of health care for adult groups and communities.</td>
</tr>
<tr>
<td>540</td>
<td>Family Nurse Practitioner I (4)</td>
<td>Application of advanced health/physical assessment and diagnostic reasoning in nursing management and primary care and of individuals and their families with actual and potential acute health problems; clinical experience in role of family nurse practitioner in variety of settings.</td>
</tr>
<tr>
<td>541</td>
<td>Family Nurse Practitioner II (6)</td>
<td>Continuation of 540. Nursing management and primary care of individuals and their families in all developmental life stages; clinical experience in variety of settings.</td>
</tr>
<tr>
<td>542</td>
<td>Family Nurse Practitioner III (7)</td>
<td>Continuation of 541. Nursing management of chronic health problems of individuals and families in all developmental life stages; role refinement and exploration of major issues in delivery of holistic primary nursing care. Clinical experiences vary depending on student's intent to pursue certification as family or adult nurse practitioner.</td>
</tr>
<tr>
<td>550</td>
<td>Nursing of Women and Children I (6)</td>
<td>Advanced practice nursing for women and children; clinical experience in role of nurse practitioner for women and children; specialization in a variety of settings. Health promotion and nursing interventions for actual or potential health problems of women, children, and families.</td>
</tr>
<tr>
<td>551</td>
<td>Nursing of Women and Children II (6)</td>
<td>Continuation of 550. Role refinement of nurse practitioner or clinical specialist in health maintenance and restoration for women, children, and families.</td>
</tr>
<tr>
<td>555</td>
<td>Parent Child Nursing Field Work and Seminar (5)</td>
<td>Seminar and intensive clinical practicum designed to facilitate further development of advanced practice knowledge and skills utilized for advanced parent-child nursing practice.</td>
</tr>
<tr>
<td>557</td>
<td>Nurse Midwifery Seminar I (1)</td>
<td>Exploration of art and science of midwifery, nature and scope of midwifery practice, professional and ethical issues in advanced nursing practice.</td>
</tr>
<tr>
<td>558</td>
<td>Nurse Midwifery Seminar II (1)</td>
<td>Exploration of psychological, developmental, and sociocultural theories as related to individual and family patterns of illness and health. Role of nurse midwifery practice promoting optimal wellness within clients and community.</td>
</tr>
<tr>
<td>559</td>
<td>Nurse Midwifery Seminar III (1)</td>
<td>Exploration of state of science in nurse midwifery, innovative practice options, and related researchable problems in nurse midwifery practice.</td>
</tr>
<tr>
<td>560</td>
<td>Mental Health Nursing I (6)</td>
<td>Theories of advanced therapeutic interventions for clients experiencing actual and potential mental health problems; advanced practice nursing in specialty of mental health; clinical practice with clients of various ages in acute care and community settings.</td>
</tr>
<tr>
<td>561</td>
<td>Mental Health Nursing II (6)</td>
<td>Continuation of 560. Advanced practice nursing in community settings for families with actual and potential mental health problems.</td>
</tr>
<tr>
<td>565</td>
<td>Teaching Practicum I-IV</td>
<td>Individualized designed teaching experience in collegiate nursing program or nursing practice setting. Objectives to be developed collaboratively by student and faculty. May be repeated.</td>
</tr>
<tr>
<td>566</td>
<td>Educational Principles and Strategies (3)</td>
<td>Exploration and analyses of selected education, curriculum, teaching-learning, measurement, and evaluation principles and theories as applied to instruction of undergraduate nursing students, staff development, and patient education.</td>
</tr>
<tr>
<td>567</td>
<td>Special Topics I-3</td>
<td>Topics determined by faculty and student interest.</td>
</tr>
<tr>
<td>580</td>
<td>Nursing Project (3)</td>
<td>Student-initiated scholarly project with faculty supervision. Review and critical evaluation of literature in specified area of advanced practice nursing, culminating in &quot;state of the practice&quot; paper.</td>
</tr>
<tr>
<td>585</td>
<td>Seminar in Gerontology I (Same as Human Ecology 585, Counselor Education and Counseling Psychology 585, Exercise Science 585, Public Health 585,</td>
<td></td>
</tr>
</tbody>
</table>
Nutrition

(College of Human Ecology)

MAJORS DEGREES

Nutrition .................................................. M.S.

Human Ecology ........................................ Ph.D.

Michael B. Zemel, Head

Professors:

Beauchene, Roy E. (Emeritus), Ph.D. .................... Kansas State

Carruth, Betty Ruth, Ph.D. .................... Missouri

Namey, T. C., M.D. ...... Washington (St. Louis)

Sachan, Dilee S., Ph.D. .............. Illinois

Skinner, Jean D., Ph.D. .............. Oregon State

Smith, John T. (Emeritus), Ph.D. ........ Missouri

Zemel, Michael (Liaison), Ph.D. .... Wisconsin

Assistant Professors:

Alam, Youssri, Ph.D. ....................... Tennessee

Bailey, James W., Ph.D. .............. Iowa State

Brooks, M. D. (Memphis), M.S. ............ Alabama

Costello, Carol, Ph.D. .................. Tennessee

Haughton, B., Ed.D. ..................... Columbia

Karlstad, Michael, Ph.D. .............. Loyola

Helen, Jay, Ph.D. ...................... Penn State

Zemel, Paula, Ph.D. ...................... Wayne State

Associate Professors:

Bittle, Joyce (Memphis), Ph.D. .......... Tennessee

Chencharick, Judith (Memphis), M.S. , M.D. Marylan

McGrath, M. (Liaison), Ed.D. .......... Pennsylvania

Moulai, Naima, Ph.D. ...................... Paris

Young, Katherine A., J.D. .............. California Western School of Law

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 bachelor's 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 option.

An M.S. degree program is also offered with a major in Recreation, Tourism and Hospitality Management. Two concentrations in that major are designed for students with primary interest in hotel and restaurant administration: hospitality management and tourism. Students interested in graduate work are referred to these concentrations listed under Health, Leisure and Safety Sciences.

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, Tennessee 37996-1900.

Admission into the graduate program in the department is dependent on completion of undergraduate courses that give the necessary background for success in the graduate program. Required undergraduate courses include: general and organic chemistry, physiological chemistry/biochemistry, physiology, statistics and advanced nutrition. Admission to the Ph.D. program in Human Ecology with a concentration in Nutrition Science requires a master's degree. Applicants to all programs with related experience may be given preference.

THE MASTER'S PROGRAM

Students may choose a thesis or non-thesis option in Nutrition. Attendance at Nutrition 540 is required every semester.

Thesis Option: The program consists of a minimum of 36 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 NTR 511, 512, 513, 514, 515, 541 and the minor in public health. Six hours of Thesis 500, and 6 hours outside the department are required. A minimum of 22 hours at the 500 and 600 level is required.

An oral comprehensive examination is required upon completion of the thesis.

Non-Thesis Option: The program consists of a minimum of 36 hours with at least 20 hours of coursework in the department. NTR 511, 512, 540, 541, 2 hours from 542-544 and 3 hours of graduate level statistics are required. Students in public health nutrition must take NTR 511, 512, 513, 514, 515 and the minor in public health. Six hours in one area outside the department are required. A minimum of 24 hours at the 500 and 600 level is required.

A written comprehensive examination is required for completion of the program.

DUAL MS-MPH PROGRAM

The College of Human Ecology offers a coordinated dual program leading to the conferment 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

Applications to the MS-MPH program must make separate application to, and be competitively and independently accepted by, the Department of Nutrition for the MS, Department of Health, Leisure and Safety Sciences for the MPH, 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 MS and MPH programs.

Curriculum
A dual degree candidate must satisfy the requirements for both the MS (public health nutrition concentration) and the MPH degree, as well as the requirements for the dual program. All candidates for the dual degree must successfully complete Health and Society (PH 555), two credits of Seminar in Public Health (PH 509), and a minimum of 60 credits. The Department of Nutrition will award a maximum of 9 semester hours of credit toward the MS degree for successful completion of approved graduate level courses offered in the Department of Health, Leisure and Safety Sciences. The Department of Health, Leisure and Safety Sciences will award a maximum of 11 semester hours of credit toward the MPH degree for successful completion of approved courses offered in the Department of Nutrition. All courses for which such cross-credit is awarded must be approved by the Public Health Academic program Committee and the student’s graduate coordinator. 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 MS or MPH degree for courses taken in the other program, except as such courses qualify for credit without regard to the dual program.

Approved Dual Credit
MS courses to be counted toward the MPH 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). MPH courses to be counted toward the MS include Public Health Administration (PH 520), Biostatistics (PH 550), and Epidemiology (PH 540).

THE PH.D. CONCENTRATION
The nutrition science concentration enables students to study the science of nutrition from the cellular level to the application of nutritional principles by people in a changing environment. The doctoral program emphasizes human nutrition, nutritional epidemiology, experimental nutrition, and intermediary metabolism. Cognate areas may include anthropology, biochemistry, chemistry, communications, education, food technology, human development, physiology, public health, sociology, statistics, and/or toxicology.

Minimum requirements include:
1. Sixteen hours in nutrition including 4 hours at the 600 level (exclusive of dissertation);
2. NTR 511, 512, 541, and 2 hours from either 542-544;
3. Four hours of NTR 540, attendance required every semester;
4. Six hours of statistics;
5. Six hours in a cognate area;
6. Nine hours at the 600 level;
7. Students without college teaching experience are required to take the fall semester teaching seminar for GTAs and NTR 548 comprising a faculty-supervised problem in college teaching.

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 or Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records. For the Ph.D., see Human Ecology.

Nutrition
GRADUATE COURSES
414 Nutrient-Drug Interactions (2) Nutrient effects on chemical interactions with drugs. Prereq: Biochemical Toxicology or consent of instructor.  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 only. E
508 Culture, Food, and Nutrition (3) Food-related behavior of individuals and groups in United States. Sociocultural, economic, and psychological influences. Nutrition and food surveys, public policy. Prereq: Nutrition for Educators or Advanced Nutrition or consent of instructor. F
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, control and hormonal interrelationships. Prereq: Advanced Nutrition or equivalent. F
513 Community Nutrition I (3) Orientation to community; assessment of nutrition programs, research, and resources; functional needs of public health nutritionists. Prereq: Consent of instructor. F
514 Community Nutrition II (3) Planning, implementation, and evaluation of public health nutrition programs. Prereq: Consent of instructor. Sp
515 Field Study in Community Nutrition (1-12) Personal participation and analysis of state or regional community nutrition program. Prereq: Consent of instructor. Sp
516 Maternal and Child Nutrition (3) Nutrition principles related to growth and development during pregnancy, infancy, and childhood to age 5. Prereq: Consent of instructor. F
517 Childhood and Adolescent Nutrition (3) Application of nutrition principles to school age children; effects of diseases and disorders on growth and health maintenance; nutritional assessment and counseling for nutrition. Prereq: Consent of instructor. F
518 Nutrition and Aging (3) Nutritional problems of adults; nutritional requirements; dietary intakes; effects of disease on nutritional status. Prereq: Consent of instructor. F
520 Nutritional Ecology (3) Examination of issues in natural, physical, and social environments that impact availability of food and nutrients in U.S. food supply. F
521 Physiological Basis for Diet and Disease (2) 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
540 Seminar in Nutrition (1) May be repeated. S/N only. E
541 Research Methods (1) Basic principles of planning, conducting, and interpreting research. Prereq: Consent of instructor. Sp
542 Advanced Experimental Nutrition (2) Application of research principles to individual project using experimental animals. Prereq: Consent of instructor. F
544 Food and Nutrition Survey Methods (2) Project for assessment of food consumption, nutrient intake, nutritional status, and sociocultural-economic patterns in populations. Prereq: Consent of instructor. Sp
547 Field Experience (3-9) Experience in food-related industry or agency. Prereq: Consent of instructor. May consist of internship. 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: Consent of instructor. May be repeated. F
603 Current Trends in Food and Sociocultural Change (2) Critical evaluation of research. Prereq: Consent of instructor. F

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-Aided Foodservice and Lodging Management (3) Application of computer technology to foodservice and lodging industry; inventory, cost accounting, pricing, computer applications and consent of instructor. F
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
532 Advanced Human Resource Management (3) Identifying labor needs; development and maintenance of employee staffing schedules; government regulations; human resources; labor relations. Prereq: Food and Lodging Cost Control or consent of instructor. F
533 Advanced Food Production and Delivery System Management (3) Analysis of food production and delivery systems; application of quantitative methods and computer modeling. Prereq: Food Procurement, Production and Service or consent of instructor. F
534 Special Topics in Foodservice and Lodging Administration (1-3) Lecture/discussion format. Con-
Assistant Professor:
Hamilton, Susan, Ed.D. .................... Tennessee
Menendez, Garry, M.S. .................... Florida
Starman, Terri W., Ph.D. .................... Texas A&M

The Department of Ornamental Horticulture and Landscape Design offers the Master of Science with concentrations in floricultural science and technology, nursery science and technology, or turfgrass science and technology. Various interests may be emphasized in any of these commodity areas, including micropropagation, innovative production and maintenance systems, computer-aided management systems, and the molecular biology, genetics, history 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

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 590 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, exclusive of Thesis 590. Six of these hours may be satisfactorily completed by more than one course.
5. An oral examination covering the thesis and coursework is required.

GRADUATE COURSES

410 Nursery Management and Production (3) Modern management methods as applied to nurseries and wholesale nurseries and landscape contracting firms. Methods of producing liners, container and field-grown woody ornamentals. Prereq: Botany 233, 322, and Plant and Soil Science 241, or consent of instructor. 3 hrs and 1 lab. Sp

420 Advanced Floriculture Science and Technology (3) Physiology and greenhouse production of floricultural crops. Cultural practices: propagation, planting, spacing, fertilization, temperature and daylength regimes, harvesting, shipping, marketing, and pest control. Prereq: Greenhouse Production and Management or consent of instructor. 2 hr-lab. Sp

440 Advanced Turfgrass Management (4) Principles and entities of turfgrass science and technology, nursery science and technology, or turfgrass science and technology. Prereq: consent of instructor. 4 hrs and 1 lab. Sp

500 Thesis (1-9) F only.

501 Special Topics in Ornamental Horticulture and Landscape Design (1-3) Topics to be assigned. May be repeated. Maximum 9 hrs. Prereq: Consent of instructor. F, Sp

520 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. 3 hrs. F, Sp

510 Research Methods in Ornamental Horticulture and Landscape Design (2) Literature retrieval, research proposition writing, use of computers for word processing, data entry, statistical analysis, and graphics production. Prereq: Plant and Soil Science 471. F, Sp

511 Plant Disease Fungal (4) (Same as Botany 451.)

550 Plant Microtechnique (3) Practical light and scanning electron microscopy methods for investigating aspects of plant development, histochemistry and pathological changes in ornamental, forest and crop species. Prereq: 8 hrs biological/botanical sciences and consent of instructor. 1 hr and 2 labs. Sp

570 Physiology and Development of Ornamental Plants (3) Basic and applied physiology of Ornamental plants related to growth and development in production and utilization. Critical review of literature and discussion of juvenile and senescent phases, flowering, photoperiodism, dormancy, reproduction, vegetative growth, acclimation, hardiness, dormancy, growth regulators, environmental stress, and post-harvest considerations. Prereq: Botany 241, or consent of instructor. 3 hrs and 1 lab. Sp

590 Seminar (1) Current literature and developments. May be repeated. Maximum 3 hrs. E

Ornamental Horticulture and Landscape Design

(College of Agricultural Sciences and Natural Resources)

MAJOR DEGREE

Ornamental Horticulture and Landscape Design M.S.

Mary L. Albrecht, Head

Professors:
Albrecht, M. L., Ph.D. ..................... Ohio State
Callahan, L. M., Ph.D. ..................... Rutgers
Crater, G. Douglas, Ph.D. .................. Ohio State
Graham, E. T. (Emeritus), Ph.D. .......... Penn State
Grasshoff, Peter M. (Rochef Chair of Excellence), Ph.D. ..................... Australian National
McDaniel, G. L., Ph.D. ..................... Iowa State
Grissell, Peter B., Ph.D. .................... Penn State

Associate Professors:
Augé, Robert, M., Ph.D. ................... Washington State
Day, J. W., Ph.D. ......................... Mississippi State
Mills, S. M., M.A. ......................... Georgia
Trigiano, R., Ph.D. ......................... NC State
Witte, William T. (Liaison), Ph.D. ......... Maryland

Temporary developments and trends in industry. Prereq: Consent of instructor. May be repeated. E

535 Directed Study in Foodservice and Lodging Administration (1-3) Problems selected for study by student with guidance of faculty member. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

537 Seminar in Foodservice and Lodging Administration (1) May be repeated. S/NC only.

542 Advanced Hotel Administration (3) Strategic management of hotel organizations. Theoretical and applied literature on formulation and implementation of strategy, external and internal factors relevant for business and corporate level decisions. Consideration of role of marketing in hotel firms. Analysis of industry and case studies. Prereq: 531, 532, Sp/A

544 Experimental Study of Quantity Food Production (3) Design and preparation of food products applicable to foodservice industry. Market research, sensory evaluation, production techniques, and microbiological evaluation of food. Prereq: Quantity Food Production, Production and Service with lab, or Observation, Hospitality Sales and Marketing, 542 and Nutrition 413, or equivalents. F, Sp

546 Foodservice and Lodging Administration Research Methods (2) Application of research methods to foodservice and lodging. Prereq or coreq: Nutrition 541.

547 Field Experience (3-9) Experience in food- or lodging-related industry or agency under supervision of faculty member. Prereq: Consent of instructor. S/NC only.

555 Foodservice and Lodging Law (3) Management organization and policy as imposed or granted by law. Legal resources to determine legal principles at state and federal levels which impact industry. Prereq: Hospitality Law or equivalent, or consent of instructor. Sp/A

600 Doctoral Research and Dissertation (1-15) F/P/NP only.

620 Advanced Topics in Foodservice Administration (1-3) Individual study and group discussion of topics related to current problems. Prereq: 533 or consent of instructor. F, Sp

570 Physiology and Development of Ornamental // Horticultursnd landsespoDesjgh !53
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 500. See the Philosophy Department Graduate Student Procedures for specific course requirements.

Students must demonstrate a reading knowledge of one foreign language, normally a living language in which there exists a significant body of philosophical literature. (In special circumstances relating to the area of dissertation research, the Graduate Committee may approve a language not satisfying these conditions.) This may be done by passing the doctoral language examination given by the appropriate department, if available, or by passing French 302 or German 332 with a B or better. Bilingual students, whose native language (other than English) is one in which there is a significant body of philosophical literature, are exempted from the foreign language requirement. Students receiving the Ph.D. with concentration in medical ethics are also exempted.

CONCENTRATIONS

Medical Ethics

The department has an M.A. and Ph.D. program of graduate study with a concentration in medical ethics. Detailed information concerning the program may be obtained from either the Director of Graduate Studies in Philosophy or the Director of the Medical Ethics Program.

Religious Studies

The department has an M.A. program of graduate study with a concentration in religious studies. Details concerning the program may be obtained from either the Director of Graduate Studies in Philosophy or the Department of Religious Studies.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.A. and Ph.D. programs in Philosophy are available to residents of the states of Alabama or West Virginia; Kentucky or Ohio; Michigan or Michigan State; Missouri or Missouri State; North Carolina or South Carolina; Tennessee or Tennessee State; Virginia or Virginia Military Institute; West Virginia or West Virginia State.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.A. and Ph.D. programs in Philosophy are available to residents of the states of Alabama or West Virginia; Kentucky or Ohio; Michigan or Michigan State; Missouri or Missouri State; North Carolina or South Carolina; Tennessee or Tennessee State; Virginia or Virginia Military Institute; West Virginia or West Virginia State.

420 Topics in History of Philosophy (3) Figures or movements from antiquity through mid-twentieth century. Prereq: 6 hrs of philosophy or consent of instructor. May be repeated when topic varies. Maximum 9 hrs.

435 Intermediate Formal Logic (3) Metatheory of forms and logic of philosophy. Prereq: Consent of instructor.

440 Contemporary Ethical Theory (3) Topics in metaethics or ethics. Prereq: 6 hrs of philosophy or consent of instructor.

446 Theoretical Issues in Medical Ethics (3) Prereq: 240 or 345 or consent of instructor. (Same as Religious Studies 446.)

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

479 Studies in Recent Continental Philosophy (3) Selected thinkers or topics: existentialism, phenomenology, hermeneutics, structuralism, post-structuralism. Prereq: 6 hrs of philosophy or consent of instructor. May be repeated when topic varies. Maximum 9 hrs.

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

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

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

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

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

544 Topics in Applied Ethics (3) Single author, tradition, or topic in ethical theory, application to issues in health and health care, business, technology, ecology, and other practical fields. May be repeated. Maximum 9 hrs.

546 Orientation to Medical Ethics (3) Survey of ethical theories in application to issues in medical ethics.

547 Ethical Issues in Mental Health (3) Values in "mental health" and "mental illness," informed consent in psychiatry, competence, patients' rights, involuntary hospitalization, and treatment, and behavior control therapies.

548 M.A. Clinical Practicum (3) Series of clinical rotations at one or more local health care institutions. Open only to graduate students concentrating in medical ethics. Prereq: 547 and consent of Medical Ethics Committee and the UTMC Graduate Education Committee.

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 acts, thinking and feeling. May be repeated. Maximum 9 hrs.

585 Special Topics (3) May be repeated. Maximum 9 hrs.

587 Advanced Clinical Medical Ethics (3) Critical concepts in medical ethics, relationship of theory to practice, and professional roles and responsibilities for health care ethics 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
Physics and Astronomy

(College of Arts and Sciences)

MAJOR

Physics ........................................... M.S., Ph.D.

Lee Riedinger, Head

Professors:

Barnes, F. E., Ph.D. .................................. California
Bingham, C. R., Ph.D. ................................ Tennessee
Bliss, W. E., Ph.D. ................................... Michigan State
Breazeale, M. A. (Emeritus), Ph.D. ................. Michigan State
Breinig, M., Ph.D. .................................... Oregon
Bugg, W. M., Ph.D. ................................... Tennessee
Burgdoerfer, J. (Distinguished Prof.), Ph.D. ...... Freie Universitat Berlin
Callcott, T. A., Ph.D. .................................. Purdue
Childers, R. W., Ph.D. ................................ Vanderbilt
Christophorou, L. G., Ph.D. ......................... Manchester
Conn, G. T., Ph.D. .................................. Illinois
Crater, H. W. (UTSI), Ph.D. ................. Yale
Deeds, W. E. (Emeritus), Ph.D. ............... Ohio State
Eguizabal, A. G., Ph.D. .............................. Brown
Elston, S. B., Ph.D. .................................. Massachusetts
Fox, K. D., Ph.D. ..................................... Michigan
Gair, N. M. (Emeritus), Ph.D. ...................... Ohio State
Georgi, S., Ph.D. ..................................... Manchester
Guidry, M. W., Ph.D. ................................ Tennessee
Handler, T. H., Ph.D. ................................ Rutgers
Harris, E. G. (Emeritus), Ph.D. ...................... Tennessee
Hart, E. L. (Liaison), Ph.D. ............................ Cornell
Jacobson, H. C., Ph.D. ................................. Yale
King, D. T. (Emeritus), Ph.D. ....................... Bristol
Lewis, J. W. L. (UTSI), Ph.D. ......................... Mississippi
Macek, J. (Distinguished Scientist), Ph.D. ..... Rensselaer

Mahan, G. D. (Distinguished Scientist), Ph.D. .................. California
Mason, A. A. (UTSI) (Emeritus), Ph.D. ............ Tennessee
McGregor, W. K. (UTSI), Ph.D. ............................ California
Nazarovitz, W., Ph.D. ................................... Pennsylvania
Obenshain, E. F., Jr., Ph.D. ............................. Pittsburgh
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 Lafarge Chair of Excellence), Ph.D. ......... Maryland
Riedinger, L. L., Ph.D. ................................... Vanderbilt
Sellin, J. A. (Distinguished Prof.), Ph.D. ............ Chicago
Shih, C. C., Ph.D. ....................................... Cornell
Sorensen, S. P., Ph.D. ..................................... Copenhagen
Strayer, M. R., Ph.D. ..................................... MIT
Thompson, J. R., Ph.D. ................................... Duke
Thomson, J. O. (Emeritus), Ph.D. ..................... Illinois
Ward, B. F. L., Ph.D. ..................................... Princeton
White, J. W. (Emeritus), Ph.D. ....................... North Carolina

Associate Professors:

Canright, G., Ph.D. .................................. Tennessee
Ferrell, T. L., Ph.D. .................................... Clemson
Muehlebach, J. W. (UTSI), Ph.D. ..................... Tennessee
Shieh, S. Y., Ph.D. ....................................... Maryland

Research Professors:

Chatterjee, L., Ph.D. .................................. Jadavpur
Kamyshnov, I., Ph.D. .................................... ITEP (Russia)
Thonnard, N., Ph.D. .................................... Kentucky
Zhang, J. Y., Ph.D. ....................................... Lanzhou

Research Associate Professors:

McCorkle, D. L., Ph.D. ................................ Tennessee
Prinnarwele, L. A., Ph.D. ............................ Pittsburgh

Research Assistant Professors:

Datskos, P. E., Ph.D. .................................. Tennessee
Davis, L. (UTSI), Ph.D. ................................ Auckland
Efremenko, Y., Ph.D. .................................... ITEP (Russia)
Mezzacappa, A., Ph.D. ................................ Texas
Tietze, S. A., Ph.D. ..................................... Princeton

Graduate programs leading to the Master of Science and Doctor of Philosophy are offered in a number of concentration areas: astrophysics, atomic and low temperature physics, biophysics, chemical physics, condensed matter and surface physics, elementary particle physics, geophysics (Master's only), health physics (Master's only), molecular spectroscopy, nuclear physics, and theoretical physics.

Departmental graduate programs leading to the M.S. and Ph.D. are also available at The University of Tennessee Space Institute, Tullahoma, where opportunities for study and research are available in quantum optics and laser physics, atomic and molecular spectroscopy, fluid physics, and theoretical physics. For additional information, contact the department head.

ADMISSION REQUIREMENTS

A student who enrolls in The Graduate School with the intention of attaining an advanced degree in Physics will have completed an undergraduate major in Physics or its equivalent. Physics 311-12, 321, 361, 431-32, 421, 461, and 411-12 constitute the minimum coursework prerequisite to graduate study. A student who intends to present Physics as a graduate minor will have completed an undergraduate minor in Physics or its equivalent. Physics 311 and 431-32 constitute the minimum coursework prerequisite to a minor in Physics.

All first-year graduate students are required, for advising purposes only, to take a qualifying examination in undergraduate physics during the fall semester registration period.

THE MASTER'S PROGRAM

Thesis Option

This program is designed primarily for students intending to go into industrial or governmental laboratories as physicists. The course requirements include 24 semester hours of physics courses, of which at least 12 semester hours are taken from Physics 511-12, 521-22, 531-32, 541-42, or 571-72. Each candidate must present an acceptable thesis, 6 hours of 500, and pass an oral examination on course material and thesis.

The department offers an M.S. thesis program with a concentration in geophysics. Program requirements are: 12 hours from Physics 531-32, 541-42, 571-72; a minimum of 12 additional hours in geology, geophysics, and/or physics, as approved by the student's committee; and the presentation of an acceptable thesis, 6 hours of Physics 500, and the passing of an oral examination on course material and thesis.

Non-Thesis Option

This program is designed primarily for students intending to teach in colleges or universities on the elementary or intermediate level, or for students specifically intending to work toward a Ph.D. Students seeking the non-thesis option must apply to the department's graduate committee for permission to enroll under this program. The requirements are the satisfactory completion of 30 hours of coursework composed of 18 semester hours from Physics 511-12, 521-22, 531-32, 541-42, and 571-72; 6 semester hours in a minor field; and 6 semester hours from other courses numbered above 400 (preferably of advanced laboratory nature.) At least 20 hours must be taken at the 500 level or above. In addition, the candidate must pass a written examination administered by his/her committee.

THE DOCTORAL PROGRAM

All students are expected to take Physics 521-22, 531-32, 541-42, 551, 571-72, and 611. Physics 601-02 are normally required of students specializing in atomic physics; Physics 621-22 of students in nuclear physics; Physics 626-27 of students in elementary particle physics (and/or Physics 613-14 for students specializing in 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 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, astrophysical and interdisciplinary, consideration of quasars, pulsars, black holes and current developments in field. Acceptable for major credit in physics. Prereq: Physics 323 and consent of instructor.

490 Special Topics in Astronomy (1-3) Topics of current interest in astronomy and astrophysics. Acceptable for graduate credit in physics with consent of department. May be repeated with consent of department. Maximum 9 hrs.

Physics

GRADUATE COURSES


431-32 Electricity and Magnetism (3,3) Electrostatics, magnetostatics, coupled electric and magnetic fields, Maxwell's Equations, electromagnetic waves and radiation. Prereq: Fundamentals of Physics: Wave Motion, Optics, and Modern Physics, or Honors: Mechanics and Heat, and consent of instructor. 3 hrs and 3 labs.


501 Graduate Research Participation (3) Advanced comprehensive techniques under supervision of staff research director whose interest is consistent with student's. Prereq: Open to all graduate students in good standing. Prereq: Consent of department and research director. May be repeated with consent of department. Maximum 18 hrs. S/NC only. E

502 Registration for Use of Facilities (1) Registration for physical and computer access to University facilities. Use may be for personal, educational or research purposes. May be repeated. Consent of department required. Maximum 15 hrs.

506 Experimental Methods (3) Principles, practical operations, behavior, and hazards of laser systems, radiation detectors, photonmultiplier tubes, image intensifiers, image converters, image dissector, streak cameras, and fast-framing cameras; high-vacuum systems including cryogenic-based detectors and vacuum techniques including spherical detection, digital electronics methods and microcomputer data acquisition and registration methods.

507 Contemporary Optics (3) Topics in geometrical, physical, Laser, and computing systems in research work. Use of computer calculators and design of practical and sophisticated optical systems.


511-12 Theoretical Physics (3,3) Classical theoretical physics, with limited use of mathematics. Prereq: Physics 322, advanced calculus, differential equations, and vector analysis.


532 Advanced Classical Mechanics (3) Varational principles and canonical transformations, Hamilton-Jacobi theory, nonlinear mechanics, elasticity, fluid mechanics. Prereq: 531.


555 Solid State Physics (3) Elementary solid state physics. Crystal structures, reciprocal lattice, bonding in solids, energy bands, semiconductors, phonons, free-electron-gas theory of metals, superconductivity, magnetism, and other forms of broken symmetry. Prereq: 522 or consent of instructor.

561 The Theory of Relativity (3) Geometry of spacetime, relativistic electrodynamics, particle mechanics and continuum mechanics, Einstein's field equations, Schwarzschild solutions, the classical test of general relativity. Prereq or coreq: 531 and 542.


574 Group Theory for Physicists (3) Introduction to group theory, discrete and continuous groups, representation theory, Noether's theorem, symmetries and degeneracies, application of group-theoretical methods to atomic physics, solid-state physics, and particle physics. Prereq: 571-72.

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

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

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

594 Special Problems (3) Especially assigned theoretical or experimental work on problems not covered in other courses. May be repeated. Maximum 9 hrs. E


600 Doctoral Research and Dissertation (3-15) S/NC only. E


605 Laser Spectroscopy (3) Applications of lasers to spectroscopy of atomic and molecular systems; absorption, laser-induced fluorescence, and Raman spectroscopy; molecular and atomic coherence, quantum beats, resonance fluorescence, photolysis, self-induced transparency; saturation and doppler-free spectroscopy; laser cooling and trapping. Prereq: 521, 541.

606 Nonlinear Optics (3) Nonlinear optical susceptibilities; wave propagation in nonlinear media, sum-frequency and difference frequency generation, harmonic generation, parametric amplification and oscillation, stimulated Raman processes, two- and multi-photon processes, four-wave mixing and phase conjugation, transient coherent optical effects and free induction decay, optical breakdown and nonlinear effects in plasmas. Prereq: 522.

610 Quantum Optics (3) Quantum theory of emission and absorption of radiation; energy levels of atoms, coherence and quantum suscepibility; coherence theory, field quantization and coherent photon states; interaction of radiation with atoms; photon optics, counting and higher-order coherence; atomic and molecular phenomena. Prereq: 521.

611 Advanced Quantum Mechanics & Field Theory (3) Second quantization, quantization of electromagnetic field, emission, absorption, and scattering of light, bremsstrahlung, production of annihilation, quantum field theory methods in condensed matter, quantum optics. Topics vary according to instructor. Prereq: 522 and 542 or equivalent. Prereq or coreq: 561 or consent of instructor.

612 Advanced Topics in Quantum Field Theory (3) Renormalization, Lamb shift, anomalous magnetic moments, gauge theories, electroweak theory, quantum chromodynamics, grand unification, advanced topics in laser physics and quantum optics. Topics vary according to interest of students, instructor and present
613-14 Quantum Field Theory (3,3) Modern formulation of quantum field theory and its applications; second quantization of free and interacting fields; third quantization; elementary processes in QED; perturbative methods; higher order processes and renormalization; path integrals; general quantization of gauge fields; applications in QED and in SU(2) x U(1) theory; quantum chromodynamics (QCD); the fate of GUTS (grand unified theories). Prereq: 520 or consent of instructor.

621-22 Nuclear Structure (3,3) General properties of nuclei; two-body scattering problems; saturation and symmetry properties of nuclear forces; theory of light nuclei; nuclear spectroscopy; special nuclear models; theory of nuclear reactions; theory of beta-decay. Prereq: 571-72.

626-27 Elementary Particle Physics (3,3) Elementary particle physics covering experimental methods, conservation laws, invariance principles, and models of interactions. 627-Advanced topics: quark models, electroweak interactions, and unification of elementary forces. Prereq: 522.

641 Advanced Topics in Classical Theory (3) To meet special needs of students. Advanced dynamics and hydrodynamics, electromagnetic theory, statistical mechanics, or theory of nonequilibrium processes. Prereq: 532, 542, 551. May be repeated with consent of department. Maximum 9 hrs.

642 Advanced Topics in Quantum Theory (3) To meet special needs of students. Angular-momentum theory, beta-ray theory, theory of atomic spectra, molecular structure and valence theory, theory of radiation, and magnetic susceptibilities, high energy processes, scattering and collision processes, or theory of fields. Prereq: 522. May be repeated with consent of department. Maximum 9 hrs.

643 Computational Physics (3) Developing computer algorithms for solving representative problems in various fields of physics, celestial dynamics in astrophysics, boundary value problems in electromagnetic, atomic and nuclear structure, band structure on solid state physics, transport problems in statistical mechanics, Monte Carlo simulation of liquids, fitting and interpolation of data, correlation analysis, or optimization strategy. Prereq: 522, 531, 542, and 551. 644-Advanced topics: Monte Carlo simulation of liquids, fitting and interpolation of data, correlation analysis, or optimization strategy.

651-62 Collision Interactions (3,3) Interaction of electromagnetic radiation and charged particles with atoms and molecules or free particles, scattering, ionization, transport and capture, collective excitations, Gorkov theory, and statistical physics. Prereq: 522.

653 Advanced Plasma Physics (3) (Same as Electrical Engineering 653.)


681-82 Molecular Spectroscopy (3,3) Spectroscopic methods of determining molecular properties, the vibrational and experimental aspects of inter- and intra-molecular energy and charge transfer, group theoretical methods and selection rules in gases and liquids, quantum mechanics, normal coordinates and potential functions, vibration—rotation interaction theory, intensities, frequencies and line shapes of molecular transitions. Prereq: 522 and 542 or consent of instructor.

Planning

(College of Architecture and Planning)

MAJOR DEGREE
Planning ................................................. M.S.P.

David A. Patterson, Acting Director

Professors:
Johnson, David A., Ph.D. ................. Cornell
Kenney, Kenneth B. (Emeritus), Ph.D. .... North Carolina
Prochaska, J. M. (Emeritus), M.U.P. .... Michigan State
Shouse, Walter L. (Emeritus), M.C.P. ... Harvard
Spencer, James A. (Liaison), M.C.P. .... Ohio State

Associate Professors:
Browne, George E., M.A. .......... George Washington
Patterson, David, Ph.D. ................ Indiana

Assistant Professors:
Anderson, Annette, M.P.A. .......... Missouri (Kansas City)
Zanetta, Maria C., Ph.D. ............... Ohio State

The Graduate School of Planning offers a program of studies leading to the professional degree of Master of Science in Planning. The degree is the normal route for entry into professional positions in urban and regional planning. Graduates are candidates for positions in regional, city, county, and metropolitan planning agencies; in local, state, and federal agencies concerned with physical, economic, and administrative planning; in private business and organizations dealing with development problems; and in private consulting.

The Master of Science in Planning program is accredited by the Planning Accreditation Board, a joint undertaking of the American Institute of Certified Planners (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

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, Mississippi, 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.)


500 Thesis (1-15) N/P only, E
501 Thesis and Major Paper Proposal Writing (1)

502 Registration for Use of Facilities (3-18) Required for the student to be registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N/C only.

510 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 (1)

512 Community Planning Process (1) Planning process, policy process and development process. Field recognition of study community and development of approaches for assessing community.

515 Theory of Planning (2) Analysis of nature and objectives of planning process; role of planner and planning function in public decision-making. Prereq: 510 or consent of instructor.

520 Planning Research Methods (3) Overall structuring of social science research in planning practice; familiarity with structure of planning literature information sources, systematic retrieval techniques, processes and tools, practice in posing research questions relevant to planning.

521 Information Systems and Networks in Planning (3) Use and impact of computer-based information systems and globalizing planning and management. Development of practical skills in design of planning decision support systems, databases, Internet based tools and geographic information systems (GIS). Prereq: Basic experience with computer software and hardware or consent of instructor.

523 Statistics for Planners (3) Applications of statistical techniques. Intuitive explanations and practical applications. Computer analysis to explore concepts.


528 Library Research for Planning (1) Survey of publications of interest to planners, resources and research techniques. Use of facilities and collections of library.

530 Policy and Land Use Analysis (4) Basic methods of policy analysis and planning. Concept and framework for land-use planning, population, employment, and economic base studies, and forecasting techniques. Coreq: 520 or consent of instructor.

531 Urban and Regional Analysis (3) Past, present and 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 plan implementation programs. Extensive laboratory experience. Prereq: 510, 512, 520, 530 and 531 or consent of instructor.

537 Planning and Transportation (3) (Same as Civil Engineering 535.)

538 Urban and Site Design (3-4) Principles of design of residential subdivisions and some components of physical and social environment, shopping centers, institutional complexes, central business district. Problems of reviewing alternative designs against each other or written regulations. Extensive laboratory experience.

539 Planning for Historic Preservation (3) Planning for preservation, restoration, and conservation of historic buildings, areas and sites as related to comprehensive planning process. National, state, and local government roles in preservation, designation of sites, legislative needs, financing and administrative organizations.

540 Legal Aspects of Planning (3) Legal basis for planning and guiding community development. Legal tools of planning. Prereq: 510 or consent of instructor.

543 Cultural Resources Planning (3) Cultural characteristics creating identity and spirit of place; role in environmental and land-use planning; use in protection of natural environment and cultural heritage. Cultural components of National Environmental Protection Act and case studies.

545 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 roles of public and private sectors in urban development and redevelopment. Prereq: 510 or consent of instructor.

547 Negotiation (1) Methods, strategies, techniques and skills useful to planners in mediation, negotiation, and dispute resolution concerning urban planning and development.

548 Tourism Planning (3) Planning of tourist resources and programs within a geographic region. Tourism planning models. Relationships among tourists, tourism development and planning of tourist attractions and services. Application of techniques in a selected area.

549 Local Fiscal Planning and Capital Improvements (3) Fiscal planning and capital improvements programing in plan implementation. Tax and expenditure limitations, infrastructure financing, municipal bond market, alternative revenue sources: development fees, exactions, intergovernmental aid. Evaluation of fiscal policies.


551 State and Regional Planning (3) Theory and practice of planning at state, sub-state, and metropolitan levels.

552 Development Planning in the Third World (3) Seminar on urban and regional development in Third World nations. Population growth, settlement patterns, economic development, land framework of integrated resource management. (Same as Ecology and Evolutionary Biology 552.)

555 Environmental Planning (3) Role of planners and planning in maintenance of balance between natural and built environment. (Same as Ecology and Evolutionary Biology 555.)

560 Strategic Planning & Policy Development (3) Models of strategic planning and process of policy development in applied decision making. Qualitative approaches, program evaluation and impact assessment.

570 Plan Implementation Process (1) Interactive community and government dynamics in plan implementation. Dynamic of change, conflict, resolution and consensus building.

590 Practicum (3) Prereq: Consent of instructor. S/N/C or letter grade.

591 Special Topics (1-3) Prereq: Consent of instructor.

592 Readings in Planning (1-3) Prereq: Consent of instructor. May be repeated.

593 Problems in Planning (1-3) Prereq: Consent of instructor.

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

Plant and Soil Science

(College of Agricultural Sciences and Natural Resources)

MAJOR

Plant and Soil Science ................. M.S., Ph.D.

Fred L. Allen, Head

Professors:

Allen, Fred L., Ph.D. ................. Minnesota Ammon, J. T., Ph.D. ................. West Virginia


Associate Professors:

Essington, M. E., Ph.D. ............ California (Riverside) Lessman, Gary M., Ph.D. ............... Michigan State Logan, Joanne, Ph.D. ................. Nebraska Mueller, Thomas O., Ph.D. ............. Georgia Reich, V. H., Ph.D. ............... Iowa State Wyatt, J. E., Ph.D. ............... Florida

The Department of Plant and Soil Science offers graduate programs leading to the Master of Science and the Doctor of Philosophy.
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 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 of which must 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, of which at least 20 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 required 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 8 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
411 Soil Microbiology (3) Soil microbial populations and role in soil chemical transformations, inorganic and organic compounds, decomposition of residues, dynamics of soil organic matter. Prereq: Intro-duction to Soil Science and Introduction to Organic and Biochemistry or Organic Chemistry or consent of in-structor. 2 hrs and 1 lab. A,F
412 Soil Genesis and Classification (3) Soil genesis and formation; observing and describing morphology of agricultural and natural soils, physical properties, classification. 3 weekend field trips. Prereq: Intro-duction to Plant and Soil Science or consent of instructor. 2 hrs and 1 lab. F
413 Soil Chemistry (3) Principles concerning structure and chemical reactions of soil materials; colloidal frac-tion as related to exchange, chemical equilibria, soil acidity, oxidation-reduction, weathering, nutrient availa-bility and waste disposal. Prereq: 511 or consent of instructor. F
414 Soil, Land Use, and the Environment (3) Soil as environmental component and soil properties affecting land use. Soil as resource in environment, consideration of nonengineering aspects of site selec-tion for land use, soil survey and resource data in land use, recognition and control of soil pollution. Prereq. 210 or consent of Instructor. Sp,A
415 Soil Hydrology (3) Physical relationships among solid, liquid, and gaseous phases of soil system. Rela-tionships of soil properties to processes governing trans-port, storage, and waste, soil. Prereq: Introduction to Soil Science. 2 hrs and 1 lab. F,A
431 Crop Physiology and Ecology (3) Principles of plant physiology and ecology as applied to crop produc-tion. Effects of environmental factors on physiological processes. Prereq: 230; Botany 521. 2 hrs and 1 lab. F,A
432 Bioecology (3) Solar energy budget; interac-tions between global, regional and local climates and biological systems: quantification of macro- and micro-climates; microclimates and their modification; autono-mous weather station data collection and analyses; biological responses to climatic stresses; climate vari-ation and change and their effects on biological systems. Prereq: 1 yr physical or biological sciences, junior stand-ing. F,A
433 Agricultural Pesticides (3) Regulation of pesticide development, manufacture, transportation, marketing and use. Structure, use, mode of action, degradation and environmental impacts in natural and seminatural ecosystems, agriculture, forestry and related areas. Prereq: 1 yr biological sciences and 1 semester chemistry. 2 hrs and 1 lab. Sp
434 Postharvest Biology and Technology (3) Prin-ciples, methods, and techniques related to maintenance of quality of horticultural commodities. Postharvest han-dling, harvesting, storage facilities and techniques, qual-ity evaluation and biological and physiological mechani sms related to maturation, ripening, and senescence. Graduate credit requires a short lab project in addition to regular class assignments. Two Saturday field trips. Prereq: 1 yr biological science. 2 hrs and 1 lab. Sp
453 Principles of Plant Breeding (3) Genetic principles and techniques used in crop improvement. Prereq: Biol-ogy 220 or equivalent. 2 hrs and 1 lab. Sp
471 Statistics for Biological Research (3) Application of statistics to interpretation of biological research. Nota-tion, descriptive statistics, probability, distributions, con-fidence intervals, 1 and -chi-square tests, analysis of variance, mean separation procedures, linear regression and correlation. Prereq: Mathematics 121 or equivalent. F
500 Thesis (1-15) P/NP only. E
501 Seminar Preparation (1) Application of speaking, writing, and organizational skills in preparation and pres-entation of scientific material for both scientific and gen-eral audiences. Preparation of abstracts for scientific presentations. Required of all entering graduate stu-dents during their first year of graduate study. F
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/C only, E
503 Seminar (1) Presentations and discussion of cur-rent scientific material. May be repeated. Maximum 3 hrs. F,Sp
512 Pedology (3) Physical and chemical weathering processes, factors of soil formation, soil forming proc-esses. Prereq. 412 or consent of Instructor. 2 hrs and 1 lab. F,A
514 Advanced Soil Physics (3) Theory and mathemati-cal modeling of flow and solute transport in saturated-unsaturated soil; geostatistical analysis of soil heteroge-neity, stochastic properties multi-scale pore processes, anisotropy, hysteresis, Analytical and numerical solution of flow and transport equations for unsaturated zone. Prereq: Calculus III, 415, or consent of Instructor. F,A
530 Integrated Pest Management (3) Same as Ento-mology and Plant Pathology 530.
532 Advanced Crop Ecology (3) General and specific relations among environmental factors, crop organisms, and inorganic and organic substances, quantification of macro- and microchemical influences on crop growth; world climates, crop distribution and productivity, human cultures, and their interaction. Prereq: 471 or equivalent. 431 or equiv-alent, or Agricultural Climatology or equivalent. 2 hrs and 1 lab. F,A
551 Advanced Plant Genetics (3) Discovery of genet-ics: controlling elements, induced mutations, genome organization, polyploidy, tetrasomic inheritance, extra-chromosomal inheritance, spores, incompatibility sys-tems, and genetic engineering of higher plants. Prereq: Biology 220. F,A
552 Quantitative Genetics (3) Genetic analysis of continuous variation. Estimation of 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.)
593 Special Problems in Plant and Soil Science (1-3) May be repeated. Maximum 6 hrs. E
600 Doctoral Research and Dissertation (3-15) P/NP only. E
601 Special Topics in Soil Science (1-3) Thermodynamics of solution and soil solutions, clay structure and surface chemistry, soil mineralogy, plant mineral nutrition, soil microbiology, water movement and use by plants, soil structure, soil thermal properties, interaction in the soil-plant-atomosphere system. May be repeated. Maximum 6 hrs. E
603 Special Topics in Crop Physiology and Ecology (1-3) Microecology of agroecosystems, crop dormancy and responses to stress, physiology of crop growth and reproduction. Interactions of physiology and germination in crop production, theory and application of quantitative methods in crop physiology and ecology research. May be repeated. Maximum 6 hrs. E
605 Special Topics in Plant Breeding and Genetics (1-3) Genotypes by environment interactions, estimation of quantitative parameters, mutations, chromosomal dy-namics, polyploidy, genetic engineering, interspecific hybridization, linkage, screening methods, genome or-ganization. May be repeated. Maximum 6 hrs. E
613 Advanced Soil Chemistry (3) Thermodynamics of soil solutions and surface chemistry of soils; soluble complex formation, mineral solubility, electrochemical equilibria, geochemical modeling, ion exchange equilibria, surface functionality and reactivity, adsorption phe-nomena, and surface complexation modeling. Prereq: 413 or equivalent and Chemistry 473 or consent of instructor. F,A
632 Plant Growth Control and Herbicide Action (3) Principles of uptake, translocation, mode of action and uses of herbicides and plant growth regulators and their effects on plant morphology, metabolic systems and enzymatic activities. Practical aspects and current com-mercial uses of plant growth regulators. Prereq: Botany 521 and 522 or equivalent. F,A
633 Advanced Plant Breeding (4) Development and utilization of concepts of quantitative parameters, in-terbreeding, heterosis, methods of selection, in vitro breed-ing, interspecific hybridization, stability parameters, ge-netic resistance and vulnerability to pests and environ-mental stresses. Prereq: 453 and 471 or equivalent or consent of instructor. 3 hrs and 1 lab. Sp,A

Political Science (College of Arts and Sciences)

MAJORS

DEGREES

Political Science ........................................... M.A., Ph.D.
Public Administration ................................. M.P.A., J.D.-M.P.A.
Patricia Freeland, Head

Professors:
Carlisle, D. H. (Emeritus), Ph.D. .................................................. North Carolina
THE MASTER OF PUBLIC ADMINISTRATION PROGRAM

The M.P.A. program is intended to prepare students for public service careers by acquainting them with management principles, analytical tools, and the ethical dilemmas they will face as public administrators. It consists of a total of 39 semester hours, including a core program, an elective specialization, and a recommended internship.

Applicants for admission to the program must have a Bachelor's degree or its equivalent. Normally, an overall average of 3.0 and an average of 3.2 in the field(s) of political science or social science courses is required. Additionally, a composite score of at least 1100 on the verbal and quantitative parts of the GRE is normally required.

Students must demonstrate proficiency in the use of software applications for the personal computer. This requirement can be fulfilled by achieving a satisfactory grade in Political Science 596, Workshops in Computer Applications. Exceptions to this requirement will be considered on an individual basis.

The M.P.A. is a non-thesis program requiring 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; 548 Public Policy Process; 558 The Politics of Administration; or 566 Ethics, Values, and Morality in Public Administration.
   b. Analytical skills (6 hours) - 512 Quantitative Political Analysis; 514 Research Methods; and 516 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; 565 Policy Analysis.

2. Specialization (9 hours)
   A specialization is designed by the student in consultation with the coordinator of the M.P.A. degree program. Possible specializations include general government, public health, budgeting and finance, planning, natural resources, program evaluation, criminal justice, public relations, personnel, and others.

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 conferred both of 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. Applications must also be submitted to the Dual Degree Committee. All applicants must submit a Law School Admission Test (LSAT) score. An applicant's LSAT score may be substituted for the Graduate Record Examination (GRE) score, which is normally required for admission to the M.P.A. program. Application may be made prior to or after matriculation in either the J.D. or the M.P.A. program, but application to the dual program must be made prior to entry into the last 29 semester hours required for the J.D. degree and prior to entry into the last 15 hours required for the M.P.A. degree.

Curriculum

A dual degree candidate must satisfy the requirements for both the J.D. and the M.P.A. degrees, as well as the requirements for the dual program. The College of Law will award a maximum of 9 semester hours of credit toward the J.D. degree for successful completion of approved graduate level courses (500 or 600 level) offered in the Department of Political Science. The M.P.A. program will award a maximum of 9 semester hours of credit toward the M.P.A. degree for successful completion of approved courses offered in the College of Law. All courses for which such cross-credit is awarded must be approved by the J.D.-M.P.A. coordinators in the College of Law and the Department of Political Science. All candidates for the dual degree must successfully complete Administrative Law (Law 821) and be encouraged to take Local Government (Law 824). An internship is strongly recommended for students in the dual degree program; as it is for all M.P.A. candidates, but an internship is not required.

During the first two years in the dual program, students will spend one academic year completing the required first year of the College of Law curriculum and one academic year taking courses solely in the M.P.A. program. During those first two years, students may not take courses in the opposite area, without the approval of the J.D.-M.P.A. coordinators in both academic units. In the third and fourth years, students are strongly encouraged to take both law and political science courses each semester.

Dual degree students who withdraw from the program before completion of the requirements for both degrees will not receive credit toward either the J.D. or the M.P.A. degree for courses taken in the other program except as such courses qualify for credit without regard to the dual program.

Awarding of Grades

For grade recording purposes in the College of Law and the Department of Political Science, grades awarded in courses in the other unit will be converted to either Satisfactory or No Credit and will not be computed in determining a student's GPA or class standing. The College of Law will award a grade of Satisfactory for an approved M.P.A. course in which the student earns a grade of B or higher and a grade of No Credit for any lower grade. The Political Science Department will award a grade of Satisfactory for an approved law course in which the student earns a grade of 2.0 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
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 subfields of political science, and must pass a final oral examination on the dissertation.

In addition, students must satisfy a research tool requirement. Usually, students meet this requirement by conducting 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 the President and Congress, federalism, sources of regulatory authority, and constitutional protection of political and economic rights.

431 U.S. Constitutional Law: Civil Rights and Liberties (3) Analysis of current issues in civil rights and liberties including affirmative action, 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.

455 Latin American Government and Politics II (3) Selected topics on Latin American political dynamics, consideration of leading theoretical explanations. (Same as Latin American Studies 555.)

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 policy.

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 Medieval Political Thought (3) Survey of major political thinkers from Socrates to Marullo of Padua.

476 Modern Political Thought (3) Survey of major political thinkers from Machiavelli to Marx.

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

502 Registration for Use of Facilities (3-15) Required for students participating in approved internship programs. May be repeated with consent of instructor. S/NC only.

510 Scope and Methods in Political Science (3) Procedures of analysis in political science.

511 Research Design (3) Methods for planning and executing research, from case studies to experimental designs; development of research questions and hypotheses; measurement issues; and validity of inferences.

512 Quantitative Political Analysis (3) Methods and techniques in quantitative political analysis: univariate and bivariate statistics.

513 Quantitative Political Analysis (3) Methods and techniques in quantitative political analysis: multivariate model building.

514 Research and Methodology in Public Administration (3) Basic assumptions and techniques of research in public administration; measurement, analysis, and reporting of data.

520 Political Theory (3) Survey of major ideas, thinkers and works of Western political theory.

522 American Political Thought (3) Systematic examination of the normative and empirical theories of leading American political thinkers from the colonial period to the present.

523 American Government and Politics (3) Survey of government and politics of the United States, approaches to research and analysis, critical examination of major works, and overviews of research in various subfields. May be repeated with consent of department. Maximum 3 hrs.

524 Presidency (3) Systematic examination of the structure, functions and powers of the American presidency as they have evolved from the founding to the present.

525 Congress (3) Formal, empirical and theoretical approaches to and models of the institutional workings of Congress and the behavior of legislators.

526 Mass Political Behavior (3) Theoretical and empirical analysis of public opinion, political socialization, political attitudes and behavior, especially voting behavior.

537 Political Parties and Interest Groups (3) Theoretical and empirical examination of the structure, functions and operations of political parties and interest groups.

539 State and Local Government and Politics (3) Theoretical and empirical analysis of government, politics, policymaking and public administration at the state and local levels.

540 Public Law (3) 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. Maximum 9 hrs.

546 Law and the Administrative Process (3) 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. Maximum 9 hrs.

548 Public Policy Process (3) Theoretical, formal and empirical analysis of the roles, functions and decision-making processes of public policymakers, including legislative, executive and judicial actors.

550 Public Administration (3) Overview of public administration theory and function.

552 Organization Theory (3) Analysis of major theories of organization and their applicability to public sector.

553 Management of Information Systems (3) Theory, design, development, implementation and evaluation of information systems in public organizations. Database systems, computer applications, and training for management information technology.

556 Policy Analysis (3) Strategies and techniques for identification and analysis of public problems and policy solutions. May be repeated with consent of department. Maximum 9 hrs.

558 The Politics of Administration (3) Analysis 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.

560 Public Budgeting and Finance (3) Technical and political aspects of budgeting, preparing and adopting government budgets. Management functions of revenue collection, debt management, treasury function, accounting, internal auditing, purchasing, risk management, post-auditing.

562 Public Management (3) Intergovernmental 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.


566 Ethics, Values, and Morality in Public Administration (3) Moral, ethical, value dilemmas confronting administrators in American political system.

569 Internship in Public Administration (3-9) Open to students participating in approved internship programs. May be repeated with consent of department. Maximum 9 hrs. S/NC only.

570 Comparative Government and Politics (3) Selected topics in modern government. May be repeated with consent of department. Maximum 9 hrs.

572 The Politics of Development (3) Selected topics dealing with political problems of less developed countries. May be repeated with consent of department. Maximum 9 hrs.

574 Area Seminar in Comparative Government and Politics (3) Selected topics in area studies: African, Asia, Latin America, Middle East, Soviet Union and Eastern Europe or Western Europe. May be repeated with consent of department. Maximum 9 hrs.

580 International Politics (3) Survey of literature and major aspects of international politics. May be repeated with consent of department. 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.

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

594 College Teaching in Political Science (1) Instructional effectiveness, techniques, organization, materials for teaching political science at college level. Prereq: Consent of instructor. S/NC only.

595 Readings and Special Problems in Political Science (1-3) Prereq: Consent of instructor. May be repeated. Maximum 15 hrs.
Psychoeducational Studies

(College of Education)

MAJORS

DEGREES

Education ................................ Ed.S., Ed.D., Ph.D.
Educational Psychology .................. M.S.

K. Greenberg, Leader

Professors:
Bellon, Jerry J. (Emeritus), Ed.D. .. UC Berkeley
Brockett, Ralph G., Ph.D. .......... Syracuse
Cameron, Walter A., Ph.D. .......... Ohio State
Dickinson, Donald J., Ed.D. .. Oklahoma State
George, Thomas W., Ed.D. .... Tennessee
Greenberg, Katharine H., Ph.D. .... George Peabody
Kasworm, Carol, Ed.D. ......... Georgia
McCallum, R. S., Ph.D. ........... NC State
Peters, John M., Ed.D. ......... Tennessee
Williams, R. J. (Liaison), Ph.D. George Peabody

Associate Professor:
Kindall, Luther M., Ed.D. .... Tennessee
Assistant Professor:
Whitaker, Dianne, Ph.D. ............ Washington

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

Education
School psychology
Doctor of Education

Education
Adult education
Educational psychology: collaborative learning
Doctor of Philosophy

Education
Adult education
Educational psychology: individual and collaborative learning

School psychology
See Education under Fields of Instruction for full description of all degree requirements.
The school psychology concentration under the college-wide Ph.D. program is accredited by the American Psychological Association and the National Association of School Psychologists.
The mission of the Psychoeducational Studies unit is to provide national leadership in creating learning environments that foster psychological health, address authentic educational needs, and promote life-long learning.
The unit will seek opportunities in a diversity of contexts for learners to apply database-based problem solving, engage in reflective and evaluative thinking, and implement the structures and processes necessary for effective collaboration.
The school psychology program is accredited by the American Psychological Association and the National Association of School Psychologists.

Psychoeducational Studies

See Materials Science and Engineering

Polymer Engineering

596 Workshops in Computer Applications (1) Training in software applications to support research and decision making tasks in public service. Successful completion certifies proficiency of MPA students in use of software applications for personal computer. S/NC only.

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

610 Special Topics in Empirical Theory and Methodology (3) Advanced methods and procedures of analysis in political science. May be repeated with consent of instructor. Maximum 9 hrs.

615 Formal Political Analysis (3) Assumptions, methods and applications 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.

628 Topics in Political Theory (3) Selected issues and problems in normative political theory. Specific content determined by instructor. May be repeated with consent of instructor. Maximum 9 hrs.

639 Special Topics in American Government and Politics (3) Advanced study of selected topics. May be repeated with consent of instructor. Maximum 9 hrs.

640 Special Topics in U.S. Constitutional Law (3) 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.

642 The Politics of Criminal Justice (3) 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.

654 Contemporary Public Policies (3) Problems in one or more public policy areas from political and administrative perspectives. Topics selected by instructor. May be repeated with consent of department. Maximum 9 hrs.

660 Contemporary Perspectives on Public Administration (3) Development of theory in public administration: contemporary critiques and alternatives. May be repeated with consent of instructor. Maximum 9 hrs.

667 Comparative Public Administration (3) Comparison of policy-making structures and public policies in selected countries. May be repeated with consent of department. Maximum 9 hrs.

668 Special Topics in Public Administration (3) Analysis of selected issues and problems in public administration. May be repeated. Maximum 9 hrs.

670 Special Topics in Comparative Government and Politics (3) Research into selected topics. May be repeated with consent of department. Maximum 9 hrs.

682 Theory and Analysis of U.S. Foreign Policy Processes (3) Theoretical approaches to decision making in foreign policy areas and analysis of policy-making processes. May be repeated with consent of department. Maximum 9 hrs.

688 Special Topics in International Politics (3) Selected issues and problems in international politics. Specific content determined by instructor. May be repeated with consent of instructor. Maximum 9 hrs.

ADMISSION REQUIREMENTS

Admission requirements include up-to-date scores from the GRE, the unit admissions application form and letters of recommendation. For the doctoral programs a writing sample is also required.

GRADUATE COURSES

432 The Disadvantaged Student: Psychoeducational Perspectives (3) Theory and research regarding etiology, psychosocial behavior and appropriate interventions.

460 Self-Management in the Helping Professions (3) Applications of self-management strategies to career, social, emotional, and health domains for both helping professionals and their clients. Prereq: Introductory course in psychology or consent of instructor. S/NC or letter grade. Sp, Su

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

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

509 Internship in Adult Education (3) Practical field experiences in selected settings under supervision of practitioner and departmental representative. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

510 Psychological Theories of Human Development Applied to Education (3) Theory and research on emotional, social, and intellectual development over the life span with applications to educational and therapeutic settings. F, Su

511 Cognitive Development: Implications for Education (3) Applications of theory and research related to higher mental problem-solving. Prereq: 510 or consent of instructor. F

512 Reflective Practice in Education and Psychology (3) Concepts, theories and processes of reflective practice applied to educational settings. E

514 Individual Study in Adult Education (3) Prereq: Consent of supervising instructor. Approval form must be completed in office of unit head. May be repeated. Maximum 6 hrs. E

515 Educational Applications of Behavioral Theories of Learning (3) Behavioral theories and research, conditioning, observational learning, and psychological learning as systems applied to student motivation, discipline and learning. F, Su

516 Educational Applications of Cognitive Learning Theories (3) Cognitive theory and research, social learning, conditioning, observational learning, and psychological learning as systems applied to education. Prereq: 515 or consent of instructor. F

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

520 Survey of Adult Education (3) Historical development, philosophies of adult education agencies, associations, programs, issues, and literature illustrating pro-
coursess 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 of program development, supervision and evaluation. 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. F, Su

523 Post-Secondary Education for Adults (3) History, evolution, philosophy, structure and function of post-secondary, sub-university institutions, their programs and clientele. Prereq: Consent of instructor. Sp, Su

524 Continuing Professional Education (3) Theories and concepts supporting design and management of educational programs for adults in professions. Prereq: 520 or equivalent. Sp

525 Characteristics of Adult Learners (3) Key characteristics of adult learners, and applications to teaching and learning contexts.


527 Controversies in Adult Education (3) Controversies confronting adult education, development of critical analysis skills by looking at controversies from different perspectives.

540 Seminar in School Psychology (3) Essentials of theory and practice of school psychology as professional specialization. Development 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. 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

543 Psychological Consultation (3) Use of two- and three-person models of consultation in educational and therapeutic settings based on behavioral, ecological, social learning and cognitive-behavioral theories. F

546 Practicum in Consultation (3) Application of consulting skills to 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, Su

560 Discipline and Conflict Resolution (3) Application of major models of discipline and conflict resolution strategies in development of constructive atmosphere for classroom learning.

571 Mediated Learning Theory (3) Feuerstein's theory of mediated learning experience and its connections to work of Piaget, Vygotsky and others. Implications for transformational learning and building of learning communities for learners of all ages.

572 Cognitive Education: Models and Approaches (3) Models and methods of cognitive education: research and theoretical support for various program components, critical variables of organizational learning that affect success of implementation.


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) Instructor- or student-initiated group investigation of empirical and theoretical problems in educational and counseling psychology. May be repeated. Maximum 12 hrs. S/N only. E

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

609 Advanced Seminar in Curriculum and Learning (4) Team taught interdisciplinary seminar; trends, issues and problems in curriculum and learning. Reading and writing based. Prereq: 520 or equivalent. F

620 Seminar in Adult Education (3) Issues in adult education, theories and concepts, philosophical positions, research trends and methodologies. Prereq: 520 or equivalent. Sp

621 Advanced Seminar in Program Planning (3) Concepts, principles, and theories related to program planning in adult education. Prereq: 521 or equivalent. Sp

622 Advanced Seminar in Adult Development (3) Adult development research. Designing research for studies of life cycle. Prereq: 522 or equivalent. Sp

626 Adult Problem Solving and Learning (3) Contemporary research and therapies in adult problem solving and learning. Prereq: 525 or equivalent. F, Sp

635 Ethical, Legal, and Professional Issues in Psychology (3) Same as Psychology 635. Course approved to counsel and advise. Prereq: Consent of instructor. E

649 Advanced Internship in School Psychology (1-9) Supervised experience as school psychologist in a unit approved internship site for doctoral level students. Prereq: Enrollment in doctoral level school psychology program and consent of instructor. May be repeated. Maximum 9 hrs. S/N only. E

650 Professional Practice in School Psychology (1) Field setting to facilitate academic, social and interpersonal development of children and adults. School and mental health settings for intervention, consultation, prevention, and assessment services. May be repeated. Maximum 12 hrs. S/N only.

655 Research in Psychoeducational Studies (1) Data analysis, collection and interpretation. May be repeated. Maximum 9 hrs. S/N only.

663 Scale Construction (3) Development, piloting, revision of attitude inventories, ratingscales, other paper-and-pencil techniques for assessing beliefs, personality characteristics, and opinions. Prereq: Counselor Education and Counseling Psychology 525, and two course sequence in statistical analysis. F

665 Analysis of Research in Instructional Technology (3) Theory, design of learning, design of learning environments. Analysis of teacher behavior, text development, computer software design and video presentations. A

668 Practicum in Instructional Planning (3) Development and management of course or program of instruction in educational psychology. Prereq: 665, or consent of instructor. E

669 Internship in Educational Psychology (1-6) Supervised employment in unit approved educational psychology internship sites. May be repeated. Maximum 12 hrs. S/N only. E

685 Educational Leadership: Theory and Practice (3) Theories of leadership applied to variety of educational settings. Prereq: Consent of instructor. E

690 Psychopathology of Childhood (3) Descriptive and critical study of the psychology of childhood and of systems of nomenclature applied to individuals with mental disorders: nomenclature provided in State Department of Education's Student Evaluation Manual and Diagnostic and Statistical Manual of Mental Disorders of American Psychiatric Association.

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

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

Psychology (College of Arts and Sciences)

MAJOR

DEGREES

Psychology ........................................ M.A., Ph.D.
531-32 or an equivalent sequence; 565 or 420; six semester hours of Thesis 500; and twelve hours of 500- or 600-level foundation courses. Students must earn a grade of B or better in all courses that are to count toward the 30-hour total. Students must also propose, conduct, and successfully defend an original piece of research in the form of a master's thesis.

THE DOCTORAL PROGRAM

A student with a B.A. or B.S. may apply to the Department of Psychology for admission to the doctoral program with a concentration in experimental psychology or clinical psychology. The doctoral program with a concentration in psychology or physiology is offered through the Life Sciences program. Doctoral study in clinical psychology is offered through the Intercollegiate program in Industrial and Organizational Psychology, to which application is made through the Department of Psychology.

Experimental Psychology

The Ph.D. program in Psychology with a concentration in experimental psychology is designed to allow students to select from a variety of specializations oriented toward careers in research, teaching, and application of psychology in academic, institutional, or industrial settings. The program is flexible, individualized, and emphasizes a professional apprenticeship model of training. A full description of the program is given in the Handbook for Students in Experimental Psychology, available from the department. The basic requirements are:

1. Twelve semester hours of statistics and research (504-05 or Statistics 531-32 or equivalent and 6 additional hours research methods or design).
2. Fifteen semester hours in experimental psychology (565 or equivalent and 4 courses from the following: 510, 511 or 512, 513, 543, 546 or 547, 550, 555, and 570 or 571).
3. Six semester hours of research practice (509).
4. Psychology 528 - preparation for college teaching.
5. Two 600-level graduate seminars.
6. Six semester hours of graduate level courses outside the Psychology Department.
7. Predissertation research project involving the collection of original data or the original analysis of existing data, reported in publishable form and accepted by the student's advisory committee.
8. An integrative review or theoretical paper, accepted by the student's advisory committee.
9. Comprehensive examination, determined and evaluated by the student's doctoral committee.
10. Twenty-four hours of dissertation research (600).
11. An original piece of research in the form of a doctoral dissertation, proposed, conducted, and defended.

Clinical Psychology

This program is designed to lay the groundwork for a career as a clinical psychologist capable of working in both academic and applied settings. The program emphasizes the theoretical foundations of psychology as well as supervised experience oriented toward the development of practical skills. The program embodies a model of clinical psychology in which practice and research are integrated. Clinical program students must complete a predissertation research project by the end of the second year.

After forming the doctoral committee, students must then pass a comprehensive examination administered and evaluated by the committee. This examination is comprised of two papers, one addressing a topic of the student's choice, and the second addressing an understanding of one individual's personality and cognitive functions. All doctoral students must complete a minimum of 78 hours of graduate level courses, including courses required by their program; at least 6 hours in courses outside of psychology, and at least 24 hours of dissertation research (Psychology 600). Finally, students must complete an acceptable doctoral dissertation and conduct a satisfactory oral defense of the dissertation.

Requirements are as follows:

1. Apprenticeship with one faculty member during the first year, two days each week.
2. Predissertation research project completed to form 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 Designs (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 (685) (18 hrs.):
      i. Dynamics of Psychopathology (573).
      m. Psychometrics (555) or Applied Psychological Measurement (557).
      n. Ethical, Legal and Professional Issues in Psychology (635).
      o. Psychodynamic Psychotherapy I and II (670-71) and Laboratory (672) (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 or consent of instructor. 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.

430 Health Psychology (3) Survey of psychological factors related to health and illness: stress, personality, and environment. Applications of psychological treatments to physical illness. Prereq: 110 or equivalent, 210.

434 Psychology of Gender (3) Biological, psychological, and social factors in gender. Importance of gender roles and stereotypes for behavior and experience. Prereq: 110 or equivalent, 210, 220. (Same as Women's Studies 434.)

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.)

458 Comparative Animal Behavior Laboratory (3) Coreq: 450. (Same as Ecology and Evolutionary Biology 450.)

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 human personality and their development. Prereq: 220 and 330 or 330.

475 Adolescent Development (3) Theoretical perspectives and empirical research findings pertaining 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 8 hrs in 300-level courses. Recommended prereq: Statistics in Psychology. Methods of
596 Psychological Assessment II (3) Basic concepts and methods of clinical assessment and promotion of professional and personal development. Prereq: admission to doctoral program in clinical psychology and consent of instructor. F

597 Psychological Assessment III (3) Techniques of assessment and promotion of professional and personal development. Prereq: admission to doctoral program in clinical psychology and consent of instructor. F

601 Seminar in Psychology (3) Consent of instructor. May be repeated. Maximum 12 hrs.

602 Seminar in Applied Psychology (3) Consent of instructor. May be repeated. Maximum 12 hrs.

603 Seminar in Existential-Phenomenological Psychology (3) Consent of instructor. May be repeated. Maximum 12 hrs.


605 Seminar in Methodology of Natural Research (3) Consent of instructor. May be repeated. Maximum 12 hrs.

606 Seminar in Organizational Psychology (3) Consent of instructor. May be repeated. Maximum 12 hrs.

607 Seminar in Industrial/Organizational Psychology (3) Consent of instructor. May be repeated. Maximum 12 hrs.

608 Research in Psychology (3) Consent of instructor. May be repeated. Maximum 12 hrs.

609 Research in Social Psychology (3) Consent of instructor. May be repeated. Maximum 12 hrs.

610 Research in Clinical Psychology (3) Consent of instructor. May be repeated. Maximum 12 hrs.

611 Independent Study in Psychology (3) Consent of instructor. May be repeated. Maximum 12 hrs.

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619 Independent Study in Psychology (3) Consent of instructor. May be repeated. Maximum 12 hrs.

620 Independent Study in Psychology (3) Consent of instructor. May be repeated. Maximum 12 hrs.

621 Independent Study in Psychology (3) Consent of instructor. May be repeated. Maximum 12 hrs.

622 Independent Study in Psychology (3) Consent of instructor. May be repeated. Maximum 12 hrs.

623 Independent Study in Psychology (3) Consent of instructor. May be repeated. Maximum 12 hrs.

624 Independent Study in Psychology (3) Consent of instructor. May be repeated. Maximum 12 hrs.

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629 Independent Study in Psychology (3) Consent of instructor. May be repeated. Maximum 12 hrs.

630 Independent Study in Psychology (3) Consent of instructor. May be repeated. Maximum 12 hrs.

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649 Independent Study in Psychology (3) Consent of instructor. May be repeated. Maximum 12 hrs.
The Rehabilitation, Deafness and Human Services Education unit participates in graduate programs leading to degrees, majors, and concentrations in: Masters of Science Counseling Rehabilitation Counseling Education Training Center, and the Educational Interpreting program.

**GRADUATE COURSES**

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


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

423 American Sign Language I (3) Expressive and receptive skill development in sign communication. Video text and interactive teaching methods. Class conducted totally in sign.

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

425 Introduction to the Psychology and Education of the Hearing Impaired (3) Primarily for those planning to teach hearing impaired. Overview of research related to psychology, social adjustment, communication methodology, language development and education of hearing impaired. Survey of literature. Visits to programs.

426 American Sign Language II (3) Expressive and receptive skill development in sign communication. Video text and interactive teaching method. Class conducted totally in sign. Must be taken in sequence. Prereq: 426; 431 for 432 or consent of instructor.

431-32 American Sign Language III, IV (3,3) Fluency of expressive and receptive sign communication skills. Use of language in context. Grammatical structures of ASL, and cultural implications of deaf community. Must be taken in sequence. Prereq: 426; 431 for 432 or consent of instructor.

482 Speech and Language Services in the Schools (3) Organization and implementation of speech and language programs in schools. IEP procedures, as it affects assessment, case-selection, and programming for students age 4-21. Procedures and materials, group intervention, and classroom consultation.

483 Clinical Practice in Communication Disorders in Schools (3) Supervised practice with children with communication disorders. Prereq: 431, 433, 434 (80-100 clinical contact hrs). 482.

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

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

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

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

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

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

523 Practicum in Hearing Impaired (3) Receptive and expressive language capabilities of hearing impaired student. Designing, teaching, and post-testing unit of instruction for remediation of specific language errors.


529 Teaching Reading to the Hearing Impaired (3) Specific methods necessary to teach the preregistrant hearing impaired student. Practice in preparation of developmentally appropriate reading materials. Methods used in instruction of hearing impaired students in regular reading curricula and materials. Prereq: 415.

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

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

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

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

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

538 Disability Management (3) Return-to-work issues in disability management programs: early intervention, quality services, and cost containment; standards and procedures for rehabilitation counselors/case managers in private sector rehabilitation.

541 Psychosocial Aspects of Exceptionalities (3) Psychosocial impact of exceptionality on person and family. Reaction to loss, coping with disability, and societal rehabilitation.

543 Medical Aspects of Disability (3) Etiology and clinical symptoms related to disabling conditions served by special education and rehabilitation personnel. Restorative measures to eliminate or minimize resulting handicaps. Skills necessary to communicate with clients and professional persons.

545 The Rehabilitation Interview (3) Interview as used in assessment and planning with people who have disabilities and vocational handicaps.

547 Practicum in Rehabilitation (3) Supervised experience in area of rehabilitation; application of concepts, principles, and skills. Prereq: Consent of instructor.

548 Internship in Rehabilitation Counseling (12) Supervised practice in rehabilitation counseling. Full time clinical experience for second-year students (800 clock hrs required).

579 Special Topics (1-3) Prereq: Admission to graduate program. May be repeated. Maximum 9 hrs. S/NC or letter grade.

591 Clinical Studies (4) Relationship between educational theory and application during internship; research project, development of portfolio, and capstone experience.

592 Assistive Technology in Special Education and Vocational Rehabilitation (3) As applied to
needs of school age and post-secondary age students/ 
deliver of assistive technology services; soft-
ware programs and assistive devices; delivery systems, 
interdisciplinary evaluation/planning, and funding issues. 

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

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

601 Seminar in Educational Theories in Special Education 
and Rehabilitation (3) Education theories: education 
and rehabilitation of exceptional persons. Theory 
applications in educational settings. Prereq: Admission 
to doctoral program or consent of instructor.

602 Seminar in Social Processes in Special Education 
and Rehabilitation (3) Social phenomena which 
influence impact of disability on person and on significant 
others. Implications for habilitation. Prereq: Admission to 
doc toral program or consent of instructor.

603 Seminar in Research in Special Education and 
Rehabilitation (3) Development and implementation of 
research. Independent research studies. Research pro-
posals. Prereq: 9 hrs of research core and consent of 
instructor.

610 Internship in College Teaching and Supervision 
(3-9) Supervision of college teaching and super-
vision. Prereq: Admission to doctoral program or con-
sent of instructor. May be repeated. Maximum 9 hrs. 
S/NC only.

630 Internship in Institutional Leadership in Special 
Education and Rehabilitation (3-9) Advanced level 
field experiences under supervision of practitioner. 
Prereq: Consent of Instructor. May be repeated. Maximum 
9 hrs. S/NC only.

679 Special Topics (1-3) Prereq: Admission to doctoral 
program. May be repeated. Maximum 9 hrs. S/NC or 
latter grade.

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

**Religious Studies**

*(College of Arts and Sciences)*

Charles H. Reynolds, Head

**Professors:**

Dungan, David L., Th.D. .................Harvard

Hackett, Rosalind J. I., Ph.D. ...........Aberdeen

Humphreys, W. Lee, Ph.D. ...............Union

Linge, David E. (Liaison), Ph.D. .........Vanderbilt

Lusby, F. Stanley (Emeritus), Ph.D. .......St. Lawrence

M.Div. ...........................................Colgate Rochester

Norman, Ralph V., Jr., Ph.D. .............Yale

Reynolds, Charles H., Ph.D. .............Harvard

**Associate Professors:**

Fitzgerald, James L., Ph.D. ..............Chicago

Gwynne, Rosalind W., Ph.D. .............Washington

Hodges, John O., Ph.D. ....................Chicago

Lowery, Vincent L., Ph.D. ...............Harvard

Schmidt, Gilvy G., Ph.D. .................Pittsburgh

**Assistant Professor:**

Huether, Mark, Ph.D. .....................Minnesota

A master's degree in Philosophy with a 
concentration in religious studies is available. 
Details of this program are described under 
Philosophy. Graduate courses in religious 

**Romance and Asian Languages**

*(College of Arts and Sciences)*

**MAJORS**

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<th>MAJORS</th>
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<td>French</td>
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<td>Modern Foreign Languages</td>
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John B. Romeiser, Head

**Professors:**

Barrett, Paul E., Ph.D. ..............California

Brady, Patrick (Shumway Chair of Excellence), D.U.P. Sorbonne

Campion, Edmund J., Ph.D. ..........Yale

Cobb, Carl W., Ph.D. ................Tulane

Elliott, Jacqueline C. (Emeritus), M.A. Illinois

Handelsman, Michael H. (Liaison), Ph.D. Florida

Hefflin, William H., Ph.D. ..........Florida State

Irving, Thomas B. (Emeritus), Ph.D. Princeton

Levy, Karen D., Ph.D. ...............Kentucky

Maurino, Ferdinando D. (Emeritus), Ph.D. Columbia

Petrovska, Marja (Emeritus), Ph.D. ....Kentucky

Pinsky, Clara (Emeritus), Ph.D. ......California

Rivera-Rodas, Oscar, Ph.D. ..........California

Romeiser, John B. (Liaison), Ph.D. ....Vanderbilt

Vazquez-Bigot, A. M. (Emeritus), Ph.D. Minnesota

Wallace, Albert H. (Emeritus), Ph.D. North Carolina

Washburn, Yulan M., Ph.D. ...........North Carolina

**Associate Professors:**

Briano, Flavia, Ph.D. .................Washington

Cazeneuve, Ondie, Ph.D. .............Penn State

Creel, Bryant, Ph.D. ....................California

Dufour, Karma, Ph.D. .................Wisconsin

DiPuccio, Denise M., Ph.D. ..........Wisconsin

Duncan, Cynthia K., Ph.D. ..........Illinois

Holmsted, Christine (Liaison), Ph.D. Wisconsin

Young, Dolly, Ph.D. ...................Texas

**Assistant Professors:**

Beauvois, Margret, Ph.D. .............Texas

Esser, Les, Ph.D. .......................Brown

Kaplan, Gregory, Ph.D. ...............Pennsylvania

LaCure, Jon, Ph.D. .....................Indiana

Lewis, Elizabeth F., Ph.D. ..........Virginia

McAlpin, Mary K., Ph.D. .............Columbia

Nakura, Concettino, Ph.D. ..........Sorbonne

Silvafili, Eudice, Ph.D. ..........North Carolina

The Department of Romance and Asian 
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 
coordinates 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 500-level seminars. If the student chooses 
to have a minor (such as Italian or Portuguese), 
at least 24 hours (including 6 hours of thesis) 
must be taken in the major, 6 in the minor.

2. A thesis, with a minimum of 6 semester 
hours in course 500.

3. A written examination covering the 
coursework and selected items from a master 
reading list.

4. A final oral examination covering the 
thesis.

**Non-Thesis Option**

1. Completion of 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 (such as Italian or
Portuguese), at least 24 hours must be taken in the major, 6 in the minor.

2. Three term papers that have been accepted by the student’s advisory committee.

3. A written examination covering the coursework and selected items from a master reading list.

4. A final oral examination to discuss the papers (French M.A. only).

THE DOCTORAL PROGRAM

The Ph.D. in Modern Foreign Languages is offered jointly by the Department of Germanic and Slavic Languages and the Department of Romance and Asian 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 and Slavic 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 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 63 semester hours of coursework beyond the bachelor’s degree in addition to 24 hours of doctoral research and dissertation. Two tracks are available:

1. First Concentration: French or Spanish. A minimum of either 39 (Track I) or 45 (Track II) hours of French or Spanish courses beyond the bachelor’s degree is required, distributed as follows:

   400 level: A minimum of 6 hours of 400-level classes taken for the M.A. may be applied.
   500 level: A minimum of 21 (Track I) or 27 (Track II) hours must be taken. These must include French 516, 544 or Spanish 516 and 544.
   600 level: A minimum of 12 hours must be taken, exclusive of dissertation hours.

2. Second Concentration: A minimum of 18 (Track I) or 12 (Track II) hours beyond the bachelor’s degree, taken in the field of applied linguistics or in a second language, either French, German, Italian, Portuguese (Track II only), Russian or Spanish. For Track I, 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 (Track I) or 3 (Track II) hours of appropriate electives in English or French. Spanish students must take Spanish 421 or 425; 426; 512; and 9 (Track I) or 3 (Track II) hours of appropriate electives in English or Spanish. The student’s graduate advisor must approve the electives chosen.

3. Cognate Field. Six hours in graduate courses numbered 400 and above in a field outside the department 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 baccalaureate 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, McClure, Rotary fellowships).

   For additional courses, see Germanic and Slavic 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

431 Readings in Chinese Literature (3) Prereq: Mastery of intermediate-level Chinese or consent of instructor. May be repeated. Maximum 9 hrs.

451 Readings in Japanese Literature (3) Prereq: Mastery of intermediate-level Japanese or consent of instructor. May be repeated. Maximum 9 hrs.

471 Selected Topics in Asian Studies (3) Content varies. May be repeated. Maximum 9 hrs.

French

GRADUATE COURSES


411 French Literature of the 16th Century (3) Highpoints 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.


418 Survey of Francophone Literature (3) Examination of French literature outside metropolitan France; particularly Africa and Caribbean. Prereq: 300-level literature course.

420 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 speakers on contemporary topics. Stresses in-class contact rather than outside preparation. Prereq: Intermediate Composition and Conversation or French for Business. 2 hrs weekly.

425 Introduction to Descriptive Linguistics (3) Theory and practice of techniques of linguistic analysis in subfields of phonetics, phonology, morphology, syntax, semantics, pragmatics and historical linguistics; discussion of relevance to learning and teaching of foreign languages and to study of literary texts. Recommended prereq: 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.)
tts or equivalent. May be repeated with consent of department. Maximum 6 hrs.

549 Capstone Colloquium in Spanish (3) Integrative experience. Broad range of issues and topics that affect much of Spanish-speaking world and also involve those who specialize in Hispanic studies. Prerequisite: Aspects of Spanish and Spanish American Literature or equivalent.

461 Special Topics (3) Aspect of Hispanic literature, culture, linguistics, or foreign language pedagogy. Topics vary. May be repeated with consent of department. Maximum 6 hrs.

471 Latin American Civilization (3) Latin America's diverse heritage and major social and political institutions. Prerequisite: Aspects of Spanish and Spanish American Literature or equivalent.

473-47 Survey of Spanish American Literature (3,3) 473-47-Historical survey from Conquest to late 19th century. 474-Major literary movements, writers and works of 20th century. Prerequisite: Aspects of Spanish and Spanish American Literature or equivalent.

479 Social Protest Literature of Latin America (3) Analysis of literature as means of unmasking social ills that have traditionally beset Latin America: Indigenismo, Black literature, women writers, role of writer in Latin American society. Prerequisite: Aspects of Spanish and Spanish American Literature or equivalent.

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

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

512 Teaching a Foreign Language (3) Practical application of methods for teaching and evaluating basic language skills and cultural aspects through seminars, demonstrations, peer teaching, and observation of foreign language classes. Required of all M.A. and Ph.D. students holding Graduate Teaching Assistantships, except those whose previous training or experience warrants their being excused by department.

522 Advanced Communication Skills for Teachers and Other Professionals (3) Advancement of oral and written proficiency in Spanish through extensive use of authentic contemporary materials; class lectures and discussions; oral and written productions and reports. Especially recommended for graduate students, teachers and other professionals seeking to maintain or enhance high level communicative competency.

531 Old Spanish (3) Evolution of Spanish language from its origins through 15th century.

532 Medieval Spanish Literature (3) Spanish literature through 15th century.

533 Golden Age Prose (3) Wide range of prose fiction in Spain during 16th and 17th centuries. Moorish, picturesque, sentimental, pastoral and exemplary novels, and dialogues.

534 Don Quixote (3)

535 Golden Age Poetry (3) Garcilaso, Fray Luis de León, San Juan de la Cruz, Lope de Vega, Quevedo, and Góngora.

537 Golden Age Drama (3) Major dramatists of period: Lope de Vega, Tirso de Molina, Ruiz de Alarcón, Guzmán de Castro, Calderón de la Barca, Moreto, and Rojas Zorrilla.

540 Eighteenth- and Nineteenth-Century Spanish Literature (3) Major works from 18th- and 19th-century Spain. Content varies with regard to theme, genre or literary movement.


543 The 20th-Century Spanish Novel (3) Baroja, Azorín, Valle-Inclán, Pérez de Ayala, Cela, Delibes, Goytisolo, Matute, and at least one present-day novelist.

545 Modern Spanish Poetry (3) From Bécquer, Unamuno, A. Machado, Jiménez, Lorca, Guzmán, Aleixandre, and a contemporary, Celaya.

547 Modern Spanish Drama (3) Major playwrights of 20th-century Spain.

550 Techniques of Literary Analysis and Research Methods (3) Theoretical and critical essays on various techniques of literary analysis. Exploration of bibliographical and research materials.

551 Special Topics in Spanish or Spanish American Literature (3) May be repeated. Maximum 6 hrs.

552 Directed Readings (3)

554 Spanish American Colonial Literature (3) From pre-Columbian era through 18th century. Reading and analysis of selected works from Colonial Spanish American period and their Continental sources. Indigenous texts and authors.

558 Nineteenth-Century Spanish American Literature (3) From early nineteenth century to 1880. Content varies with regard to genre, theme, literary movements, or other aspects contributing to definition of Spanish American literature.


573 The Spanish American Novel: Chile and the River Plate Nations (3) Novels from Chile, Argentina, Uruguay and Paraguay. Modern world.


577 Spanish American Drama (3) Major playwrights of 20th-century Spanish America.

579 The Spanish American Short Story (3) Short stories by major writers in Spanish America from Romanticism to present day, theory and criticism of genre.

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

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

593 Independent Study (1-15) See College of Arts and Sciences. Letter grade or S/N/C.

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

621 Seminar in Spanish Literature (3) Topics vary in field of Peninsular literature. May be repeated with consent of department. Maximum 9 hrs.

631 Seminar in Spanish American Literature (3) Topics vary. May be repeated with consent of department. Maximum 9 hrs.

632 Seminar in Spanish American Literature (3) Topics vary. May be repeated with consent of department. Maximum 9 hrs.

635 Social Work

662 Russian

See Germanic and Slavic Languages

Small Animal Clinical Sciences

See College of Veterinary Medicine and Comparative and Experimental Medicine

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.

Charles Glisson, Acting Dean

Professors:

Bleich, M. H. (Emeritus), M.S. ............... Ohio State
Cetingok, M., Ph.D.......................... Washington (St Louis)
Fayer, C., Ph.D............................. Michigan
Fryer, Gideon W. (Emeritus), Ed.D......... Columbia
Glisson, C. A., Ph.D............................ Washington (St Louis)
Granger, Ben P. (Emeritus), Ph.D......... Brandeis
Hirayama, H., D.S.W ......................... Pennsylvania
McLarman, G. (Emeritus), M.S.S.W......... Tennessee
Mullineux, M. Kate (Emeritus), Ph.D...... Chicago
Novac, Ber M., D.S.W ....................... Tulane
Orten, J. D. (Emeritus), D.S.W .............. Alabama
Rubenstein, H., Ph.D........................ Chicago
Shatz, Eunice (Emeritus), Ph.D............. Brandeis

Associate Professors:

Bell, W. J., D.S.W......................... Tulane
Combos-Orme, Terri, Ph.D.................... Washington (St Louis)
Cruthirds, C. Thomas, D.S.W .............. Tulane
Dufes, Judith, Ph.D........................ Tennessee
Jennings, J., Ph.D........................... Michigan
Nugent, W., Ph.D............................ Florida State
Orme, J., Ph.D............................... Oregon
Spizuzza, 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
Collier, J. C., M.S.W....................... Tulane
Crawford, S., M.S.W....................... Texas
Davey, Timothy L., Ph.D.................... Florida State
Denby, Ramona, Ph.D....................... Ohio State
Egan, Marcia, Ph.D......................... Maryland
Jones, J. Ph.D............................... Bryn Mawr
Marley, Marsha, D.S.W...................... Tulane
Page, Timmy F., M.S.W...................... Western Michigan
Patterson, D., Ph.D......................... Utah
Roch, Cynthia, Ph.D........................ Washington (St Louis)
Rogge, Mary, M.S.W......................... Washington (St Louis)
Spaulding, E., Ph.D........................ Smith
Vickstaff, Susan, Ph.D...................... Alabama

Field Practice Coordinators:

Betz, Phyllis (Knoxville), M.S.S.W...... Tennessee
Balile, Meredith (Nashville), M.S.S.W.... Texas (Arlington)
Allen, Sandra (Memphis), M.S.S.W...... Tennessee

THE MASTER'S PROGRAM

The Master of Science in Social Work program prepares social workers to provide professional leadership in: 1) clinical social work practice and 2) social work management and community practice. These objectives are met through a curriculum requiring 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 at least one course in each of the following: economics, government or political science, human biology, sociology or anthropology, psychology, philosophy or the arts, or literature, or history. 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 work with substantial preparation in the social sciences.

Advanced Standing

The University of Tennessee College of Social Work has an advanced standing program. Admission to advanced standing requires: (1) a B.S.W. from an accredited program, (2) an overall undergraduate GPA of 3.0 or 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 College of Social Work.

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) and two seminars of field practice (12 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 non-thesis option. Students pursuing the thesis option receive six credit hours for successful completion.

3. Successful completion of a comprehensive exam or thesis defense.

4. An overall GPA of 3.0 or better on all graded courses and satisfactory performance in field.

The Professional Foundation Curriculum

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 improved 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 and 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 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 placement approach. Students are in field two days per week during the first year and three days per week second year.

First-year agency placements are selected to provide practice 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.

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 purpose of the doctoral social work education at the doctoral level is to foster the development of an attitude of scientific inquiry, knowledge of the scientific method, ability to extend the knowledge base of social work practice, and effective participation in leadership roles in social work education, research, and practice.

The emphasis of the doctoral program is upon:

- The analysis of direct intervention and social administration and of the interrelationships among each of them and their social policy, organizational, and community contexts.
- Research in 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.

Admission Requirements

The Ph.D. program is designed for students who have completed a master's degree in an accredited school of social work and have post-master's social work/social welfare experience. Applicants who do not meet these requirements, but believe they have equivalent credentials, should contact the Chair of Ph.D. program for further information regarding admissions criteria.

General Requirements

1. A minimum of 63 hours beyond the master's degree including: a) completion of 24 hours of required coursework, b) completion of 15 credits of advanced electives, at least 12 of which are taken outside the department, and 9 of those 12 related to the dissertation, and c) completion of at least 24 credit hours of dissertation research.

2. Completion of qualifying and comprehensive examinations.

3. Completion and defense of the dissertation.

Curriculum

The curriculum of the Ph.D. program consists of foundation coursework, electives, and dissertation research. The foundation curriculum consists of 24 hours of coursework in the history and philosophy of social work, issues in direct service and administration and planning, areas of practice, and research methodology and methodology change. Upon this foundation, students and their academic committees develop a plan of study consisting of coursework in Social Work and other departments of the University.

Typically, the foundation curriculum is completed and elective coursework begun during the first year of study, the elective requirement is completed and dissertation research begun in the second year of study, and dissertation research is continued in the third year of study. While it is generally expected that the coursework will be completed on a full-time basis, dissertation research can be completed on a planned part-time basis.

Specific courses required are 601, 602, 612, 613, 640, 650 and Statistics 531 and 532 or any two graduate level statistics courses approved by the Doctoral Program Chair.

Examinations

All doctoral students are required to pass a qualifying examination and a comprehensive examination. The qualifying examination covers the foundation curriculum. The comprehensive examination is administered by members of the doctoral committee and is designed for the student to demonstrate comprehensive knowledge of the major and cognate areas and the dissertation topic. In case of failure of either examination, the student may request a retake. The result of the second examination is final.

Financial Aid

Financial aid is available to qualified students in the form of fellowships, scholarships, and teaching and research assistantships. Graduate assistantships and other forms of assistance are awarded on the basis of merit and interest to applicants who are accepted into the Ph.D. program.

MINOR IN GERONTOLOGY

Graduate students in the College of Social Work may pursue a specialized minor in Gerontology. This interdepartmental/interdisciplinary minor gives the student an opportunity for combining the knowledge about aging in American society with their major concentration. Please refer to Human Ecology program for specific requirements.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S.S.W. and Ph.D. programs in Social Work are available to residents of the state of Arkansas; the Ph.D. to residents of Kentucky, Oklahoma, or West Virginia.

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

GRADUATE COURSES

NOTE: Graduate students majoring in fields other than social work are admitted to certain social work courses with the approval of the College of Social Work and the student's major professor.

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

501 Foundations of Social Work Practice I (3) Survey of history, mission, and identity of profession. Basic theory, values, and methods generic to social work practice at various systemic levels. Assessment, planning, communication, intervention, and evaluation skills. Prereq: Admission to College or consent of instructor. F

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

503 Foundations of Social Work Practice II (6) Generalist practice with individual, family, and small group systems. Ecological theory to frame understanding of such systems and their adaptation to environments. Various social work strategies pertaining to each client system. Prereq: 501 or consent of instructor. Sp

504 Foundations of Social Work Practice III (3) Basic theory, methods, problems, and strategies in implementing change within larger social systems: task groups, human service organizations, and community systems. Various practice roles: planner, program developer, supervisor, administrator, advocate and task group leader. Prereq: Completion of first semester of foundation or consent of instructor. Sp

505 Social Work Research (3) Research methodologies with respect to evolution and application to social work theory and practice. History, among other topics of probability, science; problem formulation; research design; ethics; instrument use and construction; data collection; analysis and reporting; and evaluation and utilization of research. Prereq: Admission to college or consent of instructor. Sp

526 Research in Social Work Research (3-6) Supervised practice in application of research methods to social work. Prereq: 506 and consent of faculty conducting investigation. May be repeated. Maximum 6 hrs. S/NC only. E

590 Graduate Seminar in Public Health (1) (Same as Public Health 509, Exercise Science 509, Nutrition 509, and Nursing 509.)

514 Human Behavior in the Social Environment I (3) Theories relating to individual, family, and group development while emphasizing relationships among biological, social, psychological, and cultural systems. Dynamics of behavior in context of social structures: race, ethnicity, social class, gender roles. Prereq: Admission to College or consent of instructor. F

515 Human Behavior and Social Environment II (3) Patterns of adaptive and maladaptive behavior, recognizing different theories, models, and criteria. Interactions among individuals, families, organizations, communities in maladaptive behavior: mental illness and abusive behavior. Prereq: 514 or consent of instructor. Sp

516 Social Welfare Policy and Services (3) Development of contemporary social policy at local, state, national, and international levels. Contribution of social work professionals to formal policy-making processes through macro and micro visions that are effective and through which aggregate social welfare services are proposed, authorized, financed, and programmed. Theories of complex social phenomena and the social work response to them. Prereq: Consent of instructor. F

520 Social Work and Oppression (3) Sources, dynamics, and impact of oppression in U.S. society as manifested in social/educational, economic, and personal experiences. Connections among various forms of oppression: racism, sexism, classism, and heterosexism. Forces which perpetuate such conditions. Prereq: Admission to College or consent of instructor. F

521 Clinical Social Work Practice with Individuals (3) Theories, knowledge, and skills for clinical practice with individuals from ecological perspective. Therapeutic processes and treatment strategies, incorporating content from psychodynamic and cognitive practice models. Specific client problems. Prereq: Completion of foundation or consent of instructor. F

523 Clinical Social Work Practice with Families (3) Concepts related to understanding and analyzing family dynamics and interactive patterns from perspective of major family therapy models. Techniques of treatment in terms of application to families with varied systemic and individual problems and to families from varied social and cultural backgrounds. Prereq: Completion of foundation or consent of instructor. F

525 Clinical Social Work Practice with Groups (3) Theoretical and historical approaches to social work groups and clinical principles supporting specific types of group work used in clinical practice and associated leadership responsibilities. Prereq: Completion of foundation or consent of instructor. Sp

526 Research for Assessment of Social Work Treatment (3) History and philosophies, conceptual-
phrases, techniques and methods in the practice and use of treatment research as applied to implemented and evaluation of direct services to clients. Prereq. Completion of foundation or consent of instructor. F, Sp

530 Seminar in Clinical Social Work (3) Topics in theory and practice of clinical social work practice with individuals, couples and families and groups. Prereq. Completion of foundation or consent of instructor.

532 Short-Term Treatment (3) Theory and practice of planned short term treatment, emergency treatment and crisis intervention. Prereq. Foundation or consent of instructor.

533 Social Work Treatment with Couples (3) Theories regarding contemporary marriage styles, problem areas in relationships, and application of treatment methods and skills for problem resolution. Prereq. Foundation or consent of instructor.

534 Social Work Treatment with Children and Adolescents (3) Examination of various treatment modalities for assessing and treating children and adolescents. Prereq. Foundation or consent of instructor.

535 School Social Work (3) Place of school as community institution and resource. Methods, processes, and techniques employed in school social work. Prereq. Foundation or consent of instructor.

541 Leadership and Management in Human Services (3) Management and leadership skills required in development and management of human services delivery systems. Issues regarding human resource management, resource allocation, strategic planning and organizational dynamics. Prereq. Completion of foundation or consent of instructor. F

543 Fiscal Management and Resource Development (3) Administrative decision-making related to financial planning and resource allocation in human service organizations. Knowledge and skills in budgeting, allocating, expenditure control, fundraising, grant writing, marketing, and evaluation. Prereq. Foundation or consent of instructor. F

547 Evaluation Research (3) History and philosophies, conceptual approaches, techniques and methods, and issues in practice and utilization of evaluation research as applied to development and evaluation of social work programs and services. Issues pertaining to strengths and limitations of various evaluation methods, microcomputer application of data, and measurement of program goals and objectives. Prereq. Completion of foundation or consent of instructor.

550 Seminar in Management and Community Practice (2-3) Topics in theory and practice of management and community practice. Prereq. Foundation or consent of instructor. May be repeated. Maximum 6 hrs.


552 Community Organization (3) Locality development, social planning and social action as practice models for development of resources to meet human needs. Prereq. Foundation or consent of instructor.

554 Substance Abuse (3) Survey and analysis of social, cultural, medical and psychological factors underly- ing alcoholism and drug abuse and addiction; recent research and treatment innovations. Prereq. Foundation or consent of instructor. Sp

556 Social Gerontology (3) Physical, psychological and social aspects of aging. Major social policies and programs. Prereq. Foundation or consent of instructor.

580 Field Practice (3) Instruction and supervision in social work practice. Prereq or coreq: 501. S/NC only.

581 Field Practice (3) Instruction and supervision in social work practice. Prereq or coreq: 580. S/NC only.

582 Field Practice (6) Instruction and supervision in clinical social work practice or management and commu-
the student's committee. A student's plan of study should follow one of the following approaches: Plan 1, 6 hours in one of the department's concentrations and 6 hours in a second area, including areas outside the department, subject to the approval of the student's committee; Plan 2, 12 hours in a special area of study approved by the student's committee and the department's Graduate Program Committee. Students are encouraged to prepare a paper synthesizing their knowledge of the concentration(s). Students who incorporate supervised field experience in their programs are encouraged to prepare a report based on those experiences that demonstrates their understanding of research, theory, and report writing. All students must take final written and oral examinations that include questions on their general coursework in theory and methods and on their special areas of study.

Subject to approval by the student's committee, up to 12 hours may be taken in courses outside the department for either program. THE DOCTORAL PROGRAM

Coursework

Twenty-four hours of coursework beyond the master's degree are required (exclusive of S/NC credits). Twelve hours of course credit in Sociology at the 600 level are required. Students who enter the program without the courses required for the M.A. degree (521, 531, Statistics 531) or their equivalents may take them as remedial work which does not apply to their residence. Students must complete Sociology 622, 534, 563, 633, or 696; 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 coevalist) 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 interdepartmental/interdisciplinary minor gives the student an opportunity for combining the knowledge about aging American society with his/her major concentration. Please refer to the catalog 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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>405</td>
<td>Sociology of Sport (3) Social meaning, organization, and process of sport. Prereq: 521 or consent of instructor.</td>
</tr>
<tr>
<td>414</td>
<td>Sociology of Health Care (3) Organization of health care facilities, patient-battist relationships, demographic characteristics, and prevalence of disease.</td>
</tr>
<tr>
<td>415</td>
<td>Sociology of Aging (3) How roles and statuses change with age in relation to major social institutions, impact that rapidly increasing number of older people has on society, effect of society on older people.</td>
</tr>
<tr>
<td>446</td>
<td>The Modern World System (3) Critical examination of capitalist world-system as social system, its coherence, boundaries, regions, member groups, cleavages, and patterns of conflict. Analysis of who gets what, why, and how in global political economy.</td>
</tr>
<tr>
<td>455</td>
<td>Society and Law (3) How laws and legal processes are affected by social change, social impact of legal sanctions, relations between law and social justice.</td>
</tr>
<tr>
<td>462</td>
<td>Population (3) Demographic factors and social structure; trends in fertility, mortality, population growth, migration, distribution, and composition; population policy.</td>
</tr>
<tr>
<td>464</td>
<td>Urban Ecology (3) Relation of humans to their urban environment; conservation and use of appropriate technology. (Same as Urban Studies 464.)</td>
</tr>
<tr>
<td>471</td>
<td>Sociolinguistics (3) (Same as English 471 and Linguistics 471.)</td>
</tr>
<tr>
<td>480</td>
<td>Flora and Fauna 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/NC only.</td>
</tr>
<tr>
<td>500</td>
<td>Thesis (1-15) P/NP only. E</td>
</tr>
<tr>
<td>502</td>
<td>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</td>
</tr>
<tr>
<td>504</td>
<td>Sociological Foundations of Political Economy (3) Survey of contemporary sociological theories of political economy, sources of political and economic power and conflict.</td>
</tr>
<tr>
<td>505</td>
<td>Foundations of Criminology (3) Critical overview of contemporary developments in criminology, theories of crime causation and theories of responses to crime. Prereq: 350 or equivalent.</td>
</tr>
<tr>
<td>507</td>
<td>Foundations of Social Psychology (3) Current and classical theoretical perspectives in social psychology.</td>
</tr>
<tr>
<td>510</td>
<td>Teaching Sociology (3) Art and craft of teaching sociology from curricular considerations through teaching techniques. May be repeated. Maximum 6 hrs.</td>
</tr>
<tr>
<td>521</td>
<td>Sociological Theory I (3) Assessment of what sociological theory is, its major figures and their approaches to understanding society.</td>
</tr>
<tr>
<td>531</td>
<td>Research Methods in Sociology (3) Research design, measurement, sampling, quantitative and qualitative data collection techniques, data, reduction, and analysis.</td>
</tr>
<tr>
<td>534</td>
<td>Advanced Sociological Analysis (3) Underlying assumptions and logical procedures used by sociologists in formulating explanations; foundations of sociological research strategies and techniques.</td>
</tr>
<tr>
<td>540</td>
<td>Occupations (3) Occupations in relation to individuals and society, technology, economic stratification, and social organizations.</td>
</tr>
<tr>
<td>541</td>
<td>Collective Behavior, Social Movements, Social Change (3) Basic theory and research on conditions of social unrest in human collectivities and efforts of collectives to change existing society.</td>
</tr>
<tr>
<td>542</td>
<td>Sociological Aspects of Sport (3) (Same as Sport Studies 542.)</td>
</tr>
<tr>
<td>543</td>
<td>Sociology of Development (3) Sociological theories and studies of development; modernization, colonialism, dependency; comparative impact of various development paths upon selected aspects of social structure and change.</td>
</tr>
<tr>
<td>551</td>
<td>Delinquency and the Social Structure (3) How study of delinquency and juvenile justice is affected by changing structures of childhood and adolescence, changing demographic and institutional influences, and changing views about responsibility and punishment.</td>
</tr>
<tr>
<td>560</td>
<td>Environmental Sociology (3) Systematic treatment of current research in environmental sociology. Social impact analysis and conflicts over environmental issues.</td>
</tr>
<tr>
<td>563</td>
<td>Demographic Techniques (3) Standard rates and measures of demographic variables, life table analysis, increment-decrement models, and survey techniques of population analysis.</td>
</tr>
<tr>
<td>580</td>
<td>Advanced Rural Sociology (3) (Same as Rural Sociology 580.)</td>
</tr>
<tr>
<td>591</td>
<td>Foreign Study (1-15) See College of Arts and Sciences.</td>
</tr>
<tr>
<td>592</td>
<td>Off-Campus Study (1-15) See College of Arts and Sciences.</td>
</tr>
<tr>
<td>593</td>
<td>Independent Study (1-15) See College of Arts and Sciences.</td>
</tr>
<tr>
<td>594</td>
<td>Social Theories of Sport (3) (Same as Physical Education 594.)</td>
</tr>
<tr>
<td>595</td>
<td>Special Topics in Rural Sociology (1-3) (Same as Rural Sociology 595.)</td>
</tr>
<tr>
<td>599</td>
<td>Readings (3) Selected topics. May be repeated. Maximum 6 hrs.</td>
</tr>
<tr>
<td>600</td>
<td>Doctoral Research and Dissertation (3-15) P/NP only. E</td>
</tr>
<tr>
<td>622</td>
<td>Sociological Theory II (3) Distinct schools of sociological theory and contributions of their principal exponents. Prereq: 521 or consent of instructor.</td>
</tr>
<tr>
<td>629</td>
<td>Supplementary Readings in Sociological Theory (3) Individual guidance. Preparation for comprehensive examination. Prereq: Consent of instructor. S/NC only.</td>
</tr>
</tbody>
</table>
633 Survey Design and Analysis (3) Systematic exploration of survey problems through student participation in design and analysis of survey. Prereq: 531 or consent of instructor. (Same as Child and Family Studies 633.)

638 Field Research (3) Research experience in selected field sites using techniques of interviewing, participant observation, and other methods of field research. Prereq: 531 or consent of instructor.

639 Supplementary Readings in Methodology (3) Individual guidance. Preparation for comprehensive examination. Prereq: Consent of department. S/N only.

643 Class Analysis (3) Critical analysis of theories and research on class structure and conflict.

644 Political Sociology (3) Critical examination of theories of state and political processes.

645 Advanced Studies in Political Economy (3) Topical seminar. Prereq: 504 or consent of instructor. May be repeated. Maximum 6 hrs.

649 Supplementary Readings (3) Prereq: Consent of department. May be repeated. Maximum 6 hrs. S/N only.

650 Social Policy (3) Intensive examination of selected topics in sociology of law. Prereq: 505 or consent of instructor.

655 Advanced Studies in Criminology (3) Intensive examination of selected topics in criminology. Recommended prior to 531. May be repeated. Maximum 6 hrs.

662 Urban and Regional Sociology (3) Historical and contemporary studies of urban and regional problems. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

665 Advanced Studies in Energy, Environment and Natural Resources Policy (3) Topical seminar covering particular lines of research and theory within area. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

675 Advanced Studies in Social Psychology (3) Selected contemporary research issues related to social psychological theories. Prereq: 541 or consent of instructor. May be repeated. Maximum 6 hrs.

695 Advanced Special Topics (3) Topic of special interest or student-initiated courses that will not be regularly offered. Prereq: Consent of department. May be repeated. Maximum 6 hrs.


GRADUATE COURSES

510 Humanities Perspectives in the Arts and Sciences (2) Seminar on nature of inquiry in humanities. Emphasis on nature and special forms of human experience and its interpretation through study of formative texts and critical figures.

520 Natural Science Perspectives in the Arts and Sciences (2) Seminar on nature of inquiry in physical and biological sciences drawing on history of science, critical figures in shaping of scientific thought, and methodology for observation and experimentation in natural sciences.

530 Social Science Perspectives in the Arts and Sciences (2) Seminar on nature of inquiry in social sciences. Emphasis on methodology for observation and research in study of human beings, their social environments and their behavior.

Spanish
See Romance and Asian Languages

Special Programs

(College of Arts and Sciences)

GRADUATE COURSES

510 Humanities Perspectives in the Arts and Sciences (2) Seminar on nature of inquiry in humanities. Emphasis on nature and special forms of human experience and its interpretation through study of formative texts and critical figures.

520 Natural Science Perspectives in the Arts and Sciences (2) Seminar on nature of inquiry in physical and biological sciences drawing on history of science, critical figures in shaping of scientific thought, and methodology for observation and experimentation in natural sciences.

530 Social Science Perspectives in the Arts and Sciences (2) Seminar on nature of inquiry in social sciences. Emphasis on methodology for observation and research in study of human beings, their social environments and their behavior.

Speech Communication

(College of Arts and Sciences)

John Haas, Head

Professors:
Julian, Faye D. (Liaisou), Ph.D. Tennessee
Lester, Lorayne W., Ed.D. Tennessee
Yeomans, G. Allan (Emeritus), Ph.D. Louisiana State

Associate Professors:
Ambrest, M. L., Ph.D. Ohio
Buckley, J. E., Ph.D. Northwestern
Cook, N. C., M.A. Alabama
Glenn, Robert W., Ph.D. Northwestern
Haas, John W., Ph.D. Kentucky

Assistant Professors:
Ambler, R. S., Ph.D. Ohio State
Arnold, Christina L., Ph.D. Florida

Graduate courses in Speech Communication provide opportunities for students in a variety of disciplines to investigate how oral language can effect changes in the knowledge, the understanding, the ideas, the attitudes, or the behavior of other human beings.

GRADUATE COURSES

420 Communication and Conflict (3) Communication as significant factor in development, management, and resolution of conflict at interpersonal, small group, organizational or societal levels.

425 Interpersonal Health Communication (3) Interpersonal communication in health care settings: provider client interactions, social support groups, stigma and disease, and contemporary models explaining use of health-related information.

440 Organizational Communication (3) Organizational setting and communication process that affect quality of human interaction both within and outside organizations.

465 Studies in Rhetorical History and Criticism (3) May be repeated. Maximum 6 hrs.

466 Rhetoric of the Woman's Rights Movement to 1890 (3) Historical and critical study of public address in campaign for women's rights in United States from 1830's through 1920's. (Same as Women's Studies 466.)

476 Rhetoric of the Contemporary Feminist Movement (3) Historical and critical study of rhetoric in campaign for women's rights in United States from 1940's to present. (Same as Women's Studies 476.)

500 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

633 Independent Study (1-15) See College of Arts and Sciences.
500 Graduation/Supervision in Sport (3) Development and analysis of strategies; development of contracts in sport business/organization: organizational, administrative, and supervisory strategies related to sport in profit and non-profit settings.

512 Application of Legal Concepts to Sport Settings (3) Policies, laws, and regulations that affect sport business/organization: organizational, administrative, and supervisory strategies related to sport in profit and non-profit settings.


523 Research Techniques in Sport (3) Evaluation, comparison, and contrast research techniques in sport with consideration for and experiences in inappropriate review, design, and analysis procedures, and proposal development.

532 Ethics in Sport Administration (3) Development of analytical, ethical, and knowledge desirable of legislature level managers in administration of sport business/organization: organizational, administrative, and supervisory strategies related to sport in profit and non-profit settings.

542 Theories of Leadership and Leader Behavior in Sport (3) Integration of various theoretical approaches to leadership styles in sport administration within cultural contexts, research, and field experiences.

553 Case Studies in Sport Administration (3) Current issues and problems in sport administration at all levels of professional, amateur, and professional level.

554 Readings in Sport Administration (3) Survey of pertinent literature in referred and applied journals and texts.


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.

580 Special Topics (1-3) Advanced study in selected disciplinary or professional areas of physical education and sport.

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

593 Independent Study (1-3) May be repeated. S/N/C only.

595 Internship (3) Full-time application of previous theoretical and applied knowledge and skills in appropriate sport setting. S/N/C only.

Dance

GRADUATE COURSES

410 Teaching Creative Dance for Children (2) Theory, methods, materials and practical experience in presentation and integration of creative dance in grades K-6; Mini-teaching experience.

415 Dance Through the 19th Century (3) Dance of various societies and culture from pre-history through 19th century.

416 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 Intercollege Graduate Program)

MAJORS

Statistics

M.S.

Business Administration

M.B.A., Ph.D.

William C. Parr, Head

Professors:

Bogdozian, Hamparsum, Ph.D. Illinois

Guey, Frank M., Ph.D. Florida State

McLean, Robert A. (Emeritus), Ph.D. Purdue

Mee, Robert W. (Liaison), Ph.D. Iowa State

Sanders, Richard D., Ph.D. Texas

Associate Professors:

Leinaker, Mary G., Ph.D. Kentucky

León, Ramón V., Ph.D. Florida State

Walker, Esteban, Ph.D. VPI

Younger, M. S., Ph.D. VPI

Graduate Assistant:

Henderson, Emily, M.S.

Additional Intercollegiate Program Faculty:

Bunting, Dewey, Arts and Sciences; Chatterjee, Arun, Engineering; Dessart, Don, Education; Dyer, Carl, Human Ecology; Fitzpatrick, Ben, Arts and Sciences; Fife, Henry, Agricultural Sciences and Natural Resources; Gant, William, College of Agriculture, the Computing Center, and the Medical Center. Statistics graduate students may be involved in teaching and 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 consultation experience by working with faculty involved in these consulting activities. All students are encouraged to participate in supervised internship and/or consulting activities as part of their graduate program.

Individuals with undergraduate or graduate degrees in other disciplines are encouraged to enter the program. The candidate’s mathematics background should include differential and integral calculus of several variables. Individuals with limited mathematics background should seek departmental guidance regarding specific ways in which they may prepare themselves for the program by taking coursework as non-degree students. Requests for 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 rmee@utk.edu or http://funnelweb.utc.utk.edu/~stat/programs.html.

Admission Requirements

General admission requirements for The Graduate School are stated beginning on page 12. Applicants for Statistics must submit results of the Graduate Record Examination (GRE) general portion, although GMAT exam scores may be substituted. Applicants for the statistics program must have completed at least two years of college-level mathematics, including the calculus of several variables and matrix algebra, and be proficient in a computer language. Applicants whose native language is other than English must submit results of the Test of English as a Foreign Language (TOEFL).

Curriculum

A minimum of 33 credit hours must be completed for the master’s degree. Required of all students are 6 hours in statistical methods, 6 hours in statistical theory, 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 Master’s Program

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.
The Intercollegiate Graduate Statistics Program (IGSP) is a formal University of Tennessee academic program established to enable students to earn either a minor or an M.S. in Statistics simultaneously with a master's or doctoral degree in another department. Approved coursework taken to meet doctoral requirements in the student's home department may also be credited toward the M.S. in Statistics. Similarly, approved coursework in statistics taken to meet the requirements for a master's or doctoral degree in another department may also count toward the minor in Statistics. The program is open to graduate students in all departments which have an approved program of coursework 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

IGSP Courses

Master's in home department, minor in Statistics

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 accepted by the IGSP Executive Committee. Students taking an M.S. in Statistics must pass the two-part comprehensive examination covering statistical theory and methods. Students taking a minor in Statistics in conjunction with a doctorate in another field must pass a written comprehensive examination in Statistics, constructed and evaluated by the student's Examination Committee. No formal comprehensive examination is required of students earning a Statistics minor along with a master's in another field beyond questions which the home department includes as part of the comprehensive examination for the master's degree.

General Admissions and Degree Requirements

1. The student's home department must have an approved 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. Students may enroll in a group 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 indicate a program change with the cooperating department 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 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

411 Introduction to Statistical Computing (3) Use of computer operating system commands and packaged programs for statistical analysis and file management. Not available for credit for statistics majors. Prereq: 201 or 251.


471 Random Processes and Probability Models (3) Functions of random variables, multivariate distribu-
677 Statistical Modeling (3) Modern techniques of statistical modeling: predictive, likelihood, Bayesian, and information-based model selection and evaluation paradigms. Application of techniques in various types of models for both continuous and discrete data modeling problems. Interactive computational tools. Prereq: 564 and 572 or consent of instructor.

679 Multivariate Statistical Modeling (3) Modern information-based techniques and model selection in multivariate analysis, informational tests of significance with multivariate data, multivariate analysis of variance, multivariate regression and variable selection, multiple cluster analysis, principal component analysis, factor analysis model, covariance structural models with latent variables, mixture-model cluster analysis. Prereq: Matrix algebra and 564, or matrix-based linear models with experience in interactive computing, or consent of instructor.

681 Special Topics in Probability (1-3) Presentation of specialized topics in probability and stochastic processes. May be repeated. Maximum 6 hrs.

683 Special Topics in Statistics (1-3) Presentation of specialized topics in statistics. May be repeated. Maximum 6 hrs.

691 Graduate Seminar in Applied Statistics (3) Reading of literature and discussion of open problems of importance to industry: design of experiments, modeling, process control, regression, and reliability. Prereq: Consent of instructor. S/C or letter grade.

Textile, Retail, and Consumer Sciences

(College of Human Ecology)

MAJORS

Textiles, Retailing and Consumer Sciences M.S. Human Ecology Ph.D.

Nancy B. Fair, Head

Professors:

Drake, Mary Fran, Ph.D. Penn State Denny, Kermit E., Ph.D. Tennessee Wadsworth, Larry C., Ph.D. NC State

Associate Professors:

Bhat, Gajanan, Ph.D. Georgia Tech Bresee, Randall R. (Liaison), Ph.D. Florida State Dyer, C. L. (Liaison), Ph.D., North Carolina Fair, Nancy B., Ph.D. NC State Fairhurst, Ann E., Ph.D. Oklahoma State

Assistant Professors:

Lee, Jinkook, Ph.D. Ohio State Reardon, James, Ph.D. North Texas

The Department of Textiles, Retail, and Consumer Sciences offers the master's degree with a major in textiles, retailing and consumer sciences, concentrations in textile science and in retail and consumer sciences. An interdisciplinary/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 program in Textiles, Retailing and Consumer Sciences prepares 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 sciences 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 Textiles, Retailing, and Interior Design 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 major in Textiles, Retailing and Consumer Sciences has concentrations in retail and consumer sciences and in textile science. Requirements are listed below.

Retail and Consumer Sciences (Thesis)

Major (Required RCS courses): 510, 511, 541, 550, 562, 590

Cognate Area

6

Statistics

6

Total

34

Retail and Consumer Sciences (Non-Thesis)

Major (Required RCS courses): 510, 511, 541, 550, 562

Cognate Area

6

Statistics

565 (Professional Paper/Project)

3

Electives

9

Total

36

Textile Science

RCS 552

3

Research Methods

3

T3 590

Textile Science courses

12

Cognate Area

6

Statistics

3

Total

34

1 Must include RCS 562 or equivalent; or 3 hours of laboratory techniques in materials analysis and characterization.
ACADEMIC STANDARDS

**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, 696, 752, 753, 757, 853, 970

- **Research Methods:** 590, 516, 615
- **Statistics:** 12-15
- **Cognate Area:** 9
- **Electives:** 31
- **Total:** 83-89

**Note:** Students must take a minimum of 9 hours at the 600-level in the College of Human Ecology, exclusive of courses taken during dissertation and records. Admissions and Records. For the Ph.D., see Human Ecology.

**Retail and Consumer Sciences**

**GRADUATE COURSES**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>500 Thesis (1-15)</td>
<td>P/NP only, E</td>
<td></td>
</tr>
<tr>
<td>502 Registration for Use of Facilities (3-15)</td>
<td>Required for the student not otherwise registered during any semester when the student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only, E</td>
<td></td>
</tr>
<tr>
<td>510 Retail Strategy and Decision Making (3)</td>
<td>Strategy, strategic management and management process in retail sector. Analytical decision-making skills in retail. Retail industry structure. International differences in retail systems. Prereq: Retail Management or equivalent.</td>
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</tr>
<tr>
<td>541 Retail Consumer Analysis (3)</td>
<td>How consumers make decisions and how retailers attempt to influence decisions by offering environment, image and selection coinciding with customers’ needs.</td>
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</tr>
<tr>
<td>550 Consumer Economics and Market Choices (3)</td>
<td>Economic framework for evaluating consumer behavior and consumer choice within market system. Theory of consumer preferences and decision making; consumption and demand models for individuals and households. International consumer economics, issues and policies. Prereq: Textiles and Apparel Economics, Mathematics 503 or equivalent. F,A</td>
<td></td>
</tr>
<tr>
<td>552 Economics of Textile Complex (3)</td>
<td>Economics consideration of U.S. textile complex. Quantitative 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</td>
<td></td>
</tr>
<tr>
<td>562 Research Methods (3)</td>
<td>Fundamentals of science method, advancement of science, methodology and method of research. Issues and concepts of basic and applied research. Prereq: Statistics 531 or equivalent. Sp</td>
<td></td>
</tr>
<tr>
<td>590 Research Seminar (1)</td>
<td>Research topics in retail and consumer sciences. May be repeated. S/NC only. F,Sp</td>
<td></td>
</tr>
<tr>
<td>593 Directed Study (1-3)</td>
<td>Individual problems in retailing and consumer sciences. Prereq: 9 hrs retailing and consumer sciences graduate coursework. May be repeated. Maximum 9 hrs.</td>
<td></td>
</tr>
<tr>
<td>595 Special Topics in Retail and Consumer Sciences (1-3)</td>
<td>Lecture, group discussion on specialized topics in retail industry structure, international retailing, consumer affairs, entrepreneurship, small business management, issues in retail management, issues in retail strategy, retail perception by consumer, 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.</td>
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<tr>
<td>600 Dissertation (3-15)</td>
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<td></td>
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<tr>
<td>616 Research Methods, Models and Measurement in Retail and Consumer Sciences (3)</td>
<td>Quantitative methods and analysis concepts in research process. Mathematical and statistical formulation of retail and consumer sciences phenomena, utilizing models, model building and measurement constructs. Prereq: 562, Statistics 538. Sp,A</td>
<td></td>
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<tr>
<td>625 Strategic Managerial Retailing (3)</td>
<td>Decision-making framework that integrates analytical and financial analysis of specific retail cases. Prereq: 510.</td>
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<td>641 Retail Consumer Behavior (3)</td>
<td>Theories and concepts from social science in relation to consumer behavior. Prereq: 6 hrs of sociology or psychology or consent of instructor.</td>
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<tr>
<td>651 The Consumer and Public Policy (3)</td>
<td>Public policy issues within consumer environments. Analysis or past and present policies within economic, social, legal and business frameworks. Implications of consumer issues and policy alternatives. Literature and research focus. Prereq: 550 or consent of instructor.</td>
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<tr>
<td>695 Advanced Topics in Retail and Consumer Sciences (3)</td>
<td>Lecture, group discussion, individual research on advanced 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.</td>
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**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 3 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. Twelve hours of other courses which may include up to 6 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.

**Textile Science**

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<td>510 Fiber Science (3)</td>
<td>Physical properties, mechanical properties and microstructure of Performance properties of bonded structures. Prereq: Organic chemistry or consent of instructor.</td>
<td></td>
</tr>
<tr>
<td>525 Fiber Science (3)</td>
<td>Chemical properties, mechanical properties and microstructure of Performance properties of bonded structures. Prereq: Organic chemistry or consent of instructor.</td>
<td></td>
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<tr>
<td>529 Optical Microscopy (4)</td>
<td>Basic compound and polarizing microscope for imaging. Optical property measurements and methods. Other optical microscopy. Prereq: Fundamentals of Physics: Wave Motion, Optics and Modern Physics or equivalent. F,A</td>
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<td>562 Research Methods (3)</td>
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<td>615 Retail and Consumer Sciences Literature and Thought (3)</td>
<td>Evaluation of retail and consumer sciences literature with emphasis upon recent developments of scholarly thought, and identification of potential areas of further study. Prereq: 562. Marketing 501, Economics 501. F,A</td>
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<td>616 Research Methods, Models and Measurement in Retail and Consumer Sciences (3)</td>
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The Department of Theatre offers the Master of Fine Arts degree with a major in 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 to the requirements for degrees conferred by The University of Tennessee, Knoxville. The graduate record Examination, 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

1. 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 committee 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 560, 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 520-21-22-23-24-25 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 MFA degree with approval of the student’s committee, the Dean of the College of Arts and Sciences, and the Dean of The Graduate School.

Any such credits applied from a previous graduate program would be from courses that are directly related to the student’s MFA curriculum and must have been earned within the time limit (5 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 concentrated areas such as style, techniques, approaches, e.g., Shakespeare, movement, humor. Prereq: Advanced Acting and consent of instructor. May be repeated. Maximum 6 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 I or consent of instructor. May be repeated. Maximum 6 hrs.

425 Musical Theatre Dance Techniques (2) 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 transcription and reproduction 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 cobbling. Prereq: 345 or consent of instructor.

446 Costume Pattern Making (3) Draping patterns for period costumes. Consty and study of historic patterns 1500-1900. Prereq: 345 or consent of instructor.

450 Advanced Scenic Technology I (3) Study and practice of theatre woodworking; production participation required. Prereq: 320. Graduate credit to theatre M.F.A. students only.

451 Advanced Scenic 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 Scenic 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 (2) Introduction to materials, techniques, and principles of craft. Gain skill and understanding through studio experience. Prereq: Consent of instructor.


456 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: 352 or consent of instructor.

464 Computer Assisted Design for Stage Lighting (3) Advanced techniques in computer-assisted design for stage lighting. Work with CAD and other stage-lighting software for preparation of lighting plots and associated paperwork. Prereq: Introduction to Lighting Design 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.

520-21-22-23-24-25 Master Classes in Acting (6,6,6,6,6,6) Master classes in acting techniques, voice, and movement. Theatre MFA students only.

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.


544 Milliner for the Stage (2) Pattern making and construction techniques for hats from antiquity to present. Prereq: Consent of instructor.
Veterinary Medicine
(College of Veterinary Medicine)

MAJOR
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-professional course requirements listed below. These may be completed by any accredited college or university that offers courses equivalent to those at The University of Tennessee. Knowledge of a veterinary curriculum requirements must be completed by the end of spring term of the year in which the student intends to enroll. Biochemistry requirements must have been satisfactorily completed within five years of the time the student wishes to enter the program.

<table>
<thead>
<tr>
<th>Subject Area</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>6</td>
</tr>
<tr>
<td>Humanities and Social Sciences*</td>
<td>18</td>
</tr>
<tr>
<td>Physics</td>
<td>8</td>
</tr>
<tr>
<td>General Chemistry</td>
<td>8</td>
</tr>
<tr>
<td>Organic Chemistry</td>
<td>8</td>
</tr>
<tr>
<td>Biochemistry**</td>
<td>4</td>
</tr>
<tr>
<td>General Biology</td>
<td>8</td>
</tr>
<tr>
<td>Genetics</td>
<td>3</td>
</tr>
<tr>
<td>Cellular Biology***</td>
<td>3</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>66</td>
</tr>
</tbody>
</table>

*May include, for example, courses in English literature, speech, 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 molecular or cellular 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 an intensive 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 the first year are clinical subjects of physical diagnosis and anesthesia. 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 one in which the individual student may select his or her courses of study. This allows students who have specific educational goals (such as advanced or dual degree programs) to enroll in all, 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 15 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 science and art of veterinary medicine, students receive instruction in paramedical subjects such as animal behavior, medical communication, professional ethics, jurisprudence, economics, and practice management.

The curriculum requires successful completion of 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 (host-parasite interactions, pathobiology, virology and immunology), Ecology and Evolutionary Biology (environmental toxicology), Public Health, and Comparative and Experimental Medicine. (Refer to other sections of this catalog for a full description of these programs.) The majority of the graduate students and graduate faculty of the College of Veterinary Medicine are involved in the Comparative and Experimental Medicine program. This program provides a wide spectrum of interdisciplinary training that prepares graduates for teaching and/or research careers in the health sciences.

PROFESSIONAL COURSES

811 Bacteriology and Mycology (4) Fundamental aspects of microbiology and cell biology relative to pathogenesis of bacterial and fungal diseases of animals: