Accounting and Business Law
(College of Business Administration)

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

Keith G. Stanga, Head

Professors:
Anderson, Kenneth E. (Distinguished Professor of Accounting), CPA, Ph.D. ................... Indiana
Fisher, Bruce D., LL.M. ... George Washington
Kiger, Jack E. (Warren L. Slagle Professor of Accounting), CPA, Ph.D. ............ Missouri
Reeve, James M. (Deloitte and Touche Professor), CPA, Ph.D. .......................... Oklahoma State
Roth, Harold P., CPA, Ph.D. .................... VPI
Woodroof, Jonathan B., CPA, Ph.D. .............. Texas

Associate Professors:
Behn, Bruce K., CPA, Ph.D. ...... Arizona State
Carcello, Joseph V., CPA, Ph.D. ....................... Georgia State
Murphy, Daniel, CPA, Ph.D. .... North Carolina
Townsend, Richard L., CPA, Ph.D. ............... Texas

Assistant Professors:
DeVries, Delwyn D., CPA, Ph.D. ................. Arizona State
Pennington, Robin R., CPA, Ph.D. ............. South Carolina

Fields of Instruction

THE MASTER OF ACCOUNTANCY PROGRAM

The objective of the MAcc program is to prepare individuals who have a high level of ability and motivation for successful careers in professional accounting and industry. This nationally recognized program uses active learning methods to engage students in global business planning, practices, and strategies. The program offers students the breadth of a broad business perspective and exposure to cutting-edge management issues. It also provides students with the technical depth required for a career in assurance services, information management, or taxation. Coursework includes a particular focus on the development of analytical skills, communication skills (both oral and written), and research skills.

The MAcc program is a full-time, weekday program. The nature of the program precludes students from simultaneously working full-time outside of classes. UT’s accounting undergraduate and graduate programs are accredited by AACSB International and are among the first programs in the nation to receive this accreditation.

Application Deadline
Students may begin graduate coursework for the MAcc degree only in Fall Semester. The application deadline is March 1 and applications received after that date will be considered as space allows.

Admission Requirements
The program is designed both for students who have completed an accredited baccalaureate degree program with a major in Accounting and others. Students with an accounting degree from an accredited baccalaureate degree program normally meet all prerequisites for the program. Students with outstanding undergraduate records in areas other than accounting may enter the MAcc program (which starts in the fall semester) by completing coursework in introductory accounting and economics, and the following prerequisite undergraduate courses: Accounting 311, 321, 411, 414, and 431, Information Management 341, and Finance 301 or their equivalents as approved by the Director of the MAcc program. In addition, students choosing the Information Management concentration must have completed Information Management 351 or an equivalent course in object oriented-programming. All prerequisites must be completed prior to the start of graduate coursework in fall semester.

In addition to the general admission requirements, MAcc applicants are required to take the Graduate Management Admission Test (GMAT) and submit information on forms provided by the Department of Accounting and Business Law. Applicants whose native language is not English must submit results of the Test of English as a Foreign Language (TOEFL).

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

Students will be expected to have a laptop computer for use in the classroom and for assignments. Additional details concerning the hardware and software configurations required are posted on the departmental web site.

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

Students take 12 hours each semester and 6 hours in the first summer session. Program requirements are:

Business Core (12 hours) Business Administration 521, 522, 523, 524
Accounting Concentration (18 hours)

Three concentrations are available:

- **Assurance Services**: Acc 507, 514, 518, 519, 531, and IM 541.
- **Information Management**: IM 442*, 541, 549, Acc 514, and two of the following: Statistics 583, Acc 507, Acc 518, Acc 519, Acc 521, or Acc 531.
- **Taxation**: Acc 531, 532, 533, 534, 539, and an additional course.

*Students who have taken this course as an undergraduate must substitute a course approved by the Director of the MAcc program for this course.

Students may further modify their programs with approval of the Director of the MAcc program.

Transfer Credits

A maximum of six semester hours taken at other AACSB accredited institutions that otherwise conform to the transfer policy of the Graduate Council may be credited toward M.Acc. degree requirements.

Other Requirements

To qualify for the degree, a student must maintain a B average (3.0) or above in the program. The student must satisfactorily demonstrate his/her ability to recognize, analyze, and solve accounting policy problems and integrate concepts from the various areas of accounting by passing a comprehensive written examination. This examination is included in the capstone courses in each concentration as follows: Accounting 519 Seminar in Business Risk and Assurance, Accounting 539 Multi-Jurisdictional Tax Planning and Policy, and Information Management 549 Systems Analysis and Design.

BUSINESS ADMINISTRATION CONCENTRATION

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

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

ACADEMIC STANDARDS

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

Accounting

GRADUATE COURSES

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

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

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

507 Financial Reporting Research and Contemporary Issues (3) Theory and practice of contemporary financial reporting issues are covered with an emphasis on researching the authoritative accounting literature. Specific contemporary issues covered vary each semester. Prereq: Admission to MAcc program or consent of instructor.

514 Information Systems Control and Audit (3) Security, integrity, and cost management-oriented risk analysis and control models for a variety of different business system platforms and applications. Centralized and distributed environments, intranets/extranets, electronic commerce, and enterprise systems. Prereq: IM 541.

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

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

521 Advanced Management Accounting (3) Analysis of management accounting and cost management practices and models. Topics include cost behavior, strategies and models for decision making, and performance measurement issues. Prereq: Management Accounting, and either admission to a graduate business program or consent of instructor

531 Tax Strategy, Tax Research, and Entity Taxation (3) Current issues in tax strategy including investment models, implied tax, arbitrage, organizational form, and other selected topics. Methods of researching tax issues within the U.S. federal tax system with emphasis on Web-based research tools. Income taxation of business entity operations. Prereq: Admission to MAcc program or consent of instructor.

532 Corporate Taxation and Reorganizations (3) Current issues in corporate taxation including organization and structure capital and structure - distributions, liquidations, acquisitions, and reorganizations. Course emphasizes group projects and presentations. Web-based research tools used extensively. Prereq: Admission to MAcc program or consent of instructor. Prereq or coreq: 531.

533 Taxation of Partnerships and S Corporations (3) Current issues in partnership and S corporation taxation including partnership formation, operations, allocations, and distributions; LLCs; S corporation election and operations; and comparisons of different flow-through entities. Course emphasizes group projects and presentations. Web-based research tools used extensively. Prereq: Admission to MAcc program or consent of instructor. Prereq or coreq: 531.

540 Multi-Jurisdictional Tax Planning and Policy (4) International and state tax law as it pertains to business transactions. Particular emphasis is placed on identifying tax planning opportunities and designing tax strategies to meet planning objectives. Prereq: 531 and either admission to MAcc program or consent of instructor.

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

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

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

611-12 Doctoral Seminar in Accounting (3.3) Analysis of issues reflecting contemporary literature. Prereq: Consent of Ph.D. program advisor.

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

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

693 Independent Study (3) Directed research in topic of mutual interest. Prereq: Admission to doctoral program with concentration in accounting. May be repeated. Maximum 6 hrs.

Business Law

GRADUATE COURSES

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

Advertising and Public Relations

(Majors in Communication and Information)

MAJOR DEGREES

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

Ronald E. Taylor, Director

Professors:

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

Hoy, Maria, Ph.D. ..................... Oklahoma State

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

Associate Professors:

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

Morrison, Margaret, Ph.D. ........... Georgia

Morrow, Jerry L., Ph.D. ............... Toledo

White, Candace L., Ph.D. ............. Georgia
Assistant Professors:
Fall, Lisa T., Ph.D. ....................... Michigan State
Hoelges, Michael, Ph.D. ............... Florida
McMillan, Sally, Ph.D. ................. Oregon
Riechert, Bonnie P., Ph.D. .......... Tennessee

The School of Advertising and Public Relations offers a concentration area for the master’s degree with a major in Communication and participates in the interdisciplinary doctoral program. See Communication and for additional information.

Advertising
GRADUATE COURSES
490 Special Topics (3) Topics vary; advanced media strategy, advanced creative strategy, direct marketing, and advertising and social issues.
510 Advertising and Society (3) Analysis of advertising as an institution in a free-enterprise democratic society and its relation to social, legal, cultural, and economic institutions.
520 Advertising and Communications Theory (3) Application of contemporary communications theories of attitude change, information-processing, and persuasion as applied to creative strategy decisions. Prereq: Consent of instructor or admission to program.
530 Advertising Research (3) Nature, scope, and applications of research function to advertising decisions. Development of segmentation, copy appeals, media strategy. Prereq: Statistics 201 Introduction to Statistics or equivalent.
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.
597 Independent Study (3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

Public Relations
GRADUATE COURSES
412 Opinion Writing (3) (Same as Journalism 412.)
416 Issues in Public Relations (3) Topics vary. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.
470 Public Relations Campaigns (3) Research, planning and communication and evaluation of major public relations campaigns. Oral and written presentation of public relations project from inception to completion. Extensive out-of-class work. Prereq: 320 Public Relations Communications and 370 Public Relations Cases or consent of instructor.
516 Seminar in Public Relations Issues (3) Topics vary. May be repeated. Maximum of 6 hrs.
520 Political Communications (3) (Same as Journalism 520.)
525 Public Opinion (3) (Same as Journalism 525.)
530 Fund Raising and Proposal Writing (3) History, philosophy and practice of philanthropy in U.S. Sources of funds from foundations, corporations and public agencies. Research and preparation of fund-raising proposals.
560 Publishing on World Wide Web (3) (Same as Journalism 560.)
571 Public Relations Management (3) Analysis and management of problems in communication between institutions and organizations and their publics. Measurement and evaluation of effectiveness of communication programs. Prereq: 470 or consent of instructor.
597 Independent Study (3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.
598 Internship (3) Professional work in public relations supervised by communications manager with faculty approval. No retroactive credit for previous work experience. Prereq: Completion of core curriculum.

Aerospace Engineering
See Mechanical, Aerospace, and Biomedical Engineering

Agricultural and Extension Education
(College of Agricultural Sciences and Natural Resources)
MAJOR
Agricultural and Extension Education ...... M.S.
Professors:
Waters, Randol G. (Liaison), Ph.D. ....................................... Penn State
Emeriti Faculty:
Lessly, Roy R., Ed.D. ...............Oklahoma State
Todd, John D., Ed.D. ..................... Illinois

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 Council and those stipulated by the department.

THE MASTER’S PROGRAM
Thesis Option
A candidate for the master’s degree who elects the thesis option must successfully complete:
1. A minimum of 30 hours of graduate credit in courses approved by the student’s advisory committee. Six hours of thesis may be counted toward this requirement.
2. A minimum of 20 hours of graduate credit in courses numbered at or above the 500 level.
3. A minimum of 12 hours of graduate credit in courses appropriate to the area of concentration taught in the department and a minimum of 6 hours taught from outside the department.
4. A minimum of 3 hours of graduate credit in coursework in either research methodology or statistics.
5. A final oral examination.

Non-Thesis Option
A candidate for the master’s degree who elects the non-thesis option must successfully complete:
1. A minimum of 36 hours of graduate credit in courses approved by the student’s advisory committee.
2. A minimum of 24 hours of graduate credit in courses numbered at or above the 500 level.
3. A minimum of 12 hours of graduate credit in courses appropriate to the area of concentration taught in the department and a minimum of 6 hours taught from outside the department.
4. A minimum of 3 hours of graduate credit in coursework in either research methodology or statistics.
5. A creative component designed by the student and approved by the student’s advisory committee for 3 hours of graduate credit.
6. A written and oral comprehensive examination.

GRADUATE COURSES
500 Thesis (1-15) P/NP only.
501 Creative Component in Lieu of Thesis (3) Capstone experience completed under supervision of major professor and committee. Individual project: literature survey; development of teaching software; development of curriculum materials; development of a white paper; or other suitable project. Prereq: Consent of major professor. Non-thesis majors only. 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.
511 Extension History, Philosophy and Objectives (3) Historical and philosophical foundation of adult education in American agriculture, key figures, issues, legislative movement, farmer organizations and programs. Cooperative Extension Service, origin, legislation and growth and nature of present-day objectives and programs. Prereq: 211 Foundations of Agricultural and Extension Education or consent of instructor.
521 Extension Program Planning and Evaluation (3) Theories and models of program development and evaluation and their use in extension education: planning and conducting needs assessments; planning, organizing, implementing and evaluating extension educational program content and learning activities; development and interaction of county, state and federal extension plans of work; and principles, techniques and instruments used to identify, gather and analyze information to evaluate extension programs. Prereq: 211 Foundations of Agricultural and Extension Education, 511, or consent of instructor.
522 Educational Technology in Agricultural and Extension Education (3) Advanced concepts and methods relevant to both formal and non-formal instructional methodologies. Processes by which professional change agents influence the introduction, adoption, and diffusion of technological change. Prereq: 436, 436 Student Teaching in Agricultural and Extension Education or consent of instructor.
524 Research Methodology (3) Social science research methods related to research in agricultural and extension education. Issues: research design, reliability and validity in measurement, sampling procedures, logic of analysis, scaling and measurement, and selection and interpretation of appropriate inferential tests of significance. Prereq: 436 Student Teaching in Agricultural and Extension Education, 511 or consent of instructor.
Agricultural Economics

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MAJOR DEGREES

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

D. L. McLemore, Head

Professors:

Brooker, J. R. (Liaison), Ph.D. ............... Florida State

Cross, T. L., Ph.D. .................... Oregon State

Eastwood, D. B., Ph.D. .................... Tufts

English, B. C., Ph.D. ..................... Iowa State

Garland, C. D., Ph.D. .................... Tennessee

Gerloff, D. G., Ph.D. ............... Texas A&M

Hall, Charles R., Ph.D. .......... Mississippi State

Jensen, K. L., Ph.D. .................... Oklahoma State

Klindt, T. H., Ph.D. .................... Kentucky

McLemore, D. L., Ph.D. ............... Clemson

Orr, R. H., Ph.D. ....................... Illinois

Park, W. M., Ph.D. .............. Virginia Tech

Rawls, E. L. Ph.D. ...................... Virginia Tech

Ray, D. E. (Blasingame Chair of Excellence), Ph.D. ............... Iowa State

Riley, J. B., Ph.D. ...................... Oklahoma State

Roberts, R. K., Ph.D. ............... Iowa State

Smith, G. F., Ph.D. .................... Tennessee

Associate Professors:

De La Torre Ugarte, D. G., Ph.D. ............... Oklahoma State

Tiller, K. H., Ph.D. ...................... Tennessee

Emeriti Faculty:

Barenhop, M. B., Ph.D. .................... Purdue

Badenhop, M. B., Ph.D. .................... Purdue

Cleland, C. L., Ph.D. .................... Wisconsin

Keller, L. H., Ph.D. .................... Kentucky

Leuthold, F. O., Ph.D. .................... Wisconsin

McManus, B. R., Ph.D. .................... Purdue

Martin, J. A., Ph.D. ....................... Minnesota

Mundy, S. D., Ph.D. .................... Tennessee

Pentecost, B. H., J. D. .................... Tennessee

Whatley, J. T., Ph.D. .................... Purdue

The Department of Agricultural Economics offers a program of graduate study leading to the M.S. degree. The M.S. program may be completed under a thesis option with a concentration in agricultural economics. A non-thesis option is available with concentrations in agricultural economics or agribusiness. For specific information, contact the department head.

THE MASTER'S PROGRAM

A candidate for the master's degree must complete a minimum of 30 hours of graduate credit in courses approved by the student's master's committee. At least 27 hours of graduate credit must be earned in courses numbered at or above the 500 level.

Agricultural Economics

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

In the non-thesis option, 24 hours in agricultural economics, 6 hours of economic theory, and 6 hours of quantitative methods are required. Each student must pass both written and oral comprehensive examinations.

Agribusiness

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

MINOR

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

MINOR IN ENVIRONMENTAL POLICY

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

Agricultural Economics

GRADUATE COURSES

412 Agricultural Finance (3) Macro-finance, financial objectives, acquisition of debt and equity funds, capital investments, capital allocation, credit analysis, borrower and lender loan application analysis, insurance strategies, computer applications, and sources of agricultural credit, and financial intermediary. Prereq: 212 The Agribusiness Firm and Economics 201 Introductory Economics.

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

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

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

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

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

(College of Agricultural Sciences and Natural Resources)

GRADUATE COURSES

491 International Experience in Agriculture and Natural Resources (1-15) Credit for formalized international experiences related to agricultural sciences and natural resources. Determination of credit based on nature of the proposed experience. Student should discuss the opportunity with their faculty advisor prior to the trip to determine if it is appropriate for credit. Credit hours will be determined by the department and college depending on the extent of activity and types of projects and/or presentations to be completed by the student upon return. Letter grade or S/NC.

507 Professional Development Seminar (1) Planning and executing graduate research programs; ethics and professionalism; graduate program procedures and resources. (Same as Animal Science 507, Biosystems Engineering 507, Biosystems Engineering Technology 507, Environmental and Soil Sciences 507, Food Science and Technology 507, and Plant Sciences and Landscape Systems 507.) S/NC only.

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

Animal Science

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

MAJOR DEGREES

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

Alan Mathew, Head

Professors:
Conatser, G. E., M.S. ..................Kentucky
Gill, W. W., Ph.D. .....................Kentucky
Goan, H. C., Ph.D. .....................Michigan State
Godkin, J. D., Ph.D. ....................Massachusetts
Kattes, H. G., Ph.D. ....................VPI
Kirkpatrick, F. D., Ph.D. ............. Tennessee
Lane, C. D., Ph.D. ...................... Tennessee
Meadows, D. G., Ph.D. ............... Texas A&M
Neel, James B., Ph.D. ............... Tennessee
Oliver, S. P., Ph.D. ........................Ohio State
Robbins, K. R. (liaison), Ph.D. ......Illinois
Rogers, Gary W., Ph.D. .......... North Carolina
Saxton, A., Ph.D. .......................... North Carolina

Associate Professors:
Grizzle, J. M., Ph.D. ....................Florida
Harper, F., Ph.D. ..........................Rutgers
Heitmann, R. N., Ph.D. ................Maine
Mathew, A. G., Ph.D. .................Purdue
Schrick, F. N., Ph.D..................Clemson
Smith, M. O., Ph.D. ....................Oklahoma State
Staider, Kenneth J., Ph.D. .........Iowa State
Waller, J. C., Ph.D. ...................Nebraska

Assistant Professors:
Edwards, J. L., Ph.D. .....................Florida
Pighetti, G., Ph.D. .......................Penn State
Richards, C. J., Ph.D. ..................Kentucky

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 animal genetics, animal health and well-being, animal management, animal nutrition, and animal physiology with orientation towards beef cattle, dairy cattle, swine, and poultry. The Ph.D. program offers areas of emphasis in animal genetics, animal health and well-being, animal nutrition, and animal physiology. For specific information, contact the department head.

It is recommended that all first-year graduate students enroll in 507 and 509. All first- and second-year students are required to enroll in 596 each spring term.

THE MASTER’S PROGRAM

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

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

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

THE DOCTORAL PROGRAM

The doctoral program requires a minimum of 48 semester hours of coursework beyond the B.S. and a minimum of 24 hours of doctoral research and dissertation. The 48 hours of coursework must include:
1. A minimum of 16 hours in related fields outside of animal science.

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.)

508 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.)

593 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.
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 their respective concentration or closely related area. Students in the management concentration must complete 12 hours at the 500 of 600 level in two non-management concentrations.

3. A minimum of 1 hour of Agriculture 512 in addition to that required at the M.S. level.

4. A minimum of 6 hours in 400-, 500-, or 600-level statistics courses approved for the ICGSP. A minimum of five faculty members will constitute the student’s advisory committee, of which at least one must be outside Animal Science. The major professor will be the chairperson. The student and the major professor select a program of study depending on the student’s area of concentration and professional goal. The advisory committee approves the coursework and the dissertation research. A minimum of 1 hour of Agriculture 512 is required. The dissertation promulgates and determines if there is to be a foreign language requirement. The advisory committee conducts the comprehensive written and oral examination and the final dissertation defense examination.

GRADUATE COURSES

420 Advanced Reproduction (3) Collection, evaluation, and preservation of ova, spermatozoa and embryos; application of methods of natural breeding and techniques of artificial insemination and embryo transfer; herd sire and dam evaluation; pregnancy determination; gestation and parturition; infertility; recent advances in theriogenology. Prereg: 320 or equivalent. 1 hr and 2 labs.

430 Nutrient Evaluation and Ration Formulation (3) Ration nutrient analysis and formulation for beef and dairy cattle, sheep, swine, poultry, laboratory, zoo, and companion animals. Mathematical and computer solutions and applications to formulating complex rations with constraints. Prereg: 330 Comparative Animal Nutrition or equivalent and introductory computer science course. 2 hrs and 1 lab.

481 Beef Cattle Production and Management (3) Integration of principles of nutrition, breeding, physiology, and management 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 response and economic returns. Comparisons made to small ruminant, forage-based production systems. Prereg: Completion of Animal Science sophomore and junior core courses or consent of instructor. 2 hrs and 1 lab.

482 Dairy Cattle Production and Management (3) Integration of principles of nutrition, breeding, physiology, and management 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. Comparisons made to small ruminant, forage-based production systems. Prereg: Completion of Animal Science sophomore and junior core courses or consent of instructor. 2 hrs and 1 lab.

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. Prereg: Completion of 300-level core courses or equivalent or consent of instructor. 2 hrs and 1 lab.

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. Prereg: Completion of 300-level core courses or equivalent or consent of instructor. 2 hrs and 1 lab.

500 Thesis (1-15) P/NP 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 for faculty time before degree is completed. May be repeated. S/NC only.

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

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


530 Animal Nutrition and Metabolism (4) Comparative digestive physiology, digestion, absorption and metabolism of nutrients in ruminant and nonruminant species. Concepts and methodologies of nutrient growth and nutrient requirements; interrelationships, availability and deficiencies of nutrients. Prereg: Animal Nutrition, Feeds, and Ration Formulation or consent of instructor.

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

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

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

571 Design and Analysis of Biological Research (3) Experimental design and procedures; selection of experimental units; analysis and interpretation of data; statistical models and contrasts, analyses of variance, covariates, treatment arrangement, mean separation and regression. Prereg: Plant Sciences and Landscape Systems 471 or equivalent; knowledge of software package on micro- or mainframe computers. (Same as Plant Sciences and Landscape Systems 571.)

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. Prereg: 571 or equivalent. 2 hrs and 1 lab.

596 Seminar (1) Advanced topics in animal science. Required of all first- and second-year Ph.D. students. May be repeated. Maximum 2 hrs.

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

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

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

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

652 Disorders of the Endocrine System (2) Pathological and physiological aspects of diseases; endocrine glands of various animal species. Prereg: 521 or consent of instructor. (Same as Comparative and Experimental Medicine—Veterinary Medicine 652.)

681 Advanced Topics in Animal Health and Well-Being (1-4) Recent advances and concepts, research techniques, and current problems associated with animal health and behavior. May be repeated. Maximum 6 hrs.

696 Seminar (1) Advanced topics in animal science. Required of all first- and second-year Ph.D. students. May be repeated. Maximum 2 hrs.

Animal Science—Veterinary Medicine

See College of Veterinary Medicine and Comparative and Experimental Medicine.

Anthropology

(College of Arts and Sciences)

MAJOR

DEGREES

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

Andrew Kramer, Head

Professors:

Faulkner, Charles H., Ph.D. ....................... Indiana
Harrison, Faye V., Ph.D. ............................ Stanford
Howell, Benita J., Ph.D. ............................ Kentucky
Jantz, Richard L., Ph.D. .............................. Kansas
Kippel, Walter E., Ph.D. ............................. Missouri
Kongsgaard, Lyle, Ph.D. ............................. Northwestern
Logan, Michael H., Ph.D. .......................... Penn State
Schroedl, Gerald F., Ph.D. ......................... Washington State
Simek, Jan F., Ph.D. ................................. SUNY Binghamton

Associate Professors:

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

Assistant Professor:

Qirko, Hector N., Ph.D. ............................ Tennessee

Instructor:

Jantz, Lee Meadows, Ph.D. ..................... Tennessee

Research Director:

Driskell, Boyce, Ph.D. .............................. Kentucky

Research Associate Professor:

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

Research Assistant Professors:

Elam, J. Michael, Ph.D. .......................... Missouri
Frankenberg, S. (Curator), Ph.D. .......... Northwestern
Sherwood, Sarah C., Ph.D. ..................... Tennessee
The Department of Anthropology offers both the M.A. and Ph.D. degrees with concentrations in archaeology, biological anthropology, cultural anthropology, and zooarchaeology. Additional information on the Anthropology graduate program may be obtained from the departmental brochure or by contacting the Anthropology Department.

THE MASTER'S PROGRAM

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

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

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

M.A. Requirements

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

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

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

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

3. During the first year, comprehensive Graduate Evaluation Examinations (GEEs) are required of all M.A. students and are based on the content of the core courses. These examinations are given during regularly-scheduled final periods in each core class and are graded by all faculty within the appropriate subfield 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 in the GEE examinations.

4. All M.A. students must attend the graduate section of the visiting lecturer program. To insure compliance with this requirement, each student is required to register for one credit hour of Anthropology 550 in the fall semester of each year and fulfill all requirements for the course as defined by the instructor. Materials covered by visiting lecturers may appear on the GEE.

5. A graduate-level introductory statistics course, usually Statistics 537.

6. In the second year of the program, students will engage in one full semester of research and undertake thesis research. Coursework will be determined through consultation with the student’s advisor and committee (composed of the advisor and at least one other member of the Anthropology faculty along with other mutually-agreed upon members).

7. Successful completion of the thesis and final oral examination. Normally, students will complete and defend their theses during the Spring semester of their second year.

8. Two copies of the thesis are required by the Office of Graduate Student Services. In addition, bound copies of the thesis as to be provided to the department and to all members of the student’s M.A. committee.

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

Admission to the Ph.D. program is based upon the applicant’s academic record and credentials, between 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 should contact directly with the potential chairperson and two additional members of the anthropology faculty who will be asked to serve on the committee.

APPLICATIONS TO THE PH.D. PROGRAM

Applicants to the Ph.D. degree program should meet the same academic standards as M.A. program applicants and furnish the same materials (see The Master’s Program). Admission to the program requires either:

1. Acceptance of a master’s degree in anthropology;
2. Acceptance of a master’s degree in another discipline, with the provision that the student will follow the first-year program with entering M.A. students, i.e., complete the core courses (510, 560, 590) and pass the Graduate Evaluation Examinations.

Doctoral Committee: A doctoral committee is appointed following admission to the program. In consultation with this committee, the student defines the future program of study. 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 also possible, but no later than one full semester after admission, can the student submit a statement of 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 Council, including at least nine hours of 500- or 600-level courses outside of anthropology, chosen in consultation with the doctoral committee, particularly the outside member who represents the cognate area. Outside coursework may be taken in a single discipline or be distributed across two or more disciplines as appropriate to the individual’s program of study.

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

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

1. Successful performance on a language examination administered by the appropriate language department. A student electing this alternative should consult with the advisor; or

2. Completion of the second semester of specialized reading courses for graduate students with a grade of B or better.

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

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

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

Admission to Candidacy: Upon successful completion of the comprehensive exam and with the (oral or written) approval of the Dean of Graduate Studies, 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.

GRADUATE COURSES

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

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

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

413 Dynamics of Culture (3) Major forms of culture change, ranging from evolution and diffusion to religious revitalization and political revolt. Continuity and change in diverse cultural settings through use of archaeological, ethnohistorical, and contemporary cases. Prereq: 130 Cultural Anthropology or consent of instructor.

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

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

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

435 Historical Archaeology Laboratory (3) Laboratory procedures for processing, identification, and interpretation of artifacts from historical sites. Artificial material from historic East Tennessee sites used for class projects. Recommended prereq: Historic Archaeology.

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

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

463 Rise of Complex Civilizations (3) Development of complex societies in Old World from origins of agricultural economics to rise of States. Mesolithic, Neolithic, and Bronze 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 subsistence and culture. Identification and interpretation of archeologically derived mollusk 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: Historical Archaeology.

480 Human Osteology (4) Intensive examination of human skeleton. Prereq: 110 or 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; and cultural behavior. Application of primate studies to human ethology. Prereq: 110 or consent of instructor.

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

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

502 Registration for Use of Facilities (1-15) Required for the semester student is registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. Maximum 9 hrs.

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

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

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

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

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

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

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

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

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

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

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

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

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


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

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


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

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

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

(College of Architecture and Design)

MAJOR

DEGREE

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

Marleen K. Davis, Dean
Max A. Robinson, Director
Jon P. Coddington, Graduate Program Head

Professors:

Kelso, R. M., M.S. ................. Tennessee
Kinzy, S. A., Ph.D. ............... SUNY (Buffalo)
Lizon, P., Ph.D. ....................... Pennsylvania
Moffett, M. S., Ph.D. ........................ MIT
Rabun, J. S., M.A. ....................... Texas
Robinson, M. A., M.Arch. ......... Pennsylvania
Shell, W. S., M.S.Arch. .......... Columbia
Watson, J. S., M.Arch. .......... Pennsylvania

Associate Professors:

Coddington, J., M.Arch. ........ Pennsylvania
Davis, T. K., M.Arch. .............. Cornell
Debellius, C., M.Arch. .............. Harvard
Drisin, A., MdesS ..................... Harvard
Fox, L. D., M.Arch. ..................... Cranbrook
Jacobs, Becky, J.D.
Martella, W. E., B.Arch. .............. California
Moor-McCleen, T. W., M.Arch. .......... Michigan
Schimmenti, M. M., M.Arch. .... RWTH (Aachen)
Stach, E., IPMA .................... Bauhaus
Thurlow, A., M.Arch. .......................... Columbia
Ware, S. M., M.F.A. ......................... Tennessee

Emeriti Faculty:

Conley, G., B.Arch. ...................... Harvard
Kaplan, M., M.Arch. ........................ Harvard
Lauer, W. J., M.S.Arch.Engr. .......... Iowa State
Lester, A. J., M.Arch. ....................... Virginia
Rudd, J. W., M.A. ........................... Northwestern

MARTIAL 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. Contact the Graduate Program Head for additional information.

Admission Requirements

In addition to meeting the Graduate Council’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 an accredited college or university is required. International applicants must have an equivalent 4-year degree and a GPA more 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 an essay and three letters of recommendation. A personal on-site interview is desirable but not mandatory. For those applicants from accredited 4+2 architecture programs, a portfolio is required in addition to the above requirements.

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

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

Degree Requirements

Track 1 requires a minimum of 48 semester hours of undergraduate preparation and 60 semester hours of graduate coursework, taking approximately 3 ½ 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. Student’s progress will be reviewed each semester by the Graduate Program Head. Any questions regarding progress will be reviewed by the Graduate Program Advisory Committee.

For further information, contact the School of Architecture.

GRADUATE COURSES

403 Introduction to Preservation (3) History, theory, and legal aspects of architectural preservation and restoration.

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

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

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

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

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

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

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

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

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


420 American Architecture, 1860-1940 (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 East 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. May be repeated. Maximum 12 hrs.

432 Computer Applications in Design II (3) Advanced computer aided design using three-dimen- sional modeling software, Design analysis using computer animation, rendering techniques, visualization, and animation. Prereq: Computer Applications in Design I or consent of instructor.
526 Directed Readings in Architecture (3) Readings on topics of interest: primary texts, history, theory, urban issues, technology and professional practice. Prereq: Consent of instructor. May be repeated. Max. 9 hrs.

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

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

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

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

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


591 Foreign Study (1-9)

592 Off-Campus Study (1-9)

593 Independent Study (1-9)

THE MASTER'S PROGRAM

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

1. A detailed letter of intent including statement requesting assistantship, if desired.
2. Three letters of recommendation from former professors or professionals in the field.
3. An undergraduate major in art or evidence of equivalent proficiency.
4. A portfolio to be evaluated by the faculty.

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

The Master of Fine Arts is the terminal degree in studio art. It is offered in the concentration areas of ceramics, graphic design, drawing, media arts, painting, printmaking, and sculpture.
Art as (1) a minimum enrollment of 6 hours per semester and (2) use of School of Art facilities so that students are available for discussion and criticism.

The candidate’s committee will consist of a minimum of 3 members and a maximum of 6 members and will be appointed prior to registration for 589. The committee must consist of one faculty member from the candidate’s concentration area (designated as chairperson) and a faculty member from outside the concentration area. The inclusion of an Art History faculty member on each committee is encouraged.

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.

GRADUATE MINOR IN THE HISTORY OF ART
A graduate minor in Art History may be arranged during the student’s first semester of study with the consent of the student’s area instructors and the Art History faculty. Students must complete a minimum of 12 hours in Art History that is agreed upon by the Art History faculty after review of previous undergraduate coursework. A reading knowledge of French, German, or Italian is a prerequisite, unless waived by the Art History faculty. Graduate Council policy stipulates that a member from the minor unit must serve on the thesis committee.

Art

GRADUATE COURSES
481 Museology I: Museums, Purpose and Function (3) Development of museums of art, history, and applied science. (Same as Anthropology 481.)
482 Museology II: Exhibition Planning and Installation (3) Exhibition planning and implementation. Exhibition design and installation techniques. Publicity, production, mounting and framing, shipping and storage. Prereq: 481 or consent of instructor. (Same as Anthropology 482.)
484 Museology III: Field Projects (1-12) Special field projects: restoration, preservation, registration, and other related research on or off campus. Prereq: 481 and 482 or consent of instructor. Maximum 12 hrs. (Same as Anthropology 484.)
499 Special Topics (3) Student- or instructor-initiated course offered at convenience of department. May be repeated. Maximum 12 hrs.
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.
507 Professional Practices: Teaching Internship (1) Individual study in development of skills and methodology in teaching studio courses. For students who are not GTAs. Prereq: Consent of instructor. May not be used toward degree requirements. May be repeated. S/NC only.
591 Foreign Study (1-15) See College of Arts and Sciences.
592 Off-Campus Study (1-15) See College of Arts and Sciences.
593 Independent Study (1-15) See College of Arts and Sciences. Prereq: Consent of instructor.
595 Visiting Artist Seminar (2) Contemporary art issues by different visiting artists. May not be used toward art history requirement. May be repeated. Maximum 8 hrs.

Art Ceramics

GRADUATE COURSES
424 Ceramics: Clays and Glazes (3) Clay chemistry, clay bodies, glaze theory and calculation. Formulating, mixing and testing of clay bodies and glaze formulas. Prereq: Ceramics: Portfolio Review.
429 Ceramics: Special Topics (3) Student- or instructor-initiated course offered at convenience of department. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.
521 Graduate Ceramics I (2-5) May be repeated. Maximum 10 hrs.
525 Graduate Ceramics II (2-5) May be repeated. Maximum 10 hrs.
593 Independent Study (1-15) See College of Arts and Sciences. Prereq: Consent of instructor.
595 Visiting Artist Seminar (2) Contemporary art issues by different visiting artists. May not be used toward art history requirement. May be repeated. Maximum 8 hrs.
599 Projects in Lieu of Thesis (10) Prereq: All graduate course work and successful second year evaluation by graduate faculty. May be repeated. Maximum 20 hrs. S/NC only.

Art Design/Graphic

GRADUATE COURSES
405 Computer Enhanced Graphic Design (3) Exploration of new technologies and the significance to graphic design. Prereq: 351 Intermediate Graphic Design I, 356 Graphic Design Production with a grade of C or better and consent of instructor. May be repeated. Maximum 12 hours.
451 Advanced Graphic Design (3) Theory and techniques of visual problem-solving as applied to advanced applications of graphic design. Prereq: Intermediate Graphic Design II with a grade of C or better. 452 Graphic Design Seminar (3) Development of design and professional issues—politics, economics, and ethics for graphic designer. Culminates in student-initiated project. Prereq: 451 with a grade of C or better.

453 Advertising Illustration (3) Media and techniques as applied to advertising illustration. Prereq: Black and White Illustration and successful completion of any portfolio review.
454 Editorial Illustration (3) Media and techniques as applied to editorial illustration for books, magazines, and newspapers. Prereq: Black and White Illustration and successful completion of any portfolio review.
456 Graphic Design Practicum (3-12) Practical work experience in graphic design field. Only by rearrangement with department. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.
459 Special Topics in Graphic Design (3) Student- or instructor-initiated course offered at convenience of department. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.
550 Studies in Graphic Design/Illustration History (3) Design and illustration ca. 1850 to present. Prereq: M.F.A. candidate or consent of department. May be repeated. Maximum 6 hrs.
551 Graphic Design I (2-6) May be repeated. Maximum 10 hrs.
552 Graphic Design II (2-6) May be repeated. Maximum 10 hrs.
553 Computer Enhanced Design (2-6) Prereq: Consent of instructor. May be repeated. Maximum 10 hrs.
593 Independent Study (1-15) See College of Arts and Sciences. Prereq: Consent of instructor.
595 Visiting Artist Seminar (2) Contemporary art issues by different visiting artists. May not be used toward art history requirement. May be repeated. Maximum 8 hrs.
599 Projects in Lieu of Thesis (10) Prereq: All graduate course work and successful second year evaluation by graduate faculty. May be repeated. Maximum 20 hrs. S/NC only.

Art Drawing

GRADUATE COURSES
419 Special Topics in Drawing and Painting (3) Student- or instructor-initiated course offered at convenience of department. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.
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. Prereq: Consent of instructor.
595 Visiting Artist Seminar (2) Contemporary art issues by different visiting artists. May not be used toward art history requirement. May be repeated. Maximum 8 hrs.
599 Projects in Lieu of Thesis (10) Prereq: All graduate course work and successful second year evaluation by graduate faculty. May be repeated. Maximum 20 hrs. S/NC only.

Art History

GRADUATE COURSES
403 History of Photography (3) Survey of history of photography from introduction of daguerreotype and calotype to more recent trends. Aesthetics and use of photography as medium for artistic expression.
411 Art of South and Southeast Asia (3) Survey of art and architecture of Indian subcontinent and Southeast Asia from 200 B.C. to 20th century. Major achievements of each period in religious, political, and social contexts.
415 Art of China (3) Survey of art and architecture of China from neolithic period to 20th century. Major achievements of each period in religious, political, and social contexts.
419 Art of Japan (3) Survey of art and architecture of Japan from neolithic period to 20th century. Major achievements of each period in religious, political, and social contexts.
425 Early Christian and Byzantine Art to 1350 (3) Art in Italy and the Eastern Empire from the beginnings of Christian art to c. 1350. Mosaic and painting, sculpture and architecture. Writing-emphasis course. (Same as Judaica Studies 425.)
431 Medieval Art of the West, 800-1400 (3) Western European art of the “Dark Ages,” Romanesque, and Gothic periods. Writing-emphasis course. (Same as Judaic Studies 431.)
441 Northern European Painting, 1350-1600 (3) From courtyard art of late Middle Ages to Northern Renaissance. Jan van Eyck, Roger van der Weyden, and Durer; early printmakers. Writing-emphasis course.
442 Art of Northern Europe, 1600-1675 (3) Concentrated study of Bruegel, Rubens, Rembrandt, Georges de la Tour, Vermeer, Poussin, and Hals. Writing-emphasis course.
453 Art of Southern Europe, 1575-1700 (3) Concentrated study of Caravaggio, Bernini, and Italian Baroque developments in all media. Spanish Baroque painting and sculpture; Velazquez. Writing-emphasis course.
454 Renaissance and Baroque Theory (3) Theory of Western art in early modern period: development and evolution in European Art during Renaissance and Baroque periods. Prereq: 172 and 173 Western Art, or consent of instructor.
461 Art of Southern and Eastern Africa (3) Art traditions of eastern and southern regions of Africa. Sculpture, painting, pottery, textiles, architecture and human adornment. Some ancient Stone and Iron Age traditions. Diverse ethnic and regional art traditions practiced in the area from 19th century to present. (Same as African and African American Studies 461.)
462 Art and Archeology of Ancient Africa (3) Historical nature of art traditions of sub-Saharan Africa. Prehistoric rock paintings; art from archaeological sites and ancient kingdoms. First and second millennia B.C. for early terracotta sculpture and rock paintings, 11th through 19th centuries A.D. for later ancient kingdoms. (Same as African and African American Studies 462.)
463 Arts of the African Diaspora (3) Aesthetic, philosophical and religious patterns of African de-scent found in the Caribbean and United States. Full range of art forms: sculptural and performance traditions, architecture, textile, basketry and pottery art forms. (Same as African and African American Studies 463.)
471 History of North American Art (3) Landmarks in painting, architecture, sculpture, and design from prehistory to 1900.
472 History of 20th-Century American Art (3) Developments 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) Development of Modern and Post-Modern movements in Europe. Investigation of progression of abstraction through more recent conceptual trends. Analysis of work of individual artists such as Picasso, Matisse, and others.
479 Special Topics in Art History (3) Student- or instructor-initiated course offered at convenience of department. May be repeated. Maximum 12 hrs.
483 History of American Sculpture (3) American sculpture from prehistory to 1960’s.
485 History of Printmaking (3) Prints from 15th century to present. 20th century in Europe and U.S. Prereq: 172 and 173.
489 Studies in Art History (3) Concentration in individually selected area. Prereq: Consent of instructor. May be repeated. Maximum 8 hrs.
516 Graduate Watercolor II (3) Advanced watercolor, individual approaches. Prereq: Watercolor III. May be repeated. Maximum 10 hrs.
517 Studies in Medieval Art (3) Art and architecture of Middle Ages: major monuments from Byzantium or western Europe. Prereq: M.F.A. candidate or consent of instructor. May be repeated with consent of department. Maximum 6 hrs.
521 Studies in Italian Renaissance Art (3) Art and architecture of 14th, 15th, and/or 16th centuries in Italy. Early or High Renaissance or Mannerist periods. Prereq: M.F.A. candidate or consent of instructor. May be repeated with consent of department. Maximum 6 hrs.
523 Studies in Baroque Art (3) 17th-century art and architecture: major artists and works from southern or northern Europe. Prereq: M.F.A. candidate or consent of instructor. May be repeated with consent of department. Maximum 6 hrs.
531 Photography I (3) Orientation to contemporary photographic problems and techniques. Prereq: 231 and 331. May be repeated. Maximum 12 hrs.
532 Photography II (3) Advanced photography: individual projects. Prereq: Photography I and consent of instructor.
533 Special Topics in Media Arts (3) Student- or instructor-initiated course offered at convenience of department. May be repeated. Maximum 12 hrs.
541 Digital Photography II (4) Continuation of exploration and implications of use of computer in photography. Prereq: Digital Photography I and consent of instructor.
542 Large Format Photography II (4) Studio course that continues exploration of use of large format camera in photography. Prereq: Large Format Photography I and consent of instructor.
551 Photography I (2-6) May be repeated. Maximum 10 hrs.
552 Photography II (2-6) May be repeated. Maximum 10 hrs.
553 Media Arts I (2-6) May be repeated. Maximum 10 hrs.
556 Media Arts II (2-6) May be repeated. Maximum 10 hrs.
577 Studies in Media as Art (3) Selected topics in theory and history of media as art form. May be repeated. Maximum 9 hrs.
579 Special Topics in Drawing and Painting (3) Student- or instructor-initiated course offered at convenience of department. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.
599 Projects in Lieu of Thesis (10) Prereq: All graduate course work and successful second year evaluation by graduate faculty. May be repeated. Maximum 20 hrs. S/NC only.
Art Printmaking

GRADUATE COURSES

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

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

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

469 Special Topics in Printmaking (3-6) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 12 hrs.

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

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

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

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

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

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

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

Art Sculpture

GRADUATE COURSES

441 Advanced Sculpture (3-6) Individual development of sculptural problems and techniques. Students work independently while participating in group projects, critique, and discussion. Prereq: 6 hours of 300 level sculpture. May be repeated. Maximum 12 hrs.

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

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

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

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

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.
Admission to the aural habilitation concentration is competitive and applications will be processed during the first year of graduate study. The concentration requires: (1) Three semesters of clinical practicum in treatment of children who have hearing impairments, totaling a minimum of 130 clock hours, and (2) completion of 6 hours of graduate level courses in language, audiology, and/or aural habilitation. Specific requirements are outlined in the Graduate Handbook for Audiology and Speech-Language Pathology, as well as on the Departmental web site (http://web.ukt.edu/~aspweb/).

DOCTORAL PROGRAMS

The Doctor of Audiology (Au.D.) program is designed to prepare individuals for professional careers in audiology. The degree program is clinically oriented, with primary emphasis on processes involved in hearing, vestibular function, and communication. The program is designed to meet the entry-level requirements for the practice of audiology established by the Council on Academic Accreditation of the American Speech-Language-Hearing Association. Students will be expected to demonstrate competencies in the following areas:

1. Prerequisite knowledge and skills for the practice of audiology.
4. Evaluation of auditory, vestibular, and related communication disorders.
5. Treatment of auditory, vestibular, and related communication disorders.

The program will normally consist of four calendar years of study beyond the baccalaureate degree with the first three years being devoted primarily to formal coursework and the last year to a full-time externship in the practice of clinical audiology.

The program is a minimum of 112 semester hours, including a minimum of:
- 1. 67 semester hours of academic coursework at the 500- and 600-levels.
- 2. 3 semester hours of directed research in audiology, vestibular, or related communication disorders.
- 3. 24 semester hours of clinical practice in audiology.
- 4. 18 semester hours of externship in audiology (6 hours per semester for 3 semesters).
- 5. A comprehensive examination.

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, 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 topics of related interest;
  c. 2 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.

GRADUATE COURSES

431 Stuttering (3) Nature, appraisal and treatment. Prereq: 300 Introduction to Communication Disorders or consent of instructor.
433 Observation of Clinical Practice (1) Prereq: 320 Speech and Language Development 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.
435 Introduction to Speech Sound Disorders (3) Prereq: 300 Introduction to Communication Disorders, 305 Phonetics, or consent of instructor.
440 Voice Disorders (3) Etiology, diagnosis, and treatment of functional and organic voice disorders. Prereq: 300 Introduction to Communication Disorders, 305 Phonetics, or consent of instructor.
520 Aphasia (3) Prereq: 435 or equivalent or consent of instructor.
522 Seminar in Articulation and Phonological Processing Disorders (3) Current research in diagnosis and management of articulation and phonological processing disorders. Prereq: 435 or equivalent or consent of instructor.
523 Seminar in Voice Disorders (3) Current research in diagnosis and management of voice disorders. Prereq: 435 or equivalent or consent of instructor.
524 Traumatic Brain Injury (3) Advanced neurogenics: cognitive-linguistic emphasis. Medical and speech-language pathology rehabilitation issues associated with traumatic brain injury (TBI) related to adult TBI population. Prereq: 506 and 520, or consent of instructor.
526 Dysphagia (3) Clinical diagnosis, evaluation, and treatment of adult swallowing disorders and critical interpretation of research literature on dysphagia. Prereq: 506 or consent of instructor.
531 Seminar on Stuttering (3) Current significant research in stuttering. Prereq: 431 or consent of instructor.
533-534 Advanced Clinical Practice in Speech-Language Pathology (1-4, 1-4) Prereq: 434 or equivalent and consent of instructor. Maximum 6 hrs. Enrollment for less than 2 hrs must have prior departmental approval.
535-36 Advanced Clinical Practice in Speech-Language Pathology: Off-Campus Sites (1-4, 1-4) Prereq: 100 hrs clinical experience, consent of instructor. Prereq: 100 hrs clinical experience, consent of instructor. Prereq: 100 hrs clinical experience, consent of instructor. Maximum 6 hrs each. Enrollment for less than 6 semester hrs must have prior departmental approval.
538 Advanced Clinical Practice in Speech-Language Pathology: Public Schools (1-4) May be repeated. Maximum 6 hrs. Enrollment for less than 2 hrs must have prior departmental approval.
### Aviation Systems

#### MAJOR

**DEGREE**  
Aviation Systems ................................. M.S.

**Professors:**  
Collins, F. G., Ph.D. ..................... California  
Kimberlin, R. D. (Liaison),  
Ph.D. ........................................... RWTH (Germany)

**Associate Professor:**  
Soiles, U. P., Ph.D. ...................... Tennessee

**Research Assistant Professor:**  
Stellar, Frederick W., M.S. .......... Georgia Tech

**Emeriti Faculty:**  
Mason, A. A., Ph.D. ................. Tennessee  
Paludan, C. T., Ph.D. ................... Denver  
Wu, J. M., Ph.D. ......................... Cal Tech  
Young, R. L., Ph.D. ...................... Northwestern
The University of Tennessee Space Institute offers a program leading to the Master of Science degree with a major in Aviation Systems. The Aviation Systems program is designed for those who possess a bachelor’s degree in engineering or science and wish to study under a “system philosophy” toward systems 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 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 non-thesis program involves a minimum of 33 semester hours credit while the non-thesis program involves a minimum of 33 semester hours credit. Both options are fully supported off-campus utilizing electronic media for videotaping and interactive distance teaching methods.

**THESES 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. Six 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.

**Graduate Courses**

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

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

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


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

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

507 Introduction to Airborne Radar (3) Theory and application of airborne radar. Radar detection and measurement techniques through aviation systems applications. Ground effects on radar signals of multipath and clutter. Pulsed operation, coding, filters, processing techniques, Doppler effects. Problems of range and range rate tracking. Methods and techniques for reducing radar cross section.

508 Flight Test Instrumentation (3) Principles of measurement, measuring devices with views toward both ground and flight aerospace testing: measurement fundamentals, sensors for specific parameters (e.g., temperature, heat flux, flow rate, pressure, acceleration, vibration, strain, and humidity), data bus integration, signal condition, telemetry, and fabrication.

509 Introduction to Aircraft Structures (3) Design and analysis of structures: light-weight and modern materials used for aircraft structures. Topics: load determination and aviation regulations, airworthiness, ultimate loads, limit loads, load factors; simplifying assumptions to safe side; basics of stress and strain, elasticity, shear, bending, torsion; statically indeterminate systems, frames; strains, deflections, internal forces, buckling of columns, thin plates; tension field beams; principles of stressed skin construction; open, closed, thin-walled beams; tapered beams, fuselages and frames, wings and ribs; laminated composite structures; elementary aerelasticity.

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

511 Theory and Aviation Applications of GPS (3) Global Positioning System (GPS) for improved navigation and situational awareness for civil and military applications. GPS theory; geometric dilution of precision, satellite positioning, ionospheric delay, differential GPS, and GPS errors. Applications for navigation and aircraft flight-testing. Integration of GPS for aviation infrastructure and for air vehicle navigation, concepts of WAAS and LAAS.

512 Helicopter Performance Flight Test Techniques (3) Experimental test techniques for helicopter performance flight testing. Theoretical derivation of flight test techniques. Participation in series of flight test experiments demonstrating acquisition of flight test data. Instrumentation and data reduction techniques.

513 Helicopter Stability and Control Flight Test Techniques (3) Experimental test techniques for helicopter stability and control flight testing. Theoretical derivation of flight test techniques. Participation in series of flight test experiments demonstrating acquisition of flight test data. Instrumentation and data reduction techniques.

514 Systems Flight Testing (3) Experimental test techniques for helicopter and airplane flight systems. Approach and design for testing airborne systems. Theory and operation of typical flight systems: aircraft systems, navigation systems, communications systems, and specific mission systems.

515 Aviation Human Factors (3) Human factors pertinent to aviation: concept of human factors, human error, fatigue, body rhythms, performances, motivation, vision and visual illusions, communication, attitudes, training and devices, displays and controls, space and layout, anthropometry, flight deck design and evaluation, aircraft cabin design and evaluation, flying qualities evaluation, and performance measurement techniques. Applied aviation systems.

516 Aircraft Flight Controls (3) Feedback control concepts, root locus techniques, bode analysis, PID control design, and controller and observer design concepts applied to aircraft. Complex analysis and matrix algebra.


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

(College of Arts and Sciences)

MAJOR DEGREES

Biochemistry and Cellular and Molecular Biology ..................... M.S., Ph.D.

Bruce D. McKee, Head

Professors:

Becker, J. M., Ph.D. ......................... Cincinnati
Ganguly, R., Ph.D. ....................... Nebraska
Handel, Mary Ann (Distinguished Professor), Ph.D. .................... Kansas State
Howell, E. W., Ph.D. ......................... Lehigh
Jeon, K. W., Ph.D. ......................... London
Joy, D. C. (Distinguished Scientist), Ph.D. .......................... Oxford
Kennedy, J. R., Ph.D. ........................ Iowa
Koontz, John W., Ph.D. .................... Kentucky
MacCabe, J.A, Ph.D. ..................... California (Davis)
Mckee, B. D., Ph.D. ...................... Michigan State
Monty, K. J., Ph.D. ........................ Rochester
Peterson, C. B., Ph.D. .................. LSU
Roberts, D. M., Ph.D. ..................... California (Davis)
Serpusru, E. A., Ph.D. .................... Gatechpe

Associate Professors:

Bruce, B., Ph.D. .............. California (Berkeley)
Hall, J. C., Ph.D. ....................... Illinois
Prosser, R. A., Ph.D. .................... Illinois

Assistant Professors:

Dealwis, C., Ph.D. ........................ London
Fernandez, E., Ph.D. ................. Loyola
Guo, H., Ph.D. ............................. Harvard
Jain, N., Ph.D. ............................. Brandeis
Park, J., Ph.D. ............................ Texas A&M

Research Professors:

Allison, D. P., M.S. ....................... Tennessee
Hartman, F., Ph.D. ....................... Tennessee
Mazor, Peter, Ph.D. .................... Harvard

REQUIREMENTS FOR ADMISSION

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

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

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

THE MASTER’S PROGRAM

1. Biochemistry and Cellular and Molecular Biology 511-12-13, 515-16, and 517.
2. Completion of course requirements as determined by the candidate’s faculty committee.
3. Achievement of a 3.0 or better GPA in all courses taken for graduate credit.
4. Participation in 601 and 603 during the entire period of residence. Participation in at least one journal club chosen from among 605-608 for three semesters.
5. Six hours of master’s research and a thesis.
6. A final examination that covers both the thesis endeavor and the subject matter of the course requirements.

THE DOCTORAL PROGRAM

1. Biochemistry and Cellular and Molecular Biology 511-12-13, 515-16, and 517.
2. At least two additional approved graduate courses in the life sciences or chemistry, or physics, or other physical science to be determined upon consultation with the mentor and the dissertation committee. No survey courses will be accepted.
3. At least 6 hours of topics offered in 615 or its equivalent.
4. Participation in 601 and 603 during the entire period of residence. Participation in at least one journal club chosen from among 605-608 for six semesters.
5. Comprehensive examination, taken before the end of the third year of study.
6. A dissertation reporting the results of original and significant research carried out during the term of candidacy.
7. A final oral examination which will be concerned primarily with the student’s dissertation.

Petitioning for Master’s Degree

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

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

GRADUATE COURSES

401-402 Biochemistry-Molecular Biology I, II (4,4)
401—Amino acid structure and chemistry, protein structure and chemistry, protein folding, enzyme behavior and function, reaction mechanisms, catalysis and energy transfer, synthetic metabolism including photosynthesis, and protein transport. 402—Structure of DNA and RNA, experimental methods of analyzing nucleic acids, mechanisms of RNA and protein synthesis, replication mechanisms of DNA replication, repair and recombination, chromosome structure and function, regulation of gene expression, genome structure and genomics, and mechanisms of biological regulation. Prereq: Biology 240 General Genetics, Chemistry 350-360-369 Organic Chemistry and Lab.

403 Advanced Genetics Laboratory (3) Experiments illustrating methods in modern genetics: techniques in classical, cytogenetic, molecular and 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; carbohydrate and energy capture; synthetic metabolism; nucleic acid function; protein synthesis, and biochemical genetic regulatory processes. May not be counted if credit received for 401. Prereq: Chemistry 350-360-369 Organic Chemistry and Lab, Biology 140 Organization and Function of the Cell, and Biology 240 General Genetics. 3 hrs and 1 discussion.

419 Cellular and Comparative Biochemistry Lab (2) Experiments with enzymes, nucleic acids, and membranes and organelles. Chromatography, kinetics, hybridization, sequencing, and immunochemical methods. Prereq or coreq: 401 or 410.

421 Cell and Tissue Structure and Function (4)
Study of animal cells and tissues at light and electron microscopy levels. Prereq: Biology 140 Organization and Function of the Cell. 2 hrs and 2 labs.

429 Cell Biology Laboratory (3) Series of open-ended, discovery-based exercises developed to design and test new drugs using modern cell biology and computer technologies. Experimental modules: techniques used in cell isolation, purification, culturing, fluorescent microscopy, receptor binding and signal transduction, apoptosis, cell cycle analysis, protein and steroid secretion, computer modeling, and state-of-the-art electron microscopy. Experiment design, execution, data analysis, and peer evaluation. Prereq or coreq: 401 or 410.


455 Human Genetics (3) Genetic and molecular principles and problems of human inheritance. Prereq: Biology 240 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.)

480 Physiology of Exercise (3) (Same as Exercise Science 480.)

500 Thesis (1-15) P/NP 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 for faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.
511 Advanced Protein Chemistry and Cellular Biology (3) Cellular structure and function at molecular and supramolecular level in progression; protein structure and function; membrane structure and function; biogenesis and membrane proteins. Prereq: Prior knowledge of cell biology and biochemistry and/or consent of instructor.

512 Advanced Molecular Biology (3) Regulation of nucleic acid expression and protein activity. Nucleic acid structure and function; replication and repair of nucleic acids; gene expression; protein synthesis; post-translational protein modification; mitosis and meiosis; cell cycle, cell division and cell growth. Prereq: 511 or consent of instructor.

513 Advanced Protein Biochemistry and Cell Biology II (3) Advanced topics of cellular function and regulation of cell division and growth; and structure and function of supramolecular structures; cytoskeleton and cell junctions and adhesions. Prereq: 511.

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

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

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

520 Special Topics (1-3) Selected directed readings or special course in topics of interest. Consult departmental listing for offerings. May be repeated with consent of instructor. Maximum 6 hrs. S/NC only.

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

530 Experimental Design and Analysis (2) Development of skills in strategies of experimental design and interpretation of experimental results. Critical discussion of research articles illustrating issues in experimental design. Preparation of grant proposal in standard format to be read and discussed by class and by panel of faculty expert in area of proposal. Prereq: Consent of instructors.

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

554 Introduction to Electron Microscopy-Scanning Electron Microscope (3) Practical introduction to techniques of electron microscopy and to scanning electron microscopy. Use of microscope and ancillary equipment, darkroom techniques, preparation of material for publication and special project. Admission limited only to departmentally approved graduate students. (Same as Botany 510.) 2-3 lab hrs.

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

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

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

562 Introduction to Electron Microscopy - Transmission Electron Microscope (4) Practical application to techniques for preparation of biological samples for viewing in transmission electron microscopy. Use of microscope and ancillary equipment, darkroom techniques, preparation of material for publication and special project. Admission limited only to departmentally approved graduate students. (Same as Botany 510.) 2-3 lab hrs.

564 Introduction to Electron Microscopy-Scanning Electron Microscope (3) Practical introduction to techniques of electron microscopy and to scanning electron microscopy. Use of microscope, introduction to darkroom techniques and digital image processing, preparation of samples for observation, and special project. Prereq: Consent of instructor. 2 hrs and 1 lab.

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

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

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

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

600 Doctoral Research and Dissertation (3-15) PNP only.

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

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

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

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

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


610 Current Topics in Biochemistry, Cellular, and Molecular Biology (1-3) Critical reviews of research problems and methods in biochemistry, cell biology and/or molecular biology. Oral presentations, written reports, computer simulations by faculty and students. Prereq: Consent of instructor. May be repeated. Maximum 4 hrs.

612 Advanced Topics in Environmental Toxicology (1-3) (Same as Ecology and Evolutionary Biology 612.)

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

Biosystems Engineering and Environmental Science

(College of Agricultural Sciences and Natural Resources)

MAJORS

DEGREES

Biosystems Engineering ............ M.S., Ph.D.
Biosystems Engineering Technology .... M.S.
Environmental and Soil Sciences ......... M.S.
Plants, Soils, and Insects .......... Ph.D.

Ronald E. Yoder, Head

Professors:
Ammons, J. P., Ph.D. ................. West Virginia
Ayers, P. D., PE, Ph.D. ............. NC State
Buschermohle, M. J., Ph.D. ........ Clemson
Denton, H. P., Ph.D. .............. NC State
Essington, M. E., Ph.D. ............ California (Riverside)
Freeland, R. S., PE, Ph.D. ......... Tennessee
Mote, C. R., Ph.D. ........... Ohio State
Tompkins, F. D., PE, Ph.D. ......... Tennessee
Tyler, D. D., Ph.D. .............. Kentucky
Wilhelm, L. R., PE, Ph.D. .......... Tennessee
Wills, J. M., S.S. ............ Louisiana State
Yoder, D. C., Ph.D. ............. Purdue
Yoder, R. E., PE, Ph.D. ........... Colorado State

Associate Professors:
Burns, R. T., PE, Ph.D. ............ Tennessee
Grandle, G. F., Ph.D. ............. Hart, W. E., Ph.D. ............. Purdue
Logan, J., Ph.D. .............. Nebraska
Pordesimo, L. J., Ph.D. ............ Penn State
Radosevich, M., Ph.D. ............ Ohio State
Raman, D. R. (Lisond), PE, Ph.D. .... Cornell
Savoy, H. J., Ph.D. .............. Louisiana State
Wilkerston, J. B., Ph.D. ........... Purdue
Womac, A. R., PE, Ph.D. ......... Tennessee

Assistant Professor:
Buchanan, J. R., PE, Ph.D. ....... Tennessee
Eash, N. S., Ph.D. ............... Iowa State
Lee, J., Ph.D. .................. Iowa State
Tynan, J. S., Ph.D. .............. Oklahoma State
Walker, F. R., Ph.D. ............. NC State

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

A graduate program leading to a Master of Science with a major in Environmental and Soil Sciences is offered to graduates of recognized curricula in physical or biological sciences. The department also participates in the Plants, Soils and Insects Doctor of Philosophy program which is administered jointly by the departments of Biosystems Engineering and Environmental Science, Plant Sciences and Landscape Systems, and Entomology and Plant Pathology. For concentrations offered by these other departments, please see their sections in this catalog. Faculty in the Biosystems Engineering and Environmental Science Department administer the Environmental and Soil Sciences Master's program and the Environmental and Soil Sciences concentration in the Plant, Soils, and Insects Doctor of Philosophy program. The Master's and Doctoral programs are broad-based, emphasizing the application of chemical, biological, and physical principles to understand, manage, and manipulate the terrestrial environment. Within the concentration students may select an agricultural or non-agricultural focus area in soil and water chemistry; nutrient and elemental cycling; land management and reclamation; pedology; climatology; soil biology and biochemistry; contaminant transport; and soil physical processes.

A completed departmental data sheet and three completed Graduate Rating Forms are required in addition to the Application for Graduate Admission. Students must submit scores from the GRE general examination. Each applicant will be advised about any prerequisite courses before entering a program. The student's program of study must be approved by his/her advisory committee and must comply with the requirements of The Graduate Council. A significant aspect of graduate education beyond formal courses and thesis projects is active participation in the professional community which exists within academic departments at universities. Student/faculty seminars are one of the professionally rewarding activities of the community. Accordingly, all graduate students are encouraged to participate in Biosystems Engineering 505 and other departmental seminars regardless of whether they are registered for seminar credit.

**THE MASTER'S PROGRAMS**

**Biosystems Engineering**

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

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>Biosystems Engineering 507 (1), 505 (1), and other major subject courses</td>
<td>12</td>
</tr>
</tbody>
</table>

Applicants having Bachelor's degrees in fields that are related or unrelated to environmental and soil sciences may apply, although acceptance may be contingent upon the completion of prerequisite course work. Submit application, official transcripts, scores from the general portion of the Graduate Record Examination (GRE), and a statement of personal goals and reasons for applying to: ESS Master's Program Coordinator, Biosystems Engineering and Environmental Science Department, University of Tennessee, 2506 E.J. Chapman Dr., Knoxville, Tennessee 37996-4531.

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

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biosystems Engineering Technology 507 (1), 505 (1), and other major subject courses</td>
<td>12</td>
</tr>
</tbody>
</table>

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.

**Environmental and Soil Sciences**

Students seeking a Master of Science degree in Environmental and Soil Sciences will generally concentrate their studies in one of the ESS focus areas. The focus areas include: soil and water chemistry; nutrient and elemental cycling; land management and reclamation; pedology, genesis, and classification; environmental climatology; soil biology and biochemistry; and soil physical processes. Both thesis and non-thesis options are available. Please see the ESS Master's concentration homepage for additional information: http://bioengr.ag.utk.edu/graduate/, or contact the ESS program's graduate liaison.

Applicants having Bachelor’s degrees in fields that are related or unrelated to environmental and soil sciences may apply, although acceptance may be contingent upon the completion of prerequisite course work. Submit application, official transcripts, scores from the general portion of the Graduate Record Examination (GRE), and a statement of personal goals and reasons for applying to: ESS Master’s Program Coordinator, Biosystems Engineering and Environmental Science Department, University of Tennessee, 2506 E.J. Chapman Dr., Knoxville, Tennessee 37996-4531.

**Thesis Option:** To obtain a Master of Science degree, the student must meet the following requirements, in addition to those of the University Graduate Council (as specified in the Master's Degrees section at the front of this catalog).

1. Upon consultation with the department head, the student will be assigned a major professor who acts as chair of the student’s advisory committee. The student and the major professor will assemble a graduate advisory committee consisting of the major professor and a minimum of two additional faculty, each holding the rank of assistant professor or above. At least one-half of the committee members must hold teaching appointments. The advisory committee must be formalized by the end of the second semester of graduate study.

2. Develop and submit an approved program of study by the end of the second semester of graduate study. A minimum of 24 hours of graduate coursework is required in the program of study, exclusive of six hours of 500 Thesis. The program of study is subject to the approval of the student's advisory committee, and must meet the following requirements:

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>500 Thesis</td>
<td>6</td>
</tr>
<tr>
<td>503 Seminar</td>
<td>2</td>
</tr>
<tr>
<td>Courses numbered above 503</td>
<td>12</td>
</tr>
</tbody>
</table>

   Courses within the major (excluding courses numbered 503 and below) are:

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Courses that are in the major include those in Environmental and Soil Sciences. In addition, Geology 510 and Environmental Engineering 535 are in the major. The student's committee may require additional course work beyond the 24 hours if the student's progress or background indicates a need or deficiency.</td>
<td></td>
</tr>
</tbody>
</table>

3. Develop a research problem and presentation by means of a written proposal to the student's committee. This must be completed during the first two semesters of graduate study and before enrollment in 500.

4. Pass a final oral examination covering the thesis, related areas, and graduate coursework. At the discretion of the candidate's committee, an oral examination may also be required.

5. Present at least two departmental seminars (two hours of 503), in addition to an exit seminar (no credit.)
A student who has started a degree program under the non-thesis option is not eligible to transfer to the thesis option after the end of the first semester of graduate study or after receiving a graduate assistantship stipend for more than one semester.

**Non-Thesis Option:**
A student desiring the non-thesis option must declare his/her intention before the beginning of the second semester of study. The student must meet the following requirements, in addition to those of the university Graduate Council (as specified in the Master’s Degrees section at the front of this catalog).

1. Upon consultation with the department head, the student will be assigned a major professor who acts as chair of the student’s advisory committee. The student and the major professor will assemble a graduate advisory committee consisting of the major professor and a minimum of two additional faculty, each holding the rank of assistant professor or above. At least one-half of the committee members must hold teaching appointments. The advisory committee must be formalized by the end of the second semester of graduate study.

2. Develop and submit an approved program of study by the end of the second semester of graduate study. A minimum of 33 hours of graduate coursework is required in the program of study. The program of study is subject to the approval of the student’s advisory committee, and must meet the following requirements:
   - 503 Seminar: 2 credits
   - 593 Special Problems in Environmental and Soil Sciences: 3 credits
   - Courses numbered above 503 (exclusive of 593): 18 credits
   - Courses within the major (excluding 500 and 502): 12 credits

Courses that are in the major include those in Environmental and Soil Sciences. In addition, Geology 510 and Environmental Engineering 535 are in the major. The student’s committee may require additional courses or work beyond the 33 hours if the student’s progress or background indicates a need or deficiency.

3. In lieu of a thesis, students are required to complete three hours of 593 by participating in a single research program for a period of 12 weeks. The advisory committee approves the research problem. Satisfactory completion of this requirement requires a written, original research report that is acceptable to the student’s committee.

4. Pass a comprehensive written examination that integrates the student’s course work and research problem. The exam is developed and administered by the advisory committee.

A student who has started a degree program under the non-thesis option may transfer to the thesis option upon approval of a potential major professor and the department head.

**THE DOCTORAL PROGRAM**
A doctorate in Plants, Soils and Insects (PSI), with a concentration in Environmental and Soil Sciences (ESS), is offered under a multi-departmental doctoral program. Three departments participate: Plant Sciences, Entomology and Plant Pathology, and the soils faculty in Biosystems Engineering and Environmental Sciences. Other concentrations within the PSI doctoral program include horticulture, crop sciences, weed biology, plant improvement, entomology, plant pathology, integrated pest management and plant bioactive compounds. Focus areas in the ESS concentration include soil and water chemistry; nutrient management; pedology, genesis and classification; environmental climatology; soil biology and biochemistry; and soil physical processes. Please see the ESS doctoral concentration homepage for additional information, http://bioeng.ag.ukr.edu/graduate, or contact a faculty member in the area of interest.

**Admission Requirements**
Submit application, fee, official transcripts, and scores from the general portion of the Graduate Record Examination to the Graduate Admissions Office. In your application, indicate that you are applying to the Plants, Soils and Insects doctoral program. Submit resume, three letters of reference (or three Graduate Rating Forms), photocopy of GRE scores and a short statement of professional goals and reasons for applying to: ESS PhD Program Coordinator, Biosystems Engineering and Environmental Sciences Department, University of Tennessee, 2506 E.J. Chapman Drive, Knoxville, Tennessee 37996-4531.

In your statement letter and application, please indicate your interest in the ESS concentration.

**Degree Requirements**
To obtain the doctorate, the student must meet the following requirements:

1. The student and the major professor will select a minimum of three additional faculty, holding the rank of assistant professor or above, to serve on the student’s doctoral committee. The major professor and two committee members must be approved to direct doctoral research by the Graduate Council, and at least half of the committee must hold teaching appointments. At least one member of the committee must be from outside the department. The doctoral committee must be formalized by the end of the second semester of graduate study.

2. Submission of an approved program of study by the end of the second semester of graduate study. A candidate for the doctoral degree must complete a minimum of 24 hours of graduate coursework numbered 503 or higher beyond the master’s degree. Candidates not having a masters degree must complete a minimum of 48 hours of graduate coursework beyond the baccalaureate degree, 24 hours of which must be numbered 503 or higher. A minimum of 12 of the 24 hours, or 30 of the 48 hours, must be graded A-F. At least 9 hours of the student’s coursework must be from outside the PSI major, and a minimum of 6 semester hours must be taken in UT courses numbered 601 or higher. In addition, 24 hours of course 600 Doctoral Research and Dissertation are required.

3. Satisfactory preparation of a written dissertation proposal and its oral defense to the student’s committee. This must be completed during the first two semesters of graduate study and before enrollment in 650.

4. Passing both written and oral sections of the comprehensive examination. The candidate will be tested on his/her knowledge of the proposed dissertation and related fields. The student is expected to be conversant in the wide area of soil and environmental sciences.

5. Presentation of at least two departmental seminars (2 hours of ESS 503), in addition to an exit seminar (no credit).


Please see the Degree Program Requirements/Doctoral Degrees section at the front of this catalog for additional information.

**Biosystems Engineering**
Students applying for admission into the doctoral program must submit evidence of ability to perform and report independent research to the satisfaction of the faculty of the department. An approved master’s thesis will usually be acceptable for this purpose.

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

- Major subject courses: 18 credits
- Coursework in computational methods (mathematics, computer science, statistics, or any course containing appropriate computational components that may be used by the department): 9 credits
- Program electives: 21 credits (507, 505 or equivalent courses): 3 credits
- 600 Dissertation: 24 credits

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 Council.

**Biosystems Engineering**

**GRADUATE COURSES**

**411 Mechanical Systems Engineering (3)**
421 Natural Resource Engineering (3) Introduction to hydrologic cycle: movement of water and interaction with environment through such processes as erosion and contaminant transport. Impacts through estimation and measurement, and controlling impacts through engineering design. Specific designs: waterways, erosion and sediment control structures, waste management, irrigation systems, and hydrologic monitoring systems. Prereq: 321 Biothermodynamics, Heat, and Mass Transfer; Environmental Engineering 531 Introduction to Soil Science; Civil Engineering 390 Hydraulics; or Aerospace Engineering 341 Fluid Mechanics. 2 hrs and 1 lab.

431 Bioprocessing Engineering (3) Application of basic and specialized knowledge to the design of 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: Basic calculus or finite mathematics or equivalent or consent of instructor. 2 hrs and 1 lab.

451 Environmental Engineering Technology (3) Design of controlled environments to optimize conditions for organisms and development: growth equations and population dynamics; plant growth systems; microbial growth systems; animal growth systems; biotechnological and environmental mathematics. Prereq: Differential Equations; Coreq: 321 Biothermodynamics, Heat and Mass Transfer or equivalent. 2 hrs and 1 lab.

451 Electronic Systems (4) Basic electronics with biological applications. Analog and digital electronics; sensing; basic electrical and electronic systems; system design; parameter selection; and interfacing; signal conditioning; process control. Laboratory experiments and design projects. Prereq: Circuits and Electro Mechanical Components. 3 hrs and 1 lab.

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

502 Registration for Use of Facilities (1-15) Required for the use of University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

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

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

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

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

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

541 Principles of Compost Engineering (3) Comprehensive study of composting: survey of installed systems; thermodynamics of composting; biological composting; kinetics of heat inactivation; feed conditioning; aeration; substrate characteristics; process kinetics; model development; design component. Prereq: Thermodynamics, heat and mass transfer.

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

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

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

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

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

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

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

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

636 Geospatial Methods for Environmental Research (3) (Sampling and displaying the multidimensionality of environmental variables, and environmental data. Geostatistical techniques, encoding and interpretation; sampling theory; precision geomatic techniques for the environmental scientist and engineer. Prereq: 555 or equivalent. 2 hrs and 1 lab.

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

693 Research Problems in Biosystems Engineering (1-3) Independent studies of current problems. May be repeated. Maximum 6 hrs.

514 CAD Applications to Biosystems Engineering (3) (Same as Biosystems Engineering Technology 514.) Computer Aided Drafting (CAD) applications in agriculture and environmental science. Essentials of CAD software to create drawings of components, systems, and process diagrams. Applications in mechanical, structural, and biosystems. 2D applications with limited exposure to 3D applications. Computer intensive course. Hands-on experience. Prereq: Computer proficiency and admission to graduate program. (Students cannot receive credit for both 414 CAD Applications to Biosystems Engineering and 514.) Two 2-hr labs.

522 Processing and Environmental Systems (3) Environmental systems in plant and animal production; application of electronic control systems, mechanical equipment, systems, and objection and point-of-use 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.

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

546 Automation Devices and Applications (3) Basic electronics as applied to simple automation systems, programmable controllers, data acquisition, digital logic and transducers. Prereq: 506 or consent of instructor. 2 hrs and 1 lab.

555 GIS and GPS Applications to Biosystems (3) (Same as Biosystems Engineering 555.)

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

578 Financial Management (3) Financial management of operations; troubleshooting equipment; repair of single-cylinder engines. Prereq: Basic calculus or finite mathematics or equivalent or consent of instructor. 2 hrs and 1 lab.

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: Basic physics. 2 hrs and 1 lab.

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

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

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

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: Basic calculus or finite mathematics or equivalent or consent of instructor. 2 hrs and 1 lab.
Environmental and Soil Sciences

GRADUATE COURSES

434 Environmental Soil Chemistry (3) Composition and chemical properties of soils and processes that govern rate and behavior of chemicals in soil environment: clay mineralogy; soil organic matter; mineral weathering and stability; aqueous speciation; surface chemistry; ion exchange, adsorption and molecular retention; oxidation-reduction; and soil acidity, alkalinity, and salinity. Prereq: Soil science and organic chemistry or equivalent.

442 Soil Genesis and Classification (3) Soil genesis and formation; observing and describing morphology of agricultural, engineering, and urban soils; classification. 3 weekend field trips. Prereq: Soil science. 2 hrs and 1 lab.

444 Transport Processes in Soil (3) Basic understanding of soil physical properties and processes; influence of soil physical properties on water and chemical movement in soil; practical experience in the measurement and analysis of soil physical properties, water flow, and chemical movement in soil. Prereq: 210 Introduction to Soil Science and Physics 221 or equivalent.

462 Environmental Climatology (3) Study of atmosphere as environment. Physical, chemical and biological factors affecting climates of various earth environments; meteorological process affecting biosystems. Climatic change and the human impact on the atmosphere, consequences of climatic change and mitigation policies, microclimates and urban climates, atmospheric pollution, extreme events and ozone depletion. Design and operation of weather information systems; automated weather stations. Prereq: Agriculture and Natural Resources 290 Computer Applications to Problem Solving or equivalent.

481 Capstone in Environmental and Soil Sciences (3) Integrative course in which students work individually and collaboratively to develop solutions for soil and water related environmental problems. Writing and oral communication emphasis course. Prereq: 434 and senior standing.

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

501 Seminar Preparation (1) (Same as Plant Sciences and Landscape Systems 505.)

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

503 Seminar (1) Presentations and discussion of current scientific material. May be repeated. Maximum 3 hrs.

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

511 Soil-Plant Relationships (3) Principles of mineral nutrition of higher plants: plant physiological characteristics that influence uptake of water and nutrients; functions of nutrient elements in plants; soil factors influencing nutrient availability to plants; important relationships at soil-plant root interface; and responses to adverse soil-environmental conditions. Prereq: 434 or Integrated Plant Systems 431 or Plant Sciences and Landscape Systems 431 or general plant physiology. 3 hrs and 1 rec.

512 Pedology (3) Physical and chemical weathering processes, factors of soil formation, soil forming processes. Prereq: 442 or consent of instructor. 2 hrs and 1 lab.

513 Advanced Soil Chemistry (3) Chemical properties and processes that operate in soil environment: 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 phenomena, and surface complexation modeling. Prereq: 434 or consent of instructor.

514 Environmental Soil Physics (3) Principles of water, gas, heat, and solute movement in soil/water systems: application of appropriate models for the description of these processes; methods for characterizing hydraulic and chemical transport properties of soils; interactions of soil physics to solution of contemporary problems in water conservation, prevention of surface/ground water contamination, and management of plant water status. Prereq: 444 or equivalent.

516 Soil Biology and Biochemistry (3) Soil organisms and their activities in soils: soil ecology, biogeochemical cycling of important elements, organic matter decomposition, and applications of agricultural and environmental biology and biochemistry. Prereq: 210 Introduction to Soil Science or consent of instructor. 2 hrs and 1-3 hr lab.

583 Special Problems in Plant and Soil Science (1-3) May be repeated. Maximum 6 hrs.

600 Doctoral Research and Dissertation (3-15)

601 Special Topics in Soil Science (1-3) Thermodynamics of 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 environment. May be repeated. Maximum 6 hrs.

613 Advanced Topics in Soil Chemistry and Fertility (2) Topics of current significance; scientific literature. Prereq: 513 or equivalent.

614 Advanced Topics in Soil Biology and Biochemistry (2) Topics of current significance; scientific literature. Prereq: 516 or equivalent.

615 Advanced Topics in Soil Physics, Genesis, and Morphology (2) Topics of current significance; scientific literature.

Botany

(College of Arts and Sciences)

MAJOR

DEGREES

MOJAR

Edward E. Schilling, Head

Professors:

Caponetti, J. D., Ph.D. ............... Harvard
Hickok, L. G., Ph.D. ............... Massachusetts
Hughes, K. W., Ph.D. ............... Utah
Mullin, B. C., Ph.D. ............... North Carolina State
Petersen, R. H. (Distinguished Professor), Ph.D. ............... Colorado

Schilling, E. E. (Liaison), Ph.D. ............... Indiana
Schwarz, O. J., Ph.D. ............... North Carolina State

Associate Professors:

Amundsen, C. G., Ph.D. ............... Colorado
Pigliucci, M., Ph.D. ............... Connecticut
Smith, D. K., Ph.D. ............... Tennessee
Wofford, B. E. (Curator), Ph.D. ............... Tennessee
von Amm, A. G., Ph.D. ............... Iowa State

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, physiology, plant systematics, plant ecology, cytology, cytogenetics, ecology, genetics, lichenology, molecular biology, morphology, mycology, plant biology, physiology, phytology, and systematics.

For information on graduate study, 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 scientific courses: 12 semester hours.

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

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

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

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

Thesis Option

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

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

Non-Thesis Option

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

THE DOCTORAL PROGRAM

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

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

1. Satisfactory presentation of a research problem by means of a written proposal and an oral defense to the student’s committee. This must be completed before enrollment in Botany 600.
2. Satisfactory performance on a written comprehensive examination.
3. Presentation of one or more cognate areas outside of the department totaling 6 hours of graduate credit with at least a B average.
4. Satisfactory completion of 6 hours at the 600 level (excluding dissertation).
6. 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. The student’s committee may require specific or requirements such as additional foreign languages or an additional oral comprehensive examination may be required by the student’s faculty committee.

MINOR IN ENVIRONMENTAL POLICY

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

GRADUATE COURSES

401 Field Studies in Botany (1-3) Field experience and taxonomy of special plant groups. Topics vary: bryology, lichenology, phytology, agrostology, mycology, physiology, aquatic vascular plants, systematics, woody plants, and botanical photography. May be repeated under different topic. Maximum 9 hrs.
404 Plant Molecular Biology (4) Current research in plant molecular biology; techniques and procedures. Genome structure, gene expression and regulation, transcription, 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.
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.
419 Science as Method (3) (Same as Ecology and Evolutionary Biology 419 and Philosophy 419.)
431 Plant Ecology (4) Interactions between individuals, species, communities and their environments. Circulation of energy and matter in ecosystems; field trips or laboratory periods, and at least two weekend field trips. Prereq: Field Botany or equivalent. (Same as Ecology and Evolutionary Biology 431.)
451 Plant Tissue Culture (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 prerequisite: 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.
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.
503 Non-Thesis Research (2) Library, field, or laboratory research under supervision of staff member. Not for thesis candidates. May be repeated. Maximum 4 hrs.
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, classification, experimentation. Prereq: 310 or consent of instructor. 3 hrs and 1 lab.
507 Biological Illustration (3) Principles and applications of photography (B/W and Color) photo-macro- and photomicrography, drawing, graphics and video for recording and presentation for research and publication of data in pictorial and graphic form.
510 Introduction to Electron Microscopy - Transmission Electron Microscopy (4) (Same as Biochemistry and Cellular and Molecular Biology 562.)
530 Advanced Taxonomy of Flowering Plants (3) Evolution and classification of families of angiosperms, local flora. Prereq: 330 or equivalent. 2 hrs and 1 lab.
531-32 Special Problems in Botany (1-4, 1-4) May be repeated. Maximum 12 hrs.
544 Seminar in Botany (1) Readings and discussions of current literature, and/or selected topics in botanical research. May be repeated. Maximum 8 hrs. S/NC only.
585 Methods and Instrumentation in Field Investigation (1) Appropriate methods and instrumentation. Topics vary. May be repeated with consent of instructor. Maximum 5 hrs. S/NC only.
599 Advanced Evolutionary Ecology (3) Advanced concepts in evolutionary and ecological genetics, biogeography, climate, population genetics, evolution and natural selection, population growth and regulation, competition, niche, experimental ecology, predation, phylodynamics in ecology, biodiversity and conservation. Prereq: General Biology and General Ecology; one or more courses on organismal biology (ecology, evolution) at the upper undergraduate level or consent of instructor. Students cannot receive credit for both 499 and 599. (Same as Ecology and Evolutionary Biology 599.)
600 Doctoral Research and Dissertation (3-15) P/NP only.
606-07 Advanced Topics in Botanical Sciences (1-3, 1-3) Experimental botanical science: nomenclature, morphology and systematics of vascular plants, cryptogamic botany, cytology and cell biology, genetics, plant physiology, pathology, and ecology. May be repeated. Maximum 12 hrs.
662 Seminar in the History of Botany (2) History of botanical exploration and advances from early civilized to modern periods. May be repeated. Maximum 4 hrs.

Business Administration

(College of Business Administration)

MAJOR DEGREES

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

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

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

For students who wish to continue working full-time while they earn their MBA degree, there are three programs within the executive track of the MBA. In these programs, students carry a full academic course load in addition to their full-time jobs. Each of these programs is designed for the humanities, and professional fields such as engineering, business, agriculture, and architecture. In addition, most students in this program should have two or more years of work experience beyond their undergraduate degree(s). The MBA program is a 17-month program with students beginning in late July of each year and graduating in December of the following year. During the summer between the second and third semesters, students must complete an internship with a company using those skills acquired during the first year of the MBA program.

The MBA program consists of a common core (32 hours) and a selection of concentration and elective courses (15 hours). The first-year core develops a general management foundation upon which specialization is developed in the concentration area.

The objective of the 17-month program is to develop leaders able to enhance the success of their organizations. Specific emphasis is placed upon competency in the area of integrated value chain management. This management perspective acknowledges that an organization’s success is strongly related to its ability to function effectively and efficiently within a larger network of allied businesses. Managers must understand how to integrate business functions within their organizations, as well as across the other organizations within their value chain. Integrated value chain management rests upon a foundation including: supply chain management, information management, resource management, and customer relationship management. In addition, students will gain an understanding of concepts and careers in a variety of areas, including finance, logistics and transportation, marketing, and operations management.

Admission Requirements

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

To be considered for admission, the applicant’s file must be complete. A completed file includes the Application for Graduate Admission, 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 Office of Graduate Admissions one month before the MBA application deadline to allow for processing. Additional information is required by Graduate Admissions for international students.

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

Prerequisites

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

MBA Core

The MBA core (32 hours total) consists of: a 3-hour foundations course taken during the three weeks prior to the beginning of fall semester, a 15-hour core course and a 1-hour career development course taken in the first semester (Fall 1), a 9-hour core course taken in the second semester (Spring 1), a 3-hour distance course taken during the internship (Summer), and a 1-hour capstone in the third semester (Fall 2). The topics introduced within these courses follow three major themes. The first theme covers “what every manager needs to know,” and includes such functional topics as finance, strategy, decision tools, environmental analysis, and leadership skills development. The second theme focuses on functions involved in the flows of product, information, and finances within an integrated value chain, to include, but not limited to, operations management, logistics management, demand management, customer relationship management, supplier management, and resource management. The third theme involves integrating the content of the other two themes using information technology. Throughout all three themes, students will understand how various business functions are integrated within an organization, as well as how integration should occur across organizations within the context of a value chain.

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

Concentration and Electives

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

Among the 15 credit hours in the concentration/electives block, 9 credit hours must be taken in one of the following concentration areas. For specific courses required in concentration areas, see the appropriate field of instruction.

Finance

Logistics and Transportation

Marketing

Operations Management

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

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

Transfer Credits

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

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

Elective Area: 3 hours

Because of the fully integrated nature of the first-year curriculum, no credit hours are transferred into this core curriculum. The maximum number of hours that may be transferred to elective and concentration areas is 6 semester hours. Transfer credit will be considered upon formal petition to the
Dean of the MBA Program and must meet all requirements of the Graduate Council.

Other Requirements

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

To qualify for the degree, the student must achieve a B average (3.0) or above in MBA core courses required in his/her program, a B average or higher in courses comprising the concentration area, and a B average or higher in the overall program.

THE EXECUTIVE MBA PROGRAMS

Each of the four programs of the executive track is designed to serve the needs of a different student group. The programs share a common course structure of 36 credit hours of classroom learning (BA 551, 552, 555) and 9 credit hours of projects applied within the student’s business organization (BA 561,562 and 563). Students carry a full, 15-credit-hour load each semester. In each program, all participants begin and complete the program together.

The courses are functionally integrated, and the broad curriculum objectives are similar in each of the executive-track programs. All are oriented toward applied learning and are highly interactive, making extensive use of experiential learning techniques. Emphasis and depth of subject material within the curriculum varies somewhat from program to program depending on the intended student group. All programs result in the same Master of Business Administration degree as the full-time MBA.

Admissions Criteria: Primary consideration is given to the applicant’s professional achievements and recommendations from the applicant’s organization. Applicants must meet the minimum requirements of the Graduate Council and submit transcripts of all undergraduate and graduate work. Applicants may need to take the Graduate Management Admission Test (GMAT) (see specific program descriptions). No specific cut-off score exists for either grade-point averages or GMAT scores; however, admission is competitive, and applicants will be evaluated on their ability to operate on a par with other high achieving participants. Students whose native language is not English must take the Test of English as a Foreign Language (TOEFL) unless they are U.S. citizens or have earned a degree from an accredited college or university within the past two years. A minimum TOEFL score of 213 on the computer-based test is required for admission to graduate study.

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

Transfer Credits: Because of the integrated nature of the executive track curricula, no credit hours may be transferred as substitutes for program curriculum.

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

Professional MBA Program

The weekend professional MBA is provided for fully-employed managers within commuting distance of the University of Tennessee. The group of students for whom this program is designed has approximately five years of work experience. The emphasis in this program is to provide a good grounding in the quantitative and qualitative tools of various business functions and a good basis in strategic thinking. Learning is expanded through applying these tools within the student’s own organization through a structured project each semester. The professional MBA is the right choice for individuals who wish to enhance their position within their organization by broadening their business knowledge beyond the functional area in which they are currently employed.

The Professional program is three consecutive semesters completed in 16 months. Classes meet all day on Saturdays and via live, distance learning classes on Tuesday evenings. The program begins in August with an intensive week of classes, then continues with weekend classes. The final fall semester also includes an intensive week of courses in addition to weekend classes. Graduation is in December.

Applications are accepted for fall semester only. The application priority deadline is April 10. Additional information on the professional MBA can be found at www.promba.utk.edu.

Senior Executive MBA Program

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

The Senior Executive MBA is three consecutive semesters completed in 12 months. The class meets in Knoxville for 11-day residence periods in January and ending in December. The May residence period is a global business seminar of two weeks and is held in South America, Asia or Europe. Off-campus work includes distance learning classes and requires substantial and regular contact with faculty and other participants. The project work in the Senior Executive MBA is a large-scale management project running throughout the year. Students work with managers in their own organizations to choose a project of significant scale and scope. Each project has a faculty advisor.

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

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

Physician Executive MBA

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

The Physician Executive MBA is three consecutive semesters completed in 12 months. The class meets in Knoxville for 8-day residence periods in January, April, August and December. Between residence periods, live distance learning classes are held each Saturday morning, and there are asynchronous internet learning sessions each week.

Applications are accepted for January entry only. Applications are accepted throughout the year. The final application deadline is November 1. Applicants to the physician executive MBA are not required to take the GMAT test.

Additional information on the Physician Executive MBA can be found at www.pembu.utk.edu.

The Aerospace Executive MBA

The Aerospace Executive MBA is provided for a national audience of managers from defense and commercial aerospace organizations. The students for whom this program is designed have five to ten years of work experience and are currently employed in the aerospace sector. The emphasis in this program is providing a solid grounding in the broad range of business functions comprising virtually all MBA programs. However, much of this coverage will be delivered within the context of the aerospace industry. Beyond a basic grounding in business fundamentals, this program will offer advanced concepts especially relevant to managing the complex value streams that produce today’s most advanced aircraft. Advanced coverage and emphasis will be given to value stream integration, lean manufacturing, and industrial statistics in particular. This mix of topical coverage is ideal for engineers and others with technical backgrounds who are transitioning into program management where business and leadership skills are critical.

The program starts each fall semester and is completed in three consecutive semesters spread over twelve months. Classes are held during six residency periods, lasting from eight to eleven days each, some of which may be hosted on-site at the facilities of...
The establishment of the dual program addresses the critical need for personnel trained in both engineering and management who can integrate an increasingly complex body of knowledge for rapid introduction of new products to the marketplace. The objective of the dual degree program is to prepare graduates to take a leading management role in companies that must react quickly to a dynamic market where forces of competition require rapid changes in design and manufacturing and a short product development cycle.

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

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

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

Curriculum
All engineering students enrolled in the dual program must complete common coursework designed to provide them with an integrated, multidisciplinary teamwork experience. The MBA curriculum consists of 32 hours of common coursework in the College of Business Administration and 15 hours of common coursework in the College of Engineering. Engineering common coursework includes a culminating 3-hour integrated project course requiring a comprehensive report, and a final examination as required by the Dual Program Committee, to be taken during the first session of summer following the second year.

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

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

August—First Year
BA 511 MBA Core I 3
Fall—First Year
BA 512 MBA Core II 15
IE/ME 504 Product Development Process 1
Spring
BA 513 MBA Core III 9
IE/ME 506 Product Selection and Evaluation 2
IE/ME 508 Integrated Product, Process, and Manufacturing System Design 3
Summer
— Internship —
BA 514 Integrated Business Simulation 3
IE/ME 509 Multidisciplinary Project 1
Fall—Second Year
IE 511* Business Planning and Commercialization 3
IE/ME 509 Multidisciplinary Project 1
— Engineering major 9-12
Spring
— MBA “hub” course elective 3
IE/ME 509 Multidisciplinary Project 1
— Engineering major 6-9
Summer (first session)
IE/ME 594 Culminating Integrated Project Report 3
TOTAL 63-69

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

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

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

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

THE DOCTORAL PROGRAM

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

Admission Requirements
Students seeking a Ph.D. degree must be recommended for acceptance by the College of Business Administration to the Office of Graduate Admissions. Actual admission is based on the applicant’s overall standing compared with other applicants and with the number of vacancies in each department. The Graduate Council requires the Graduate Admissions 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 applicants should be received by the College of Business Administration not later than March 1. Late applications are considered only if space is available.

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

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

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

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

There are seven concentrations offered in the Ph.D. program:
Accounting
Finance
Human Resource Development
Logistics and Transportation
Management (Operations Management and Strategic Management)
Marketing
Statistics

More detailed information concerning these specific areas is available by writing directly to each department or by accessing the College of Business Administration web page.

Degree Requirements
Doctoral students must file a program of study that has been approved by their doctoral committee within one year of completing their first year of doctoral studies. This committee is nominated by the department chairperson in a student’s intended area of concentration, subject to the Graduate Council’s policies and procedures. Following are specific degree requirements:
1. Students must complete at least three years of full-time coursework beyond the baccalaureate degree, with two years of residence on the Knoxville campus.
2. Students are required to have a sound and broad base on which to build their Ph.D. coursework. The departmental doctoral advisor will work with the student to determine what, if any, courses need to be completed. All such work is subject to approval by the temporary doctoral advisory committee and the Dean of the MBA Program. Specific concentrations may have prerequisites.
3. Research Tools: A minimum of 9 semester hours of graduate research methods must be completed. At least 6 semester hours in statistics courses beyond Statistics 531 are required. The remaining 3 semester hours may be completed in additional statistics courses (not 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 seven concentration business areas listed above, economics, or a related area in another school or college of the University. Hybrid cognates combining courses from multiple disciplines are permitted with the approval of the doctoral advisor and the temporary doctoral advisory committee.

Comprehensive Examinations
Comprehensive written examinations over the concentration area are required of each person seeking candidacy for the Ph.D. degree. This examination is administered in two sessions of approximately four hours each. Students qualify in the cognate area by completing a one-session, four-hour examination or an equivalent jointly approved by the student’s major professor and the student’s advisor in the cognate area. Comprehensive examinations are generally offered during the fall and spring terms. Comprehensive examinations must be taken within five years of matriculation.
When either the concentration or cognate area examination is passed, the remaining examination must be passed within the next 13 months.

Doctoral Committee

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

Admission to Candidacy

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

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

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

Dissertation

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

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

ACADEMIC 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.

Business Administration

GRADUATE COURSES

501 MBA Career Development (1) Career opportunities available in each concentration. Prereq: Admis- sion to MBA program or consent of Assistant Dean of MBA Program. Satisfactory/No Credit grading only.

506 Enterprise Process Redesign (3) Enterprise Resource Planning (ERP) software as primary tool for redesigning business processes. Management meth- ods for evaluating value in redesign, value manage- ment, consensus management, project management, and implementation methodologies. Configuration of ERP module and business-to-business e-commerce tools. (Same as Information Management 501.)

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

511 MBA Core I (3) Essential skills of manager: basic information management, team building, and writ- ten and oral communication skills. Finance and ac- counting fundamentals. Introduction to integrated value chain. Prereq: Admission to M.Acc. program or consent of Assistant Dean of MBA Program. S/NC only.

512 MBA Core II (15) Development of roles and responsibilities of business managers. Functional fun- damentals: marketing, operations, human resource management, finance, information technology, cost management and delivery of customer value. Role of firm in society, shareholder value, economics, and ethical and legal environment of firm. Personal leadership skills, and assessment of students' leadership abilities. Integra- tion of value chain: demand management, operations management, process design and management, and logistics management. Prereq: 511 or consent of As- sistant Dean of MBA Program.

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


515 MBA Capstone (1) The course is the capstone experience in the full-time MBA Program. It is de- signed to allow students to integrate and utilize the skills and knowledge they have acquired in the pro- gram, by applying them to real world business prob- lems. Working in teams, students will participate in one of several types of projects including but not limited to a comprehensive case analysis and compe- tition, development of a business plan, or a consulting project with a non-profit or other type of existing organization. They will be required to deliver both a written and oral presentation of their work at the end of the semester. Prerequisites are BAS11, BAS12, and BAS13 or consent of Assistant Dean of the MBA Program. S/NC only.


551 Executive Core I (12) Integrated course with substantial reading, study and analyses during off-site periods. Integration of major business functions through strategic and business process perspectives. Focus on application of functional knowledge to tactical and strategic issues. Development of purpose of firm as delivering value to customers and other stakeholders. Emphasis on: strategic and financial principles, Economic and regulatory environment of business. Human resource and organizational behavior topics in context of business systems and objectives. Per- sonal development for leadership: individual personal skills of communication, negotiation, leadership and management.


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


591 International Travel (1) One-hour course pro- vides one-hour credit for international study. Prereq: admission to international travel and cultural exchange programs that are sponsored by the MBA program. Prereq: Admission to M.Acc. program or consent of Assistant Dean of the MBA Program.

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

599 Executive-In-Residence (3) Interaction with cor- porate executives from wide spectrum of business disciplines and discussion of domestic and interna- tional strategic planning as applied in major corpora- tions. Prereq: MBA core and consent of instructor.


612 Seminar in Research Methods (3) Research processes: philosophical foundations, problem formu- lation, grounded theory, qualitative methods and analysis, measurement, validity and reliability, experimen- tal design and analysis, survey design and analysis.

693 Independent Study (3) Prereq: Consent of In- structor. May be repeated. Maximum 6 hours.

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

( College of Engineering )

MAJOR DEGREES

John R. Collier, Head

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

Professors:
Bienkowski, Paul R., Ph.D. .......... Purdue
Cochran, Hank D. (Adjunct), Ph.D. ....... M.I.T.
Collier, John R., Ph.D. .......... Case Western Reserve
Couser, Robert M., Ph.D. .......... Tennessee
Moore, Charles F. (Alumni Professor), Ph.D. .......... Louisiana State
Steth, Atul C. (UTSI), Ph.D. .......... Northwestern

Associate Professors:
Bruns, Duane D., Ph.D. .......... Houston
Edward, Brian J., Ph.D. .......... Delaware
Frymier, Paul D. (Liaison), Ph.D. .......... Virginia
Petranov, Simion (Research), Ph.D. .......... Iasi Tech

Wang, Tse-Wei, Ph.D. .......... M.I.T.
Weber, Frederick E., 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; non-resident students must register for ChE 502 every semester or may register for ChE 505, 506, or 507 with permission of the instructor.

4. A final oral examination covering the thesis, related fields and graduate course work.

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

1. A total of at least 33 hours in graduate courses in chemical engineering and related areas. The minimum requirements are 18 hours in chemical engineering; 6 hours in other engineering, scientific, or business areas (as approved by the departmental faculty); and 9 hours chosen from either of these two categories.

2. Completion of a critical review of the literature and other sources in an area related to chemical engineering (CHE 580).

3. A written comprehensive examination covering the 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 doctoral’s thesis may be offered as such evidence.

Department requirements consist of the satisfactory completion of:

1. Graduate courses in chemical engineering, amounting to approximately 24 semester hours, at least 9 of which must be in 600 series courses.

2. Supporting courses in related scientific and engineering fields amounting to approximately 24 semester hours, subject to approval by the student’s faculty committee.

These related fields will normally include chemistry, mathematics, physics, and engineering.

3. The comprehensive examination, consisting of a written part and an oral part. The written component will normally include thermodynamics, reactor analysis, and transport phenomena and separations.

4. Active participation in graduate seminars conducted by the department. Resident students must register for ChE 501 every semester offered.

CERTIFICATE IN MAINTENANCE AND RELIABILITY ENGINEERING

The College of Engineering offers a certificate program in maintenance and reliability engineering. The program is designed primarily for part-time students in that several of the courses are available through distance education.

The 12-credit certificate is earned by completing 483 and 484, which are cross-listed among all participating departments in the College of Engineering, plus two elective courses selected from a list of courses provided by the participating departments. Currently, the available elective courses are Chemical Engineering 561, Industrial Engineering 516 and 591, Mechanical Engineering 534 and 599, and Nuclear Engineering 579 and 585. The selection of elective courses is determined through an advising conference with each individual student, and is based on the student’s personal interests, academic background, and work experience. Applicants must meet the minimum criteria established by the Graduate Council.

GRADUATE COURSES


467 Honors: Engineering Internship in Process Control (4) Selected students work in small groups on industrial problems in process dynamics and control. Directed by faculty and engineers from host company. Prereq: Process Dynamics and Control and consent of instructor.

477 Honors: Applied Process Automation Laboratory (3) Interfacing flexible batch continuous processes to automation systems. Top down analysis with bottom up implementation, hierarchical structures and object oriented concepts used to design automation solutions: human-machine-interfaces. Workstations with modern industrial equipment, interactive graphics and visualization environment. Prereq: Process Dynamics and Control and consent of instructor.

483 Introduction to Reliability Engineering (3) (Same as Nuclear Engineering 483, Industrial Engineering 483, and Mechanical Engineering 483.)

484 Introduction to Maintenance Engineering (3) (Same as Nuclear Engineering 484, Industrial Engineering 484, Materials Science and Engineering 484, and Mechanical Engineering 484.)
485 Hydrocarbon Processing (3) Chemical and physical properties of selected petroleum and those processes utilized in conversion of raw material into various fuels and selected chemical feedstocks. Prereq: Mass Transfer and Separation Processes, Organic Chemistry.

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

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

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

505 Engineering Analysis (3) Formulation and solution of problems in chemical engineering and material areas, ordinary and partial differential equations; types of ODE, PDE, and solution techniques; transform methods; conformal mapping; variational methods; introduction to numerical methods. (Same as Materials Science and Engineering 505.)

507 Application of Linear Algebra in Engineering Systems (3) Fundamental concepts of linear algebra to problems in chemical engineering; steady state and dynamic systems. Geometric and physical interpretations of relevant concepts: least square problems, LU, QR, and SVD decompositions of system matrix, eigenvalue problems; similarity transformations in solving difference and differential equations; numerical stability aspects of various algorithms; application of linear algebra to control and optimization studies; introduction to linear programming. Computer projects. Prereq: Graduate standing or consent of instructor. (Same as Electrical and Computer Engineering 507, Mechanical Engineering 507.)

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


541 Polymer Rheology (3) (Same as Materials Science and Engineering 507.)

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 operation, emphasizing nonisothermal and multi-component systems.

547 Transport Phenomena I (3) Unified treatment of momentum transport (fluid flow), energy transport (heat conduction, convection, and radiation) and mass transport (diffusion). Fundamental basis of transport phenomena and momentum transport: viscous, viscoelastic, and potential flows.

548 Transport Phenomena II (3) Unified treatment of momentum transport (fluid flow), energy transport (heat conduction, convection, and radiation) and mass transport (diffusion). Energy transport and mass transport in closed and flow systems, interrelationships between transport processes, and prediction of transport parameters.

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 bioreactor systems, biosensors, and immobilization methods. Fundamental laboratory techniques during 8-week laboratory period. (Same as Environmental Engineering 575, Biosystems Engineering 575 and Microbiology 575.)


581 Industrial Pollution Prevention (3) Principles and practical aspects of industrial waste minimization. Regulations, environment, waste minimization strategies, economic analysis, process safety, case 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 585.)

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

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

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

631 Advanced Topics in Statistical Thermodynamics and Molecular Dynamics (3) Statistical thermodynamics, molecular based computer simulations: Monte Carlo and molecular dynamic calculations; applications to supercritical fluids, macromolecules and biological systems. Prereq: 532.


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

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


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 macroecological, cellular/physiological and molecular). Experimental methods for data gathering, signal resolution and processing, mathematical signal analysis, model development (deterministic, stochastic, phenomenological), and utility and limitations of approach. Prereq: 575 or consent of instructor.

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

Chemistry

(Majors and Certificate Program)

DEGREES

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

Michael Sepaniak, Head

Professors:

Adcock, J. L., Ph.D. ..................... Texas
Baker, D. C. (Paul and Wilma Ziegler Professor), Ph.D. ................. Ohio State
Barnes, C. E., Ph.D. ......................... Stanford
Bartmess, J. E., Ph.D. ................. Northwestern
Chambers, J. Q., Ph.D. ................. Kansas
Compton, R. N., Ph.D. ................. Tennessee
Cook, K. D., Ph.D. ....................... Wisconsin
Dunning, T. (Distinguished Scientist), Ph.D. .... California Institute of Technology
Feigerle, C. S., Ph.D. ................... Colorado
Guiochon, G. (Distinguished Scientist), Ph.D. .... Ecole Polytechnique and Paris VI
Kalbaka, G. W. (Robert H. Cole Professor, Distinguished Professor), Ph.D. .... Purdue
Kovac, J. D., Ph.D. ........................ Yale
Larese, J. Z., Ph.D. .... Wesleyan (Connecticut)
Magid, L. J., Ph.D. ....................... Tennessee
Magid, R. M., Ph.D. ........................ Yale
Mays, J. W. (Distinguished Professor), Ph.D. ........................ Akron
Pagni, R. M., Ph.D. ........................ Wisconsin
Schwertzer, G. K. (Distinguished Professor), Ph.D. ....... Illinois
Sepaniak, M. J., Ph.D. ........................ Iowa State
VanHook, W. A. (Paul and Wilma Ziegler Professor), Ph.D. .......... Johns Hopkins
Williams, T. F. (Distinguished Professor), Ph.D. ......... London
Woods, C. III, Ph.D. ....................... NC State
Xue, Z. B., Ph.D. ............................ California

Associate Professors:

Baker, D. C. (Paul and Wilma Ziegler Professor), Ph.D. ................. Stanford
Berke, J. R., Ph.D. .......................... Penn State
Bower, D. A., Ph.D. ....................... Florida
Chancellor, E., Ph.D. ..................... California
Schell, F. M., Ph.D. ....................... Indiana

Assistant Professors:

Gilman, S. C., Ph.D. ................. Penn State
Turner, J. Ph.D. ............................. Oxford
Young, D. G., Ph.D. ...................... Ohio State
Zhad, B., Ph.D. ............................ Akron
Zhang, X. P., Ph.D. ....................... Pennsylvania

The Faculty of the Department of Chemistry at The University of Tennessee seek to prepare their students to join the international ranks of professional chemists in fundamental areas of chemistry as well as cross-disciplinary sciences in which chemical expertise plays a critical role in the development of new knowledge and technologies. Students planning to major in Chemistry for the master’s or doctoral degree will ordinarily have attained a satisfactory record in the traditional areas of chemistry. The Department, however, recognizes that modern chemistry transcends traditional disciplinary divisions. Therefore, it encourages students with undergraduate majors in chemical engineering, the biological sciences, physics, mathematics, computer science, or other fields to apply for admission to our program.

Admission to the graduate program and a student’s course of study in graduate school are decided on a case-by-case basis, taking into consideration an applicant’s undergraduate record (traditionally including one year, each, of general, analytical, organic, and physical chemistry, and one-half year of inorganic chemistry), performance on national graduate school tests, and departmental diagnostic exams. All applicants are required to take the general Graduate Record Examination.
GRADUATE COURSES


471-81 Biophysical Chemistry (3, 3) (Same as Biochemistry and Cellular and Molecular Biology 571-81.)

473-83 Physical Chemistry (3, 3) Students may not receive credit for both 471 and 473 nor for both 481 and 483. 473 - Properties of gases; first, second and third laws of thermodynamics; chemical equilibria; simple phase equilibria; properties of solutions. 483 - Introduction to statistical thermodynamics; kinetics of chemical reactions; introduction to quantum mechanics and applications to electronic structure of atoms and molecules; molecular spectroscopy. Prereq: General Chemistry, Elements of Physics or Fundamentals of Physics: Electricity and Magnetism, and Calculus III.

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 479 and 481 or 483 for 489. 1 lab.

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

501 Chemistry Seminar (1) Lectures and discussion on current research. May be repeated. Continuous registration required for resident graduate students. 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.

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

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

511 Analytical Separations (3) Principles and practice of chemical separations based on extraction, chromatographic, and electrophoretic phenomena. Required background: Two semesters of physical chemistry.

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

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. Required background: One semester of inorganic chemistry.

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

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

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

550 Structure and Reactivity in Organic Chemistry (3) Structure and bonding in organic compounds; molecular orbital theory, stereochemistry, conformation, reactivity, and chemical reactions. Prereq: Two of 550 or 51-52 or consent of instructor. May be repeated. Maximum 12 hrs.


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


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

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

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

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

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

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

594 Organic Chemistry of Polymers (3) Synthesis of monomers; mechanism, stereochemistry, sequence distribution, and kinetics of polymerizations, formation of biodegradable polymers. Reactions on polymers. Prereq: 590 or equivalent.

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

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

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

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

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

650 Selected Topics in Organic Chemistry (3) Topics of current significance. Prereq: Two of 550-51-52 or consent of instructor. May be repeated. Maximum 12 hrs.

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

691 Selected Topics in Thermal Analysis of Polymeric Materials (3) Topics of current significance. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. Maximum 3 hrs may be applied toward degree in chemistry.

Child and Family Studies
(College of Education, Health, and Human Sciences)

MAJORS DEGREES
Child and Family Studies................. M.S.
Human Ecology.......................... Ph.D.

Gary W. Peterson, Head

Professors:
Barber, Brian K., Ph.D. ............... Brigham Young
Blanton, Priscilla, Ed.D. ............. Tennessee
Buehler, Cheryl, Ph.D. ............... Minnesota
Cunningham, Jo Lynn, Ph.D. .... Michigan State
Fox, Greer Litton, Ph.D. ................. Michigan
Moran, James D., Ph.D. ......... Oklahoma State
Nordquist, V. Mick, Ph.D. ........ Tennessee
Peterson, Gary W., Ph.D., Brigham Young
Twardosz, Sandra, Ph.D. .............. Kansas

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

Assistant Professors:
Brandon, Denise, Ph.D. .............. Tennessee
Devereaux, Matt, Ph.D. .............. Tennessee
Moran, Mary Jane, Ph.D. ........... New Hampshire
Wass, Tara, Ph.D. ....................... Denver

The Department of Child and Family Studies offers graduate programs leading to degrees, majors, and concentrations in:

Master of Science

Child and Family Studies
Child and Family Studies
Early Childhood Education

Doctor of Philosophy

Human Ecology

Child and Family Studies

The Department of Child and Family Studies (CFS) provides both masters and doctoral degrees. Our graduate programs are based on the model of the "empirically-based professional" where students learn to conduct research on child development, family studies, and educational environments in accordance with established standards of scientific inquiry and evaluation. CFS graduate programs seek to produce researchers, scholars, and educators who are capable of independent investigation of family and developmental processes. Students also receive training in how to conduct scientifically based assessments of prevention, intervention and educational strategies. Many opportunities exist in CFS for graduate students to become involved in research on children, youth, and families. The central premise of graduate programs in CFS is the idea that scientific inquiry provides the most effective means to improve the welfare of children, youth and families.

A cornerstone idea for CFS graduate programs is "development in context," or the perspective that human development is best understood in terms of interconnections among families, neighborhoods, schools, communities, cultures and international environments. A more specific focus within this "development in context" perspective is an emphasis on "children, youth, and families at risk." Together, these two themes, "development in context" and "children, youth, and families at risk," are the foundations upon which our graduate curriculum options are structured.

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 Rating Forms by three colleagues who can attest to the applicant's potential for graduate education. Forms may be obtained from the department or departmental link on the college web site: http://www.cehhs.utk.edu/departments.html.

Admission to the program is contingent upon faculty evaluation of GRE scores, undergraduate/graduate GPA, rating forms, work experience, and the match between student's goals and department's focus and programs. Prerequisites for admission to the master's program are 9 semester hours of upper division undergraduate social science. Prerequisites to the doctoral program are a master's degree from a regionally accredited institution or equivalent, completion of the 12-hour foundation core in the CFS master's program, 3 hours of computation-based, graduate-level statistics, and completion of a thesis as part of the master's degree.

THE MASTER'S PROGRAM

The Master of Science degree in Child and Family Studies provides a broad foundation for understanding how children develop and how families function in today's society. All master's candidates enroll in CFS foundation courses which include theoretical and empirical surveys of the human development, child development, and family science literatures plus a survey of methods of discovery used in child and family research. All MS students are expected to engage in productive research culminating in a thesis or project. Students choose to concentrate either in Child and Family Studies, leading to doctoral study or careers in community agencies serving children and families, or Early Childhood Education, leading to an educator career in early childhood or school settings.

The Child and Family Studies concentration requires a minimum of 36 credits of coursework: 12 credits in foundation coursework and 24 credits in specialization. The CFS foundation courses include CFS 510, 511, 550, and 570. The 24 additional credit hours, selected with guidance of the student's master's committee, are earned as follows: 9 CR in CFS-prefix courses, 6 CR in graduate electives, which may include CFS-prefix courses, 3 CR in Statistics 531, 537 or Social Work 605, and 6 CR of thesis research in CFS 500. Students seeking the M.S. with a major in Child and Family Studies must select a master's committee chair and file a plan of study with the department head after 12 hours of graduate credit.

I. MS in Child and Family Studies

CFS Foundation Courses 12 CR

CFS 510 Theories of Human Development
CFS 511 Research in Child Development
CFS 550 Theory and Research in Family Studies
CFS 570 Research Methods in CFS

Computation-based Statistics 3 CR

Stat 531 Survey of Statistical Methods 1 or
Stat 537 Statistics for Research 1 or
SW 605 Analysis of Social Work Data 1

CFS Specialization Electives 9 CR

Three CFS-prefix graduate courses; may not include directed study courses CFS 581 or 620; may include only 3 CR of special topics courses CFS 580 or CFS610.

General Electives 6 CR

Courses may be CFS-prefix courses or may include courses from outside the CFS curriculum.

Thesis Research 6 CR

CFS 500

Total 36 CR

The Early Childhood Education concentration is designed for students seeking a MS degree along with initial teacher licensure in early childhood education (Pre-K through Grade 4). Students interested in a CFS MS degree in ECE must apply for admission to graduate study in CFS through the procedures outlined above. (Application for admission to the fifth year licensure program in CFS ECE is a separate procedure and is described in the CFS undergraduate catalog. Admission to the fifth year licensure program does not include admission to the CFS MS in ECE program.) The course of study for CFS MS in ECE students includes 12 CR in the CFS foundation courses: CFS 510, 511, 550, and 569. 18 CR in ECE core: CFS 512, 574, 575, 591; 3 CR of computation- or consumer-based graduate statistics (Statistics 531, 537, Social Work 605, or EP 550), 3 CR in ECE specialization electives, completion of a research project in CFS 569, and a written comprehensive examination (36 credits).

II. MS in Early Childhood Education

CFS Foundation Courses 12 CR

CFS 510 Theories of Human Development
CFS 511 Research in Child Development
CFS 550 Theory and Research in Family Studies
CFS 569 Action Research in Early Childhood Education
Early Childhood Education Core (includes licensure) 18 CR

CFS 512 Research in Early Childhood Education (3)
CFS 574 Analysis of Teaching for Professional Development (1 cr)
CFS 575 Professional Internship in Teaching (12 cr)
CFS 591 Clinical Studies (2 cr)

Computation- or Consumer-based Statistics 3 CR
Stat 531 Survey of Statistical Methods 1 or Stat 537 Statistics for Research 1 or SW 605 Analysis of Social Work Data 1 or CEEP 520 Statistics and Research Design

ECE Specialization Electives 3 CR
Elected from list of courses with prior committee approval.

Research Project in Lieu of Thesis CFS 569 Action Research in Early Childhood Education

Written Comprehensive Exam Total 36 CR

THE PH.D. PROGRAM
The department supports a doctoral program leading to a Ph.D. in Human Ecology. Two themes are highlighted: the integration of human development and family studies and concentration in a selected area of study. A doctoral program that is concurrently specialized and integrative in nature reflects the complexity of the disciplinary subject matter, provides a broader context to formulate theoretical questions, and broadens the empirical literature for addressing those questions.

Requirements include:
1. Completion of the foundation courses in the Master's program: 510, 511, 550, and 570.
2. Completion of the doctoral core: 640, 634, 691 or 650.
5. Three credits of advanced statistics.
6. Minimum 3 credits in specialized research methods.
7. Selection of one of the following specializations: teaching in higher education requires UT GTA seminar, 3 credits of college teaching methods and one semester of supervised teaching experiences; administration in community services requires 566 or 563, 521 or SW 541, and one semester of an administrative apprenticeship; research emphasis requires 6 additional credits in research methods or statistics.
8. Minimum of 6 credits in a cognate area.
10. Minimum of 96 credits beyond the bachelor's degree.

GRADUATE COURSES

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

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.

505 Development of Interpersonal and Supervision Skills (3) Refinement of interpersonal skills needed to work with families and other professionals. Supervisory training in others' skill development, active listening, self-disclosure, relationship building, and negotiation. Skills adapted for use among family members.

510 Theory in Human Development (3) Theoretical models of human development: cognitive, social learning, and ecological theory; analysis, synthesis, and discussion of historical and contemporary relevance of models; application of theory to research, prevention, intervention, and education; critical reading and evaluation of theory-based research on human developmental processes.

511 Survey of Research in Child Development (3) Survey of human development research from conception through adolescence. Classic and contemporary empirical literature in domains of physical, cognitive, language, social, moral, and motor development; biological basis of development of cross-cultural perspectives.

512 Survey of Research in Early Childhood Education (3) Current literature and issues in early childhood education. Prereq: 510 or equivalent or consent of instructor.

515 Children in Contemporary Society (3) Theory and research on environmental and developmental issues in contemporary family situations and educational environments for children from infancy through middle childhood. Implications for programs and policy.

522 Naturalistic Interventions for Parents and Teachers of Young Children (3) Common problems facing home and school settings. Methods available to modify problem behavior.

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

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


545 Family Resource Management and Instruction (3) Design and implementation of family resource management curriculum for family life education auditoriums, education of family community: planning and community participation in family settings; analysis of goals, resource use, information systems, constraints within families. Observation and analysis of diverse family practices. Prereq: 563.

550 Theory and Research in Family Studies (3) Research in various major topics in family studies and application of theoretical models to understanding research. Prereq: 560.


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


564 Practicum in Human Development or Family Studies I (3) School and community programs concerned with education for human development and family living. Committee approved and supervised written project. S/NC only.

565 Practicum in Human Development or Family Studies II (3) School and community programs concerned with education for human development and family living. Committee approved and supervised written project. S/NC only.

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

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


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

574 Analysis of Teaching for Professional Development (1) Strategies to design and analyze the effectiveness of teaching and of professional development. Study and application of various approaches. Coreq: 575.

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/NC only.

580 Special Topics in Human Development or Family Studies (1-3) Research, theory and current issues in child development or family studies: divorce, handicapped children, symbolic interaction, work and family, Piaget, mainstreaming children, theory and research in human sexuality, cognition. Prereq: 6 graduate hrs in major, or consent of instructor. May be repeated with different topics. Maximum 9 hrs.

581 Directed Study in Human Development or Family Studies (1-3) Individual learning experiences in specific topics in child development and early childhood education or family studies. Prereq: 6 graduate hrs or consent of instructor. May be repeated with different topics. Maximum 6 hrs.

591 Clinical Studies (1-4) Group and individual seminar activities during full-time internship. Application and evaluation of professional core competencies. Completion and presentation of portfolio and analysis of teaching project. Coreq: 575.

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

(College of Engineering)

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

Gregory D. Reed, Head

Professors:
Bennett, R. M., PE, Ph.D. ................ Illinois
Burdette, E. G. (Fred N. Peebles Professor), PE, Ph.D. ......... Illinois
Chatterjee, A., PE, Ph.D. ............... NC State
Davis, W. T., Ph.D. ....................... Tennessee
Deatherage, J. H., PE, Ph.D. .......... Tennessee
Drumm, E. C., PE, Ph.D. ............... Arizona
Goodpasture, D. W., Ph.D. ............. Illinois
Reed, G. D. (Liaisson), PE, Ph.D. ..... Arkansas
Robinson, R. B. (Fisher Professor), PE, Ph.D. ............... Iowa State
Urbanik, T., Ph.D. ....................... Texas A&M
Wegmann, F. J., Ph.D. ................. Northwestern

Associate Professors:
Cox, C. D., Ph.D. ...................... Penn State
Han, L. D., Ph.D. ...................... California
Miller, T. L., PE, Ph.D. ............... Tennessee
Penumadu, D., Ph.D. ................... Georgia Tech
Richards, S. H., PE, Ph.D. .......... Tennessee
Robinson, K. G., Ph.D. .............. VPI

Assistant Professors:
Chu, K., Ph.D. ....................... California
Gentry, R., Ph.D. ...................... Memphis
Huang, B., Ph.D. ............... Louisiana State
Ingram, E., Ph.D. .................. Tennessee
Emeriti Faculty:
Tschantz, B. A., PE, Sc.D. .......... New Mexico State

The Department of Civil and Environmental Engineering offers degrees leading to the Master of Science and Doctor of Philosophy with a major in Civil Engineering concentrating in construction engineering, environmental engineering, geotechnical/materials engineering, public works engineering, structural engineering, and transportation engineering; to the Master of Science in Environmental Engineering with concentrations in water quality, water resources, air quality, waste management, waste management, and environmental risk assessment. For further information, visit the web site at http://www.engr.utk.edu/civil/.

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 6 hours of thesis, is required.

Non-Thesis Option: A minimum of 33 semester hours of approved graduate courses. A minor may be selected but is not necessarily required.

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 level graduate courses in a field of study and dissertation credit, at least 6 hours of which must be 800-level courses.

2. A minimum of 24 semester hours of approved graduate courses in civil engineering, exclusive of dissertation credit, at least 6 hours of which must be 800-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 mathematics, physics, and other engineering fields. A minimum of 9 semester hours of mathematics will be required beyond the civil engineering undergraduate requirements.

4. One foreign language if the student's faculty committee feels that a reading knowledge of a foreign language is crucial to the student's research efforts.
510 Urban Systems: Engineering and Management (3) Various urban systems usually under re- sponsibility of city manager and/or city engineer: streets, lighting, traffic, water, refuse collection, Personnel management, finance, planning and public relations. Prereq: Graduate standing or consent of instructor.
522 Advanced Mix Design and Analysis for Asphalt and Portland-Cement Concrete (3) Aggregate properties and tests, asphalt binder properties and tests, mix design methods for asphaltic mixtures, hot-mix asphalt (HMA) mixture production and placement, HMA mixture characterization and analysis, Portland-cement concrete (PCC) mix design, admixtures for PCC, special types of PCC, PCC production and construction. Prerequisite: CE 321.
531 Soil Stabilization (3) Mechanical stabilization of soils (compaction, drainage, and blending); chemi- cal stabilization of soils with admixtures, waterproof- ing and modifying soils and additives. Reinforced earth and stabilization with geosynthetics. Prerequisite: Introduction to Soil Behavior.
532 Rock Mechanics and Rock Engineering (3) Rock engineering properties and characterization of rock and rock masses. Discontinuity analysis, stress and strain, rockburst theory. Applications to rock slopes, underground excavations, foundations and ground- water flow. Prereq: Introduction to Soil Behavior or consent of instructor.
533 Advanced Laboratory and Insitu Testing of Soil (3) Instruments for measurement of electrical signals, static and dynamic transducers, data acquisi- tion and control, insitu measurement of stress, pore pressure, deformation, load deformation behavior (seismic methods, static methods), advanced labora- tory shear strength and compressibility testing. Prereq: 320. Introduction to Soil Behavior. 2 hrs and 1 lab.
534 Geological Engineering (3) Influence of geo- logical factors on engineering and construction characteristics of rocks and soils; applications of geology in planning, design and construction of civil engineering projects. Prereq: Introduction to Soil Behavior 2 hrs and 1 lab.
537 Issues in Geotechnical Engineering (1-3) Special readings, in-depth investigations, and present- ations in geotechnical engineering. Prereq: Graduate standing or consent of instructor. May be repeated.
538 Finite Element Applications in Geotechnical Engineering (3) Application of finite element method to study typical geotechnical engineering. Con- fined and unconfined flow through porous media; two- dimensional stress and strain; two-dimensional ele- ments; representation of nonlinear soil behavior with elastic and elastic-plastic models. Prereq: Introduc- tion to Soil Behavior and Matrix Computation or equiva- lent. Taught concurrently with CE 536. Students may not receive credit for both 538 and 536.
539 Geotechnometry Seminar (1) Seminar topics in geotechnical and geological engineering. Research contributions and case histories by graduate students and engineers and scientists from surrounding com- munity. Prereq: Graduate standing and consent of advisor. May not apply toward degree. May be re- peated. S/NC only.
540 Construction Management I (3) Management and organization of heavy and building construction projects. Prereq: Construction Methods and Equipment.
541 Construction Management II (3) Management organization of heavy building construction projects. Prereq: Construction Methods and Equipment.
543 Construction Estimating (3) Project costs, esti- mating and takeoff techniques, market cost condi- tions, and feasibility of design and cost. Prereq: Con- struction Methods and Equipment.
551 Traffic Engineering-Characteristics (3) Driver-vehicle-roadway system; traffic flow modeling; ele- ments of transportation/highway safety. Prereq: Gradu- ate standing.
552 Traffic Engineering-Operations (3) Signs, sig- nals and marketing; short-term operations; controllers; signal timing/ phasing; one-way reversible flow; sys- tem operations; identification and correction of high- accident locations and system deficiencies. Prereq: 551 or 452.
553 Geometric Design and Layout of Roadways and Community Facilities (3) Functional and geo- metric design and rural and urban roads of all classes; future transportation corridors and/or urban roads of all classes; techniques for access control; freeway inter- changes and street intersections; and parking. Prereq: 451 or consent of instructor.
555 Public Transit Planning (3) Characteristics of transit modes—conventional and paratransit; opera- tional design of transit services: route planning and scheduling; cost analysis; mode choice models; per- formance evaluation; congestion, public organization and financing. Prereq: 554 or graduate standing.
559 Traffic Accident Reconstruction (3) Data collection and analysis as basis for accident prevention on control programs; roadside hardware design and crash test. Prereq: 452 or graduate standing.
557 Transportation Planning and Operations with Micro-Computer Applications (3) Transportation sys- tem management techniques and application of mi- cro-computers to analysis of transportation actions. Prereq: 537.
558 Planning and Transportation (3) Preparation of transportation as elements of comprehensive develop- ment plans. Analysis of relationship between vari- ous transportation modes and between transportation and other community features. Use of planning pro- cess to establish existing travel patterns, modeling of demand, proposing alternatives and evaluation. Prereq: Graduate standing. Same as Planning 537.
561 Finite Element Applications in Structural Engi- neering (3) Application of finite element method to typical problems in structural engineering. Truss, beam and plate elements; two-dimensional stress and strain; two-dimensional elements; representation of nonlinear material behavior with elastic and elastic- plastic models. Prereq: Structural Analysis and Ma- trix Computation or equivalent. Taught concurrently with CE 538. Students may not receive credit for both 538 and 561.
562 Structural Systems (3) Structural system analy- sis and design; dead, live, wind, and earthquake loads on buildings; vertical and horizontal resisting sys- tems; use of computers in analysis and design. Prereq: Introduction to Structural Design.
563 Statistically Indeterminate Structures (3) Elastic analysis of indeterminate articulated and rigid frames with nonprismatic members using energy, slope de- flection, and moment distribution methods; plastic analysis of rigid frames; and stability analysis of com- pression members and portal frames. Prereq: Struc- tural Analysis II.
565 Structural Dynamics (3) Analysis of free and forced vibrations, and transient response of struc- tures having many degrees of freedom; elastoplastic behavior and consideration of nonprismatic elements, earthquake design and response of structures. Prereq: Introduction to Structural Design.
571 Behavior of Steel Structures (3) Behavior of structural steel members due to static and fatigue loading; relation between research results and current specifications for design. Prereq: 471.
Environmental Engineering

GRADUATE COURSES

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

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

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

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

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

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

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

530 Urban Hydrology and Stormwater Engineering (3) Planning, design, modeling, management, and maintenance of urban stormwater systems. Theory and application of hydraulic and hydrologic principles to design of stormwater management systems; design of inlet structures, conveyance systems, detention/retention basins and appurtenances, and selected best management practices (BMP’s); evaluation of land-use changes of runoff quantity and quality; review, selection and application of contemporary computer models. Prereq: Hydraulics, Hydrology.

535 Ground Water Hydrology (3) Dynamics of flow and contaminant transport in groundwater, geohydrodynamic, dispersion, anisotropy, layered soils, unsaturated flow and groundwater contaminant transport phenomena. Analytical and numerical solution of flow, and transport equations. Prereq: Hydraulics and Hydrology or Civil Engineering 485 for geology majors. (Same as Geological Sciences 535.)

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

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

551 Physicochemical Unit Processes (3) Theory and design application in water and waste water treatment. Prereq: Water and Waste Treatment, 2 hrs and 1 lab. (Same as Biosystems Engineering 552.)

552 Biological Treatment Process (3) Theory and design applications of biological processes to treatment of wastewater and solid wastes. Prereq: Water and Waste Treatment. 2 hrs and 1 lab. (Same as Biosystems Engineering 552.)

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

554 Environmental Engineering Chemistry (3) Application of chemical principles in analyzing physical, chemical, or biological interactions of chemical contaminants in various environmental compartments: ambient water, 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 treatment; regulations, analysis; industrial applications. Prereq: Graduate standing or consent of instructor.

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

570 Air Quality Management/Pollution Control (3) Introductory course on concepts of air pollution, analysis of relationships among sources, meteorology, effects; 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 particle air pollutants. Comprehensive design of specific devices and systems. Prereq: 570.

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

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

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

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

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

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

597 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.

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

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

David W. Tandy, Head

Professors:  
Craig, C. P., Ph.D. .......... North Carolina  
Gesell, G. C, Ph.D. .......... North Carolina  
Martin, S. D., Ph.D. .......... Michigan  
Tandy, D. W. (Distinguished Professor), Ph.D. .......... Yale

Associate Professor:  
Shelton, J., E., Ph.D. .......... Vanderbilt

Assistant Professors:  
Sutherland, E. H., Ph.D. .......... UC Berkeley  
Van de Moortel, A., Ph.D. .......... Bryn Mawr

Emeritus Faculty:  
Rutledge, H. C., Ph.D. .......... Ohio State

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

GRADUATE COURSES


405-06 Selected Readings from Greek Literature (3,3) For advanced students in Greek, plays, historical writings, poetry of ancient Greece in original Greek. Prereq: 401-402 or consent of instructor. May be repeated. Maximum 9 hrs.

414 Cicero and Techniques of Latin Prose Composition (3) For advanced students in Latin, practice in prose composition, writings of Cicero the model. Prereq: 351-52 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 (3) Art, literature, religion, and society of Greece and Rome. May be repeated with consent of department. Maximum 9 hrs.

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

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

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

Communication Studies  
(College of Communication and Information)

MAJORS

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

John W. Haas, Head

Professors:  
Julian, Faye D. (Liaison), Ph.D. .......... Tennessee  
Lester, Lorayne W., Ed.D. .......... Tennessee

Associate Professors:  
Ambrester, M. L., Ph.D. .......... Kentucky  
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. .......... Oklahoma  
Halone, Kelby K., Ph.D. .......... Oklahoma  
Violanti, Michelle T., Ph.D. .......... Kansas

Emeritus Faculty:  
Yowmans, G. Allan, Ph.D. .......... Louisiana State

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

Graduate courses in Speech Communication also provide opportunities for students in a variety of disciplines to investigate how oral language can effect changes in the knowledge, the understanding, the ideas, the attitudes, or the behavior of other human beings.

Speech Communication

GRADUATE COURSES

466 Rhetoric of the Woman's Rights Movement to 1930 (3) Historical and critical study of public address in campaign for women's rights in United States from 1830's through 1930'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 1840's to present. (Same as Women's Studies 476.)

505 Research Methods (3) Understanding of wide array of data collection and analysis procedures used in speech communication research. Development of project/thesis proposal.

510 Orientation to Teaching Assistantship (1) Curriculum, classroom management, and other issues associated with teaching at college level. For departmental GTAs.

525 Seminar in Interpersonal Health Communication (3) Current research in health communication: support groups, medical ethics, medical narratives, doctor-patient communication, or interpersonal communication theoretical perspectives in medicine.

550 Organizational Culture (3) Clarification of complex nature of organizational culture to communicate meaning and its usefulness to organizational effectiveness: challenges created by today's changing organizations and workforces.

Communication

560 Special Topics in Speech Communication (3) Contemporary topics. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

580 Contemporary Rhetorical Theory (3) Current theoretical contributions to rhetoric: Burke, Perelman, Weaver, feminist and critical scholars.

590 Directed Reading and Research (3) May be repeated. Maximum 6 hrs.

591 Foreign Study (1-15) Independent study outside U.S. Prior to departure student must have plan of study approved by department head and supervising faculty member. Credit given only upon fulfilling all requirements set by department. May be repeated. Maximum 15 hrs.

592 Off-Campus Study/Internship (1-6) Independent study outside traditional classroom setting: community involvement and/or work experiences. Credit given only upon fulfilling all requirements set by department. May be repeated. Maximum 6 hrs.

593 Independent Study (1-6) Independent study by individual under direction of faculty member. Must obtain approval of faculty member and department prior to study.

Communication  
(College of Communication and Information)

MAJOR

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

The College of Communication and Information offers the Master of Science for the Schools of Advertising and Public Relations, Journalism and Electronic Media, Information Sciences, and Communication Studies. The Doctor of Philosophy in Communication is offered with concentrations in the areas noted above.

For application forms and other information about the M.S. and Ph.D. programs in Communication and Information, write to: Associate Dean for Graduate Studies, College of Communication and Information, 420 Communications Building, The University of Tennessee, Knoxville, Tennessee 37996-0347.

ADMISSION REQUIREMENTS

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

New students normally are admitted to the programs 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 communication, information sciences, 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.

Master’s 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 Communication is intended for students who desire a career in the mass media and communication industry, with an emphasis on communication management and a deeper understanding of the communication process and social role of media. The program concentrations include advertising, electronic media, journalism, science communication, public relations, converging media, and science communication. Both thesis and non-thesis options are available.

Degree Requirements

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

1. Six hours of core courses—Communication 512 and 540 to be taken during the first two semesters of the student’s program, except with written approval of the Associate Dean for Graduate Studies for the College.
2. Fifteen hours within one department of the college, at least 6 hours at the 500 level or above. An internship, if needed, is included.
3. Three hours for the thesis option and 9 hours for the non-thesis option of electives from a list provided by the department in area of concentration.
4. Six hours of thesis work (Communication 500) or a 3-hour project (Communication 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 communication law is a prerequisite.

A student’s internship experience requires approval by his/her advisor. Credit will be given through 598, Electronic Media 598, Journalism 598, or Public Relations 598 on the basis of 3 hours of credit for the equivalent of 15 weeks of full-time professional experience. This credit is to be included in the hour requirements for the M.S. program. Previous professional experience will be evaluated by the student’s committee. Students interested in subsequent entry into a doctoral program are advised to pursue the thesis option and to take additional courses in communication 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 Communication is intended to prepare scholars for teaching, research, administration, and service in the fields of communication and information. The program is interdisciplinary, consisting of a required core curriculum and recommended courses outside the College in the related social and behavioral sciences. The program is flexible and will accommodate a wide variety of career goals in communications. New students may be admitted to the program at any time; however, core courses begin only in the fall semester. Orientation attendance is required.

The master’s degree is required for entry into the doctoral program. Students lacking academic or professional experience in communications will be evaluated by the student’s committee. Generally, however, the program may be completed within three academic years of full-time study beyond the master’s degree.

The following are normally minimal requirements for admission to full potential candidate status:
1. A 3.0 (4.0 system) grade-point average in undergraduate studies, and 3.5 for graduate work in a master’s degree;
2. At or above the fiftieth percentile in verbal, quantitative and analytical aptitude on the Graduate Record Examination;
3. endorsement by at least three former teachers or professional colleagues; 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 87 hours of approved graduate work is required for the Ph.D.

1. Twenty-seven hours of core courses—Communication 620, 640, 641; 6 hours of statistics; and three of the following courses: Communication 622, 632, 642, and 652.
2. Fifteen hours in a primary concentration (advertising, electronic media, information sciences, journalism, public relations, science communication, or speech communication) supplementing the core. Courses may be taken in one or more of the schools in the college.
3. Twelve hours in a secondary concentration (outside the College of Communication and Information).
5. Twenty-four four hours of dissertation. All courses require the approval of the student’s advisory committee. Admission to candidacy must be attained at least two years 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 Communication and Information. 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 521, Tutorial in Communication Teaching. Planned course offerings in the College of Communication and Information for a full calendar year are available the preceding November. This information is available from the Graduate Studies Office, 420 Communications Building, 974-6651. See also courses listed under Advertising/Public Relations, Journalism/Electronic Media, Information Sciences, and Speech Communication.

ACADEMIC STANDARDS

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

GRADUATE COURSES

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

500 Thesis (1-15) P/NC only.

502 Registration for Use of Facilities (1-15) Requisite 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.

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

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

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

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

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.
Comparative and Experimental Medicine

(Office of the Provost)

MAJOR DEGREES

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

Robert N. Moore, Director

Joint Graduate Coordinating Committee:

Bartges, Joe, D.V.M., Ph.D., Veterinary Teaching Hospital
Karlstad, M.D., Ph.D., Anesthesiology
Lawler, J. E., Ph.D., Psychology
Lozzio, C., M.D., Medical Biology Moore, Robert E., 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 and resources from both veterinary and human medicine, is broadened by faculty members representing animal science and numerous areas of the life sciences. The interdisciplinary training environment includes such diverse support as facilities and personnel at the Veterinary Teaching Hospital, UT Medical Center at Knoxville, the Oak Ridge National Laboratory, Knoxville Zoological Park, Hemophilia Clinic, Developmental and Genetic Center, Hematology and Oncology services, and departments of life sciences.

For additional information, write to the Office of Research and Graduate Programs, or access the web site at http://www.vet.utk.edu/graduate.

ADMISSION REQUIREMENTS

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

Master of Science Degree Program

Applicants must have a baccalaureate degree with coursework in chemistry through organic, mathematics through calculus, physics, and basic biology. More advanced study in biology such as biochemistry, mammalian anatomy, histology, cell biology, or other appropriate biomedical courses from an accredited university is recommended. Applicants for admission to the Master of Science degree program whose background include no formal training in the biomedical field beyond the baccalaureate degree will be required to score at least 1,000 on the quantitative and verbal portions of the Graduate Record Examination.

Doctor of Philosophy Degree Program

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

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

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

THE MASTER’S PROGRAM

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

The graduate committee (at least 3 members) is chosen after the first term and must include at least one member from the College of Veterinary Medicine and at least one member from the Graduate School of Medicine. If a minor is declared, one member must be from the minor discipline.

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

THE DOCTORAL PROGRAM

Core courses are required for the program. A basic science and/or applied science concentration must be selected at the first meeting of the student’s doctoral committee. For the basic science concentration, students must take at least 4 credit hours in 500- or 600-level courses in basic mechanisms of disease and at least 6 credit hours of 500-level biochemistry or cell biology. See listings under the Biochemistry and Cellular and Molecular Biology program for information on these courses. For the applied science concentration, students must take at least 6 credit hours of 600-level epidemiology and at least 5 credit hours of 500- or 600-level statistics. In addition, students must complete a minimum of 8 hours of coursework in a specified discipline, 5 or more hours of electives, and 6 hours of Thesis 500. Exceptions to accommodate students with specific interests must be approved by the Joint Graduate Coordinating Committee after application, in writing, to the director.

The graduate committee (at least 3 members) is chosen after the first term and must include at least one member from the College of Veterinary Medicine and at least one member from the Graduate School of Medicine. If a minor is declared, one member must be from the minor discipline.

A final oral examination is given at the end of the program.
Comparative and Experimental Medicine—Veterinary Medicine

GRADUATE COURSES

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

500 Thesis (1-15) P/NC only.
501 Special Topics in Comparative and Experimental Medicine (1-8) Specialized experience in comparative and experimental medicine. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.
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.
508 Graduate Research Participation (1-3) 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.
521 Principles of Oncology (3) Lectures, classroom discussion, and case reports surveying major topics of oncology. Prereq: Biology 220-30 or consent of instructor.
541 Molecular Basis for Human Diseases (4) Disease at molecular level. Changes in molecular events in cells that lead to disease and occur as result of disease. Correlation with clinical and pathological states. Prereq: Biochemistry and Cellular Molecular Biology 410-419 or equivalent.
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/NC only.
610 Medical Biology Seminar (1) Invited speakers. Topics posted in advance. May be repeated. S/NC only.
611 Advanced Topics in Medical Science (1-3) New developments in biological research applicable to clinical medicine. Prereq: For doctoral candidates in Comparative and Experimental Medicine. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

Comparative and Experimental Medicine—Veterinary Medicine

Graduate School of Medicine

GRAMADUATE COURSES

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

500 Thesis (1-15) P/NC only.
501 Special Topics in Comparative and Experimental Medicine (1-8) Specialized experience in comparative and experimental medicine. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.
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.
503 Predictive Toxicology (3) Principles and techniques of predictive toxicology-activity relationships, expert systems, neural nets and molecular similarity.
505 Laboratory Animal Care and Use (2) Review of basic laboratory animal care and use as prerequisite to conducting research using animal subjects. Compliance, issues and techniques.
506 Experimental Animal Surgery (3) Competence in performing humane surgical modifications of experimental animals. Techniques of anesthesia. Drug administration and postoperative care. Prereq: Embryology, parasitology, physiology and/or consent of instructor. 1 hr and 2 labs.
530 Wildlife Diseases (2) (Same as Wildlife and Fisheries Science 530.)
551 Mammalian Organology (3) (Same as Animal Science 551.)
552 Anatomy of Domestic Carnivores (4) (Same as Animal Science 552.)
561 Pharmacology (4) Principles of pharmacokinetics and pharmacodynamics properties of drugs: mode of action, pharmacologic effects, chemical and physical properties, metabolism, toxicities, important idiosyncrasies of drugs, and clinical applications. Prereq: Consent of instructor.
600 Doctoral Research and Dissertation (1-15) P/NC only.
602 Surgical Pathology (1-2) Examination of biopsy specimens and interpretation of observations. Preparation of specimens for sectioning. Prereq: Consent of instructor. May be repeated. Maximum 3 hrs.
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.
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.
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.
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.
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.
608 Descriptive and Applied Epidemiology (3) Principles of epidemiology and historic and modern applications 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.
609 Mechanisms of Disease (4) Advanced topics in pathophysiology 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.
610 Advanced Topics in Comparative and Experimental Medicine (1-3) Specialized in-depth experience in various disciplines. Current and future research methodology, recent advanced in instrumentation and analytical techniques for comparative medicine. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.
651 Advanced Topics in Animal Anatomy (1-4) (Same as Animal Science 651.)
652 Disorders of the Endocrine System (2) (Same as Animal Science 652.)

Comparative Medicine

See College of Veterinary Medicine and Comparative and Experimental Medicine.

Computer Science

Graduate School of Engineering

MAJOR

DEGREES

Computer Science M.S., Ph.D.

Jesse H. Poore, Interim Head

Professors:
Dongarra, Jack, Ph.D. New Mexico
Langdon, Michael A., Ph.D. Texas A&M
Poore, Jesse H., Ph.D. Georgia Tech
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.

Thomason, Michael G., Ph.D. ................. Duke
Vander Zanden, Bradley, Ph.D. ............... Cornell
Ward, Robert C., Ph.D. ...................... Virginia
Associate Professors:
Beck, Micah, Ph.D. ............................... Illinios
Berry, Michael W., Ph.D. .......................... North Carolina
Gregor, Jens, Ph.D. ......................... Aalborg (Denmark)
MacLennan, Bruce J., Ph.D. .............. Purdue
Parker, Lynne, Ph.D. .......................... Massachusetts Institute of Technology
Plank, James S., Ph.D. ............................ Princeton
Vose, Michael D., Ph.D. ...................... Texas

Problems in Lieu of Thesis Option

The student must achieve 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.

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 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 Office of Graduate Admissions.

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

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/Non-P only.

502 Registration for Use of Facilities (1-15) Requ-ired 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.
Consumer Services Management

(Major in Education, Health, and Human Sciences)

MAJORS DEGREES
Consumer Services Management ......... M.S.
Human Ecology ....................... Ph.D.

Nancy B. Fair, Head

Professors:
Costello, Carol, Ph.D. (Liaison) ...... Tennessee
Fair, Nancy B., Ph.D. ............... NC State
Fairhurst, Ann E., Ph.D. .......... Oklahoma State
Jolly, Laura, Ph.D. ................. Oklahoma State

Wise, Dena, Ph.D ..................... Texas A&M

Chen, Rachel, Ph.D. .......... Tennessee
Pfaffenberg, Carl, Ph.D. ........ Titan State
Salazar, John, Ph.D. ............. Auburn
Young, Allison, Ph.D. .......... Minnesota

The Department of Consumer Services Management offers graduate programs leading to degrees, majors, and concentrations in:

Master of Science
Consumer Services Management
Retail and Consumer Sciences
Hospitality and Tourism
Management

Doctor of Philosophy
Human Ecology
Retail and Consumer Sciences
Hospitality and Tourism
Management

Certificate Programs
Services Management
Tourism Development

The Department of Consumer Services Management offers the master’s degree with a major in Consumer Services Management and concentrations in hospitality and tourism management and retail and consumer sciences. The programs in Consumer Services Management prepare students for careers in industry and business, public and private agencies, and educational institutions. Master’s level work develops students' technical skills in retail management, merchandising, hospitality management, tourism, and related consumer services. The advanced work undertaken for the doctoral degree focuses on building and applying research skills to advance the fields of retail and consumer sciences and hospitality and tourism.

Interested students should contact the department for more information or visit the department link on the college web site: http://www.chehs.utk.edu/departments.html.

Admission Requirements
A complete file for review includes the Graduate Application for Admission file, Department of Consumer Services Management application, Graduate Record Examination (GRE) scores for the general section, and three Graduate Rating Forms completed by individuals who can attest to the potential for graduate education.

In addition to specified entrance requirements stipulated by the Graduate Council, admission to the master’s degree program with a major in Consumer Services Management 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 sciences, students should have an adequate background in retailing and/or consumer science supported by coursework in marketing and statistics. For the concentration in hospitality and tourism management, students should have an adequate background in hotel and/or restaurant management and/or tourism management supported by coursework in food production, cost control, or lodging management.

Superior students deficient in one or more of the above requirements, may be admitted at the discretion of the department’s graduate faculty. Deficiencies may need to be addressed through undergraduate coursework.

THE MASTER’S PROGRAM

The requirements for the major in Consumer Services Management are listed below by concentration.

Retail and Consumer Sciences (Thesis)
Services Management:
Retail and Consumer Sciences 541, 538, Hotel and Restaurant Administration 510, 532

Research Methods:
Retail and Consumer Sciences 562
Statistical Methods
Cognate Area
RSC Elective
Thesis
TOTAL

6
5
6
3
6
36

Hospitality and Tourism Management (Thesis)
Services Management:
Retail and Consumer Sciences 541, 538, Hotel and Restaurant Administration 510, 532

Tourism:
Select either HRA 523 or 524

Research Methods:
Retail and Consumer Sciences 562
Statistical Methods
Cognate Area
HRA 547, Field Experience
Thesis
TOTAL

3
3
6
3
3
36

Hospitality and Tourism Management (Non-Thesis)
Services Management:
Retail and Consumer Sciences 541, 538, Hotel and Restaurant Administration 510, 532

Tourism:
Select from HRA 523, Tourism Analysis;
423, Marketing for Hospitality and Tourism; 435, Conventions and Meetings;
Pursuit and Attainment; 524, Tourism Destination Development

Research Methods:
Retail and Consumer Sciences 562
Statistical Methods
Cognate Area
HRA 547, Field Experience
Professional Paper/Project: RCS 501
TOTAL

3
3
6
3
3
36

THE PH.D. CONCENTRATIONS

The requirements for the doctoral degree are listed below by concentration.

Retail and Consumer Sciences
RCS Required Courses:
RCS 590, 616

Research Methods:
RCS 590, 616

Statistics:
Stat 537, 538, 579, elective

Cognate Area1
Instructional Methods2
Electives
Dissertation
TOTAL

12
9
3
21
24
86

1Cognate hours must include at least 3 hours at the 600 level.
2Graduate level courses that will help develop students’ instructional capabilities.

Hospitality and Tourism Management
HRA Required Courses:
HRA 614, 615, 547, 523, 524

Research Methods:
HRA 537, RCS 616

Statistics:
Stat 537, 538, 579

Cognate Area1
Instructional Methods2
Electives
Dissertation
TOTAL

15
9
9
3
21
24
86

1Cognate hours must include at least 3 hours at the 600 level.
2Graduate level courses that will help develop students’ instructional capabilities.
CERTIFICATE IN SERVICES MANAGEMENT

The Department of Consumer Services Management offers a certificate program in services management for students seeking continuing education and career advancement opportunities in the services industry. The 12-credit hour certificate is available by completing the following courses: Retail and Consumer Sciences 541, 538, Hotel and Restaurant Administration 510, 532.

CERTIFICATE IN TOURISM DEVELOPMENT

The Department of Consumer Services Management offers a certificate program in tourism development for students seeking continuing education and career advancement opportunities related to tourism in public and private sectors. The 12-credit hour certificate is available by completing the following courses: HRA 523, Tourism Analysis, HRA 524, Tourism Destination Development, HRA 435, Conventions and Meetings; Pursuit and Attainment, HRA 423, Marketing for Tourism and Hospitality.

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.

Hotel and Restaurant Administration

GRADUATE COURSES

423 Marketing for Hospitality and Tourism (3) Marketing principles and practices specifically applied to the hospitality and tourism industry. Includes the analysis of various hospitality and tourism marketing strategies and the implications of those strategies. Develops the use of marketing tools as an integral part of the hospitality and tourism operation.

435 Conventions and Meetings: Pursuit and Attainment (3) Discussion of types of conventions/meetings, roles of meeting planners, identifying decision makers, site selection, negotiating, budgeting, marketing and gaining commitment from group. Prereq: HRA 210, 211, 390 or consent of instructor.

500 Thesis (1-15) P/NP 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.

510 Trends and Issues in Services Management (3) Examination of current and emerging trends and issues in the consumer product and services industry. Implications of trends and their managerial and strategic applications in services management. (Same as Recreation and Leisure Studies 510.)

523 Tourism Analysis (3) Trade theory and regional analysis methodologies applied to tourism and the service industry, including travel balance account, interregional transactions flow, impacts on environmental economics, demand theory and forecasting.

524 Tourism Destination Development (3) Relationship of economic theory and planning principles to tourism development. Includes the application of prefeasibility analysis to tourism projects and the evaluation of various types of tourism and components of tourism.

532 Human Resource Management in Services Industry (3) Analysis of significant organizational processes and practices in management of human resources within consumer product and service industry.

534 Special Topics in Foodservice and Lodging Administration (1-3) Lecture discussion format. Contemporaneous developments and trends in industry. Prereq: Consent of instructor. May be repeated.

535 Directed Study in Foodservice and Lodging Administration (1-3) Problems selected for study by student with faculty advisor. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

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 firm. Analysis of industry and case studies. Prereq: 531, 532.

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.

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

Retail and Consumer Sciences

GRADUATE COURSES

411 Entrepreneurship and Small Business Management (3) Concepts of entrepreneurship within single ownership and other business organizations; risk taking and risk management; management of small business; current issues and problems. Prereq: Marketing 301 Principles of Marketing. Accounting 202 Principles of Managerial Accounting.

412 Direct Retail Methods (3) Use of direct selling methods to sell goods and services. Analysis of consumers and product/service types for integrated direct retail methods; Direct Mail, catalogs, telemarketing, infomercials, and electronic commerce (internet). Prereq: 376 Strategies for Growth.

415 Retail Promotion (3) In-store promotional activities; development of retail promotion strategies; evaluation of retail promotions; supplemental focus on development of retail strategies to communicate in-store promotions. Prereq: 376 Strategies for Growth.

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

501 Professional Project (3-6) Application-oriented, capstone project to show competence in major academic area. Enrollment limited to retail and consumer sciences students in non-thesis program. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. S/NC only.

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.

510 Retail Strategy and Decision Making (3) Strategy, strategic management and strategic process in retail sector. Analytical decision-making skills in retail. Retail industry structure, international differences in retail systems. Prereq: Retail Management or equivalent.

511 International Trade and Retail Analysis (3) International trade and marketing concepts with implications for retail, services, and consumer. Theoretical framework for developing consumer products, services, programs, and service processes from conception to implementation and evaluation.

538 Consumer Product and Service Development (3) Critical analysis of consumer product and service development process in services industry. Strategies for developing consumer products, services, programs, and service processes from conception to implementation and evaluation.

541 Consumer Analysis in Services Management (3) Analysis of consumer behavior in consumer products and services industry. Development of knowledge to positively impact services marketing organizations through marketing, environmental and product/services strategies based upon consumer behavior knowledge. Investigations of qualitative and quantitative methodologies to conduct elementary consumer behavior research.

562 Research Methods (3) 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.

590 Research Seminar (1) Research topics in retail and consumer sciences. May be repeated. S/NC only.

593 Directed Study (1-3) Individual problems in retailing and consumer sciences. Prereq: 9 hrs retailing and consumer sciences graduate coursework. May be repeated. Maximum 9 hrs.

595 Special Topics in Retail and Consumer Sciences (1-3) Lecture, group discussion on specialized topics; retail industry structure, international trade, international retailing, consumer affairs, entrepreneurship, small business management, issues in retail management, issues in retail strategy, quality perception by consumers, product and service value, retailing to children, retailing and special populations, special research methods. Prereq: 9 hrs graduate coursework. May be repeated. Maximum 9 hrs.

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

614 Theory in Retail Environment (3) Analysis and evaluation of theory in retail environment and its application to research in retailing. Prereq: 562 or equivalent.

615 Retail and Consumer Sciences Literature and Thought (3) Evaluation of retail and consumer sciences literature with emphasis upon research literature, development of scholarly thought, and identification of potential areas of further study. Prereq: 562 or equivalent.

616 Research Methods, Models and Measurement in Retail and Consumer Sciences (3) Quantitative and qualitative methods and analytical concepts in the research process. Formulation of models and measurement of consumer sciences constructs. Prereq: 562, Statistics 538 or equivalent

625 Strategic Managerial Retailing (3) Decision-making orientation that integrates strategic theories with retailing components with preparation and analysis of specific retail case situations. Prereq: 510 or equivalent.

641 Retail Consumer Behavior (3) Theories and concepts from social science in relation to ultimate consumer’s behavior. Prereq: 541 or equivalent.

695 Advanced Topics in Retail and Consumer Sciences (3) 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.
Earth and Planetary Sciences

(College of Arts and Sciences)

MAJOR DEGREES

Geology .......................................... M.S., Ph.D.

Claudia I. Mora, Acting Head

Professors:
Broadhead, Thomas W., Ph.D. .......... Iowa
Driese, Steven G. (Liaison), Ph.D. .... Wisconsin
Dunne, William M., Ph.D. .........       ...Caltech

Taylor, Lawrence A., Ph.D. ................ Lehigh

Associate Professors:
Clark, G. Michael, Ph.D. ............ Penn State
Mora, Claudia I. (Carden Professor), Ph.D. ............. Virginia Tech
Uhle, Maria (Jones Professor), Ph.D. ....................................... Virginia

The department offers the thesis option in the master's program. Graduation requires successful oral defense of a written thesis and a minimum 3.0 GPA in all graduate coursework.

Course requirements are a minimum of 30 semester hours, including:
1. Six hours of Thesis 500.
2. Registration in 595 during the first two years in residence. Two hours may be counted toward the 30-hour minimum. This requirement may be waived in unusual circumstances.

3. Sixteen hours of geology courses, with at least 14 hours at the 500 or 600 level, including at least one course from any of the following five groups:
   Group 1: 410, 460, 475, 480, 530, 563, 565, 568.
   Group 5: Any 400- or 500-level courses with graduate credit from related departments (e.g., sciences, mathematics, and engineering), selected with approval of the advisor.

4. Eight hours of additional graduate coursework.

THE DOCTORAL PROGRAM

The prerequisite for the Ph.D. program, in addition to that for the M.S. program, is either a master's degree in Geology, or a bachelor's degree plus completion of 24 hours of graded coursework with at least one course from any of the three groups listed in #3 above. These courses may be taken while completing other course requirements.

Graduation requires passing a comprehensive examination, taken no later than the end of the second year, completion of all course requirements with a minimum 3.0 GPA, completion of the language requirement, and successful oral defense of the dissertation.

The comprehensive examination includes both written and oral parts in which the candidate will be tested on his/her knowledge of the area concerning the proposed dissertation and of related fields. The candidate is expected to be conversant in a wide field of geological sciences.

A minimum of 24 hours of graded coursework beyond the master's degree is required in addition to the 24 hours of Dissertation 600. The coursework includes the sum of 9 hours of 600-level geology courses, 9 hours of 500-level or higher geology courses, and 6 hours of additional graduate 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.

Geology

GRADUATE COURSES

401 Quantitative Methods in Geology (3) Applications of calculus and mathematical methods to problems in earth sciences. Examples of diffusion equations in geohydrology: wave equation in geophysics; mechanics of modeling and boundary conditions in structural geology and tectonics. Prerequisites: The Dynamic Earth or Earth, Life, and Time, 2 semesters of Calculus.

410 Mineral Science (3) Crystal chemistry of rock-forming minerals. Interaction of electromagnetic radiation and crystalline solids. Optical properties of minerals, visible and infrared spectroscopy, and X-ray diffraction. Laboratory exercises emphasize thin section and X-ray diffractometer methods of mineralogy. Prerequisite: 310. 2 hrs and 1 lab.

411 Optical Mineralogy (2) Laboratory course on principles of optical mineralogy. Use of petrographic microscope to identify rock-forming minerals with applications to petrology and environmental mineralogy. Prerequisite: Mineralogy.

412 Elements of X-ray Diffraction (2) Laboratory course on principles and applications of X-ray diffraction. Phase identification, quantitative determination of mineral abundances in mixtures, and crystal structure determination. Prerequisites: Mineralogy.

420 Paleoclimatology (4) Principles of palynology analysis as applied to fossil and fossil assemblages; data collection and interpretation. Laboratory designed to encourage careful thought in the provision of scientific reports based on field and laboratory analysis. Writing emphasis course. 3 hrs and 1 lab.

421 Invertebrate Paleontology (4) Survey of invertebrate animal phyla: skeletal structure and preservation, functional morphology, ecology, and stratigraphic distribution. Prerequisites: Paleobiology or consent of instructor. 2 hrs and 2-2.5 hrs.

440 Field Geology (5) Summer field course for advanced undergraduate and graduate majors and first-year graduate students in geology. Taught off-campus and requires full time of student. Synthesis of major aspects of geological sciences through field excursions. Field techniques demonstrated, practiced, and applied to solution of geologic problems. Prerequisite: Completion of major core courses and consent of instructor.

450 Process Geomorphology (3) Integrative approach to development of surface of earth based upon case histories, maps, remote sensing imagery. Prerequisites: 101-02. (Same as Geography 450). 2 hrs and 1-2 hrs.

455 Basic Environmental Geology (3) Applications of geological sciences toward comprehension of effects of geologic processes on humans and effects of human activities on earth's environments. Prerequisites: The Dynamic Earth or 2 semesters of field period.

460 Principles of Geochronology (4) Applications of radiometric dating techniques. Applications of radiometric principles to geologic systems: problem-solving techniques. Phase diagrams, partitioning of trace elements, thermodynamic principles for evaluating stability of mineral assemblages, radioactive solvations, and applications of radiometric and stable isotopes to geologic systems. Prerequisites: Chemistry 120-130 General Chemistry, Mathematics 141-142 Calculus I, II. Recommended prerequisites: Geology 330 Igneous and Metamorphic Petrology or consent of instructor. 3 hrs and 1-2 hour tutorial.

470 Applied Geophysics (3) Basic principles of geophysical exploration: applications to environmental problems. Seismic and electromagnetic methods. Prerequisites: 6 hours of geology courses numbered above 300. Elements of Physics.

475 Physical and Chemical Systems of the Earth (4) Development of physical laws of quantum mechanics and the application of these laws to present. Formation, composition and evolution of hydrosphere, crust, mantle, and core. Interdependence of earthquakes, volcanism, plate tectonics, geocology, and geochemistry. Chemical and isotopic processes and their applications. Recommended prerequisites: 160-161 General Physics, Calculus I, II. 2-4 hrs.

480 Principles of Economic Geology (4) Ore-forming processes, classification of mineral deposits, survey of different types of mineral deposits with examples, and metallogeny. Prerequisites: 310 and 330 or equivalents. Recommended prerequisite: 460. 1 hrs and 1-2 hrs.

485 Principles of Hydrogeology (3) Physical principles of flow equations, geological controls, aquifer analysis, water well design/testing, introduction to transport processes. Prerequisites: The Dynamic Earth, Calculus: Fundamentals of Physics or equivalent, or consent of instructor. (Same as Civil Engineering 485).

490 Hydrogeology Laboratory (2) Application and demonstrations of hydrogeological principles in field and laboratory. Prerequisites: 465 or Environmental Engineering 485 or consent of instructor.

500 Thesis (1-15) P/NP 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.

505 Structure of the Southern and Central Appalachians (2) Structural development of Southern and Central Appalachians from extensional Late Paleozoic—early Paleozoic rift-drift-platform processes through compressional events producing orogenic elements that formed Appalachian fold-and-thrust belts. Prerequisite: Geology 504. Comparison to similar orogens. Prerequisite: Structural Geology.

510 Clay Mineralogy (3) Origin, chemistry, structures, and properties of clay minerals; application of mineralogical techniques in clay mineral studies. Prerequisite: 310 and 568 or equivalent. 2 hrs and 1 lab.

521 Data Analysis in Geology and Environmental Science (3) Application of statistical and other quantitative techniques using computers to analyze geological data: environmental problems.

530 Petrogenesis of Crystalline Rocks (4) Origin and properties of igneous and metamorphic rocks; magmatic and subsolidus processes and physical conditions. Laboratory involves petrographic study of crystalline rocks in thin section. Prerequisite: 410. 3 hrs and 1 lab.

535 Ground Water Hydrology (3) (Same as Environmental Engineering 535.)

540 Seminar in Local Geology (1) Introduction of geology of Southern Appalachians. 1 hr plus fieldtrips.

544 Paleopedology (3) Field, microscopic, and geochemical analysis of fossil soils (paleosols) and comparison with modern analog soils; interpretation of changes in paleoweathering processes, paleoclimate, and paleoatmospheric chemistry over 4.6 billion years of earth history based on paleosols. Prerequisite(s): 340 Stratigraphy and Sedimentation or equivalent, general chemistry, or consent of instructor.

545 Sandstone Petrology/Physical Sedimentology (4) Field and microscopic analysis of terrigenous clastic rock types; physical processes of sedimentation, transport of sediment, and formation of sedimentary structures. Prerequisite: 340 or equivalent. 3 hrs and 1 lab.

546 Carbonate Sedimentology (4) Environments of deposition of modern and ancient carbonate sediments and resultant rock types; field and laboratory analysis of sample material and preparation of scientific reports. 3 hrs and 1 lab.

550 Regional Geomorphology (3) Integrative approach to study of natural geomorphological regions stressing links and similarities across boundaries, unique characteristics of major divisions, provinces, sections, and districts. May be repeated with consent of instructor. Maximum 6 hrs.

556 Ice-Age Environments and Global Climate Change (3) (Same as Ecology and Evolutionary Biology 556.)

557 Quaternary Ecology (3) (Same as Ecology and Evolutionary Biology 557.)

563 Stable Isotope Geochemistry (3) Theoretical aspects of isotope fractionation and applications to geologic systems. Isotope exchange, variations in natural waters, diagenetic, hydrothermal and metamorphic systems. Prerequisite: General Chemistry or equivalent.

565 Chemical Petrology (3) Application of thermodynamics to geologic materials. Thermodynamics of condensed phases, solutions, thermodynamic stability, heterogeneous multicomponent phase equilibria, and conduct of heat through earth. Prerequisite: Chemistry 120-30, Mathematics 141-42. Recommended prerequisite: Physical Chemistry.

568 Geochemical Analysis (3) Collection and treatment of geochemical data using electron microprobe, x-ray fluorescence, and atomic absorption spectrophotometry. Prerequisite: 310 or consent of instructor. 2 hrs and 1 lab.

570 Advanced Structural Geology (4) Current topics in structural geology and tectonics of mountain belts; recent literature. Prerequisite: 370 or equivalent, or consent of instructor. 3 hrs and 1 lab or seminar.

572 Fracture Analysis (3) Field and subsurface characterization, and mechanical development of natural fractures: role in groundwater flow. Prerequisite: Structural Geology or equivalent, or consent of instructor. (Same as Civil Engineering 572.)

575 Tectonics (4) Evolution of Earth’s lithosphere in context of plate tectonics theory. Formation of continents through comparative anatomy of mountain belts, including Appalachians, Alps, Urals, Caledonians, Cordilleran, Andes, and Himalayas. Prerequisite: Structural Geology or consent of instructor. 3 hrs and 1 seminar.

576 Reflection Seismology (3) Imaging subsurface features using reflected seismic waves. Energy sources, modes of wave propagation, field procedures, computer data processing, and pitfalls. Applications to tectonic and environmental problems. Prerequisite: 470 or consent of instructor.

585 Contaminant Hydrogeology (3) Physical transport processes, isotopes and groundwater age dating, processes influencing inorganic, organic and microbial contaminants, sampling and monitoring methods, remediation of contaminated groundwater, aquifer protection. Prerequisite: 485 or 535; 460; or Environmental Engineering 553 or equivalent; and consent of instructor.

586 Field and Laboratory Methods in Hydrogeology (3) Research methods. Measurement of hydraulic properties, drilling, sampling and instrumentation, tracer experiments. Formulating hypotheses and research plans. Prerequisite or corequisite: 485 or Environmental Engineering 553; and consent of instructor.

590 Special Problems in Geology (1-3) Directed study or special topics. Prerequisite: Consent of instructor. May be repeated. Maximum 10 hrs.

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

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

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

595 Selected Topics in Geology (1) Presentation of research by faculty and visiting scientists. Registration required each semester for resident full-time graduate students, except in summer and when registered for 596. S/NC only.

596 Geology Colloquium (1) Preparation and oral presentation of scientific material. Grade based on presentation, preparation, and instructor critique in departmental seminar. Taken only once during residence for each graduate student.

600 Doctoral Research and Dissertation (3-15) Open only.

620 Seminar in Paleontology (3) May be repeated with consent of department. Maximum 9 hrs.

630 Seminar in Petrology (3) May be repeated with consent of department. Maximum 9 hrs.

640 Seminar in Sedimentary Geology (3) May be repeated with consent of department. Maximum 9 hrs.

650 Seminar in Geomorphology and Quaternary Geology (3) May be repeated with consent of department. Maximum 9 hrs.

660 Seminar in Geochemistry (3) May be repeated with consent of department. Maximum 9 hrs.

670 Seminar in Structural Geology (3) May be repeated with consent of department. Maximum 9 hrs.

675 Seminar in Geophysics (3) Advanced treatment of selected topics in geophysics. Prerequisite: 470 or consent of instructor.

685 Seminar in Hyrogeology (3) May be repeated with consent of department. Maximum 9 hrs.

Ecology and Evolutionary Biology (College of Arts and Sciences)

MAJOR DEGREES

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

C. R. B. Boake, Head
L. J. Gross, Associate Head

Professors: Boake, C. R. B., Ph.D. ............... Cornell
Burghardt, G. M., Ph.D. .................. Chicago
Delcourt, H., Ph.D. .................... Minnesota
Echternacht, A. C., Ph.D. ............. Kansas
Etner, D. A., Ph.D. .................. Minnesota
Greenberg, N. B., Ph.D. ............. Rutgers
Gross, L. J., Ph.D. .................. Cornell
Hallam, T. G., Ph.D. .................. Missouri
Harris, W. F., Ph.D. ................. Tennessee
McCormick, J. F., Ph.D. ............. Emory
McCracken, G. F., Ph.D. .......... Cornell
Riehert, S. E., Ph.D. .......... Wisconsin
Sayler, G. S., Ph.D. .................. Idaho
Schultz, T. W., Ph.D. .................. Tennessee
Simberloff, D., (Gore Hunger Chair of Excellence), Ph.D. ........ Harvard

Associate Professors: Drake, J. A., Ph.D. ............... Purdue
Gavrilets, S., Ph.D. ................. Moscow State
Pigliucci, M., Ph.D. ................. Connecticut

Assistant Professors: Butler-Higa, M., Ph.D. .... Washington (St. Louis)
King, A., Ph.D. ...................... Arizona
Kovar, P. E., Ph.D. ................. Indiana
Weltzin, J., Ph.D. .................... Arizona
Wolf, J. B., Ph.D. ................... Kentucky

Research Professors: Cooper, L. W., Ph.D. ................. Alabama
Grebmeier, J. M., Ph.D. ............... Alaska

Shared faculty are drawn from other University departments, the Oak Ridge National Laboratory, the U.S. Geological Survey, and the Tennessee Valley Authority.

The Department of Ecology and Evolutionary Biology administers an interdisciplinary graduate program which offers the Master of Science and Doctor of Philosophy degrees with a major in Ecology and Evolutionary Biology and concentrations in behavior, ecology (including mathematical ecology) and evolutionary biology.

REQUIREMENTS FOR ADMISSION

Applications are accepted once a year. The deadline for receipt of all application materials is 6 January for those applicants wishing to enroll in the 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 or who have completed a large number of relevant 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 1850. Submission of scores on appropriate (e.g., biology, mathematics) advanced GRE examinations is recommended but not required. Applicants are also expected to have an overall grade-point average of at least 3.0, and 3.0 or above for all science and mathematics courses, on a 4.0 scale (successful applicants will usually have grade-point averages well above these minimums).

Application must be made to both the Office of Graduate Admissions 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 Committee, Department of Ecology and Evolutionary Biology, The University of Tennessee, Knoxville, Tennessee 37996-1610.

THE MASTER’S PROGRAMS

In addition to general requirements of the Graduate Council, aspirants for the Master of Science degree are required to: (1) during the first semester in residence, take a prescriptive diagnostic examination covering major concepts in ecology and evolutionary biology. The examination may be taken twice and must be passed before the student is admitted to candidacy; (2) complete course requirements as determined by the department and the student’s faculty thesis research committee; and (3) satisfactorily complete and defend a research thesis.

THE DOCTORAL PROGRAMS

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

MINOR IN ENVIRONMENTAL POLICY

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

GRADUATE COURSES

411-12 Minicourse in Ecology in 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.

419 Science as Method (3) Dynamic process of scientific discovery. Comparisons of science, nonscience, pseudoscience, successful and unsuccessful science. Ethics of scientific research, philosophical aspects of scientific enterprise, and implications for teaching and writing about science. Prereq: Introductory science or philosophy course, or consent of instructor. (Same as Botany 419 and Philosophy 419.)

431 Plant Ecology (4) (Same as Botany 431.)

446 Introduction to Oceanography (4) Basic oceanography: physical, chemical, geological and biological processes and patterns. Oceanic subsystems: upwelling, polar oceans, hydrothermal vents, gyres, coral reefs, estuaries, and coastal regions. Field trip to coast required. Prereq: General Biology and General Chemistry; General Ecology recommended.

450 Comparative Animal Behavior (3) Principles and methods of ethological research. Evolutionary, physiological and psychological 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.)


470 Aquatic Ecology (3) Introduction to the physicochemical nature of inland waters with description of biotic communities and their interrelationships. Prereq: Chemistry 120-130 General Chemistry, Biology 250 General Ecology. 2 hrs and 1 lab.

474 Ichthyology (4) Evolution, classification, collection and identification of freshwater and estuarine fishes of freshwater fauna of Eastern North America. Prereq: General Ecology or consent of instructor. 2 hrs and 2 labs.

484 Conservation Biology (3) Application of principles and techniques of ecological research to conservation of biological diversity at genetic, population, community, and ecosystem levels. Prereq: Biology 240 General Genetics, 250 General Ecology.

500 Thesis (1-15) P/NP 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.

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 8 hrs. S/NC only.

508 Introduction to Faculty Research (1) Orientation of new graduate students to current research of departmental graduate faculty. Prereq: Admission to program in Ecology and Evolutionary Biology. Required of all first-year students. S/NC only.

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.

512 Foundations: Readings in Conservation Biology (2) Readings and discussion of classic papers in field.

514 Foundations: Readings in Mathematical and Computational Ecology (2) Readings and discussion of classic papers in field.

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

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

520 Ecology for Planners and Engineers (3) Ecological principles and effects that human-caused changes have on living organisms. Lectures and field trips. Appropriate for students in Planning and Environmental Engineering. Not intended for graduate students in Ecology and Evolutionary Biology.

524 Physiological Ecology of Animals (3) Adaptive physiological response of animals to natural changes in or extremes of physical and biotic environment. Terrestrial vertebrates. Prereq: Undergraduate courses in animal physiology and ecology, Biochemistry and Cellular and Molecular Biology 440 and General Ecology or equivalent.

535 Ecology and Development in the Amazon (3) Natural history, ecosystem diversity and function, and opportunities for sustainable economic development in the Amazon Basin. Includes field trip of 7-10 days to Manaus, Brazil.

540 Insect Taxonomy I: Major Orders (3) Survey of classification of major orders of insects, with practical experience in identification of insects at family level. Prereq: Consent of instructor. 4 hrs combined lecture and lab.

541 Insect Taxonomy II: Minor Orders (3) Survey of classification of minor orders of insects, with practical experience in identification of insects at family level. Prereq: 540 or consent of instructor. 4 hrs combined lecture and lab.

542 Insect Structure and Function (3) Integrated study of morphology and physiology at tissue and cellular level of insects. Prereq: Consent of instructor.

543 Aquatic Insects (3) Taxonomy and biology of aquatic insects; immature forms. Prereq: Consent of instructor. 3 hrs and 1 lab.

544 Fresh Water Invertebrate Zoology (3) Ecology and taxonomy of fresh water invertebrates exclusive of insects. Prereq: Comparative Invertebrate Biology or equivalent and consent of instructor. 3 hrs lab and field study.

545 Advanced Animal Behavior (3) Second-level core course in ethology, stressing evolution, genetics, philosophy, ecology and human behavior. Prereq: 450 or equivalent. (Same as Psychology 545.)

546 Ethological Psychology (3) (Same as Psychology 546.)
547 Conceptual Foundations of Evolution and Behavior (3) (Same as Psychology 547.)

552 Development Planning in the Third World (3) (Same as Planning 552.)

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

556 Ice-Age Environments and Global Climate Change (3) Glacial-interglacial climatic cycles and dynamic responses of landscapes within glacial periglacial, and non-glacial environments across North America over past 2.5 million years. (Same as Geological Sciences 556.)

557 Quaternary Ecology (3) Perturbation, process, and patterns in Quaternary ecosystems: climatic change and vegetational response during last 2.5 million years. Prereq: Consent of instructor. (Same as Geological Sciences 557.)

560 Biometry (3) Statistical applications in biological research. Prereq: Statistics course or consent of instructor.

561 Environmental Toxicology (3) Basic concepts in toxicology; molecular toxicity and detoxification; reproductive toxicology; mutagenesis, teratogenesis, carcinogenesis, factors affecting changes and environment impact. Prereq: Biochemistry and Cellular and Molecular Biology 410, Organic Chemistry or consent of instructor. (Same as Biochemistry and Cellular and Molecular Biology 561.)

575 Ecological Genetics (3) Genetics of natural populations, using both single-locus and quantitative genetical approaches. Prereq: Statistics course.

577 Landscape Ecology (3) Ecological structure, function, and change through time of landscape mosaic: quantitative measures of landscape heterogeneity; responses of organisms to changes in landscape heterogeneity. Prereq: General Ecology or equivalent or consent of instructor.

581-582 Mathematical Ecology (3,3) (Same as Mathematics 581-582.)

583 Zoogeography (3) Processes determining geographic distribution of animals and distribution and composition of animal communities. Prereq: Ecology course or consent of instructor.

585 Mathematical Evolutionary Theory (3) (Same as Mathematics 585.)

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

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

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

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

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

602 Advanced Topics in Ecological Process and Structure (1-3) Exposure and in-depth training in contemporary topics and approaches important to advanced research in ecological process and structure. Consult departmental listing for offerings. May be repeated with consent of department. Maximum 9 hrs.

603 Advanced Topics in Evolutionary Biology (1-3) Exposure and in-depth training in contemporary topics and approaches important to advanced research in evolutionary biology. Consult departmental listing for offerings. May be repeated with consent of department. Maximum 9 hrs.

606 Advanced Topics in Conservation Biology (1-3) Exposure and in-depth training in contemporary topics and approaches important to advanced research in conservation biology. Consult departmental listing for offerings. May be repeated with consent of department. Maximum 9 hrs.

607 Seminar in Ecology and Evolutionary Biology (1) Readings and discussion based on current literature. May be repeated. Maximum 12 hrs.

608 Advanced Topics in Comparative Animal Behavior (1-3) Exposure and in-depth training in contemporary topics and approaches important to advanced research in animal behavior. Consult departmental listing for offerings. May be repeated with consent of department. Maximum 9 hrs.

610 Advanced Topics in Mathematical, Theoretical and Computational Ecology (1-3) Exposure and in-depth training in theoretical and computational topics and approaches important to advanced research in mathematical, theoretical, and computational ecology. Consult departmental listing for offerings. May be repeated with consent of department. Maximum 9 hrs.

611 Advanced Topics in Organismal Biology (1-3) Exposure and in-depth training in contemporary topics and approaches important to advanced research in organismal biology. Consult departmental listing for offerings. May be repeated with consent of department. Maximum 9 hrs.

612 Advanced Topics in Environmental Toxicology (1-3) Exposure and in-depth training in contemporary topics and approaches important to advanced research in environmental toxicology. Consult departmental listing for offerings. May be repeated with consent of department. Maximum 9 hrs.

615 Environmental Assessment and Sustainable Development in Third World Countries (3) Concepts and methods of environmental impact assessment and risk assessment. Sustainable development concepts and issues in developing countries. The role of risk and impact assessment in achieving sustainable development. Prereq: General ecology or equivalent or consent of instructor.

635 Environmental Assessment and Sustainable Development (1-3) Exposure and in-depth training in contemporary topics and approaches important to advanced research in environmental assessment and sustainable development. Consult departmental listing for offerings. May be repeated with consent of department. Maximum 9 hrs.

650 Advanced Topics in Comparative Animal Behavior (3) (Same as Psychology 650.)

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

653 Zoogeography (3) Processes determining geographic distribution of animals and distribution and composition of animal communities. Prereq: Ecology course or consent of instructor.

581-582 Mathematical Ecology (3,3) (Same as Mathematics 581-582.)

583 Zoogeography (3) Processes determining geographic distribution of animals and distribution and composition of animal communities. Prereq: Ecology course or consent of instructor.

585 Mathematical Evolutionary Theory (3) (Same as Mathematics 585.)

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

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

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

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

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

602 Advanced Topics in Ecological Process and Structure (1-3) Exposure and in-depth training in contemporary topics and approaches important to advanced research in ecological process and structure. Consult departmental listing for offerings. May be repeated with consent of department. Maximum 9 hrs.

603 Advanced Topics in Evolutionary Biology (1-3) Exposure and in-depth training in contemporary topics and approaches important to advanced research in evolutionary biology. Consult departmental listing for offerings. May be repeated with consent of department. Maximum 9 hrs.

606 Advanced Topics in Conservation Biology (1-3) Exposure and in-depth training in contemporary topics and approaches important to advanced research in conservation biology. Consult departmental listing for offerings. May be repeated with consent of department. Maximum 9 hrs.

607 Seminar in Ecology and Evolutionary Biology (1) Readings and discussion based on current literature. May be repeated. Maximum 12 hrs.

608 Advanced Topics in Comparative Animal Behavior (1-3) Exposure and in-depth training in contemporary topics and approaches important to advanced research in animal behavior. Consult departmental listing for offerings. May be repeated with consent of department. Maximum 9 hrs.

610 Advanced Topics in Mathematical, Theoretical and Computational Ecology (1-3) Exposure and in-depth training in theoretical and computational topics and approaches important to advanced research in mathematical, theoretical, and computational ecology. Consult departmental listing for offerings. May be repeated with consent of department. Maximum 9 hrs.

611 Advanced Topics in Organismal Biology (1-3) Exposure and in-depth training in contemporary topics and approaches important to advanced research in organismal biology. Consult departmental listing for offerings. May be repeated with consent of department. Maximum 9 hrs.

612 Advanced Topics in Environmental Toxicology (1-3) Exposure and in-depth training in contemporary topics and approaches important to advanced research in environmental toxicology. Consult departmental listing for offerings. May be repeated with consent of department. Maximum 9 hrs.

615 Environmental Assessment and Sustainable Development in Third World Countries (3) Concepts and methods of environmental impact assessment and risk assessment. Sustainable development concepts and issues in developing countries. The role of risk and impact assessment in achieving sustainable development. Prereq: General ecology or equivalent or consent of instructor.

635 Environmental Assessment and Sustainable Development (1-3) Exposure and in-depth training in contemporary topics and approaches important to advanced research in environmental assessment and sustainable development. Consult departmental listing for offerings. May be repeated with consent of department. Maximum 9 hrs.

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

ACADEMIC STANDARDS

A graduate student whose grade-point average falls below 3.0 will be placed on probation. A student on probation will be dropped from the program unless his/her cumulative 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, 514, and the remaining 6 hours must be in one field of economics. Of the 30 hours, a maximum of 9 hours in courses approved by the department may be taken in fields other than economics. Students electing the non-thesis option are required to pass a final comprehensive examination. The thesis option requires 30 hours of coursework at the 400 level or above, including at least 24 hours at the 500 level or above, 6 hours of which may be thesis hours. Of the remaining 18 hours at the 500 level or above, at least 15 hours must be in economics and must include 511, 512, 513, and 514. A maximum of 6 hours may be in an area other than economics.

THE DOCTORAL PROGRAM

Admission to the Ph.D. program is based on promise of outstanding scholarship as demonstrated by previous academic performance, by scores achieved on the general portion of the GRE, and by recommendations. The program requires a minimum of 48 hours of coursework beyond the bachelor’s degree or 24 hours beyond the master’s degree, at least 24 hours of 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 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 can 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 in good standing in one of the 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.
   5. Students may request admission to the minor following admission to a graduate program in one of the participating departments.

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.

Doctoral students seeking a minor in environmental policy must also complete, in addition to above, a policy-relevant dissertation approved by the coordinating committee.

**GRADUATE COURSES**

**400 Special Topics (3)** Topics vary. Prereq: Determined by department. May be repeated.

**413 Macroeconomic Fluctuations (3)** Analysis of historical data, methods of analyzing macro-economic fluctuations, theoretical explanations of cycles, and role of monetary and fiscal policies in aggregate economy. Major writing requirement. Prereq: Intermediate Microeconomics, or consent of instructor.


**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: 401.


**472 Public Finance: Taxation and Intergovernmental Relationships (3)** Analysis of individual taxes and of tax systems, non-tax sources of revenue, fiscal federalism, and taxation and economic growth. Major writing requirement. Prereq: 401.

**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.

**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. Major writing requirement. May be repeated. S/NC only.

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

**513-514 Macroeconomic Theory (3,3)** Dynamic general equilibrium models, endogenous growth theory, credibility of monetary policy, budget deficits and fiscal policy, consumption, investment, asset pricing, overlapping generations models, real business cycle, search theory, and open-economy macro models.

**515 History of Economics (3)** Purpose and methods of history of economics. Background for and origins of concerns, methods, development and conclusions of classical political economy; From Adam Smith through J.S. Mill and K. Marx. Prereq: neoclassicists: J.C. Dupuis and H.H. Gossen.

**537 Managing in a Regulated Economy (3)** Dynamic equilibrium models, endogenous growth theory, credibility of monetary policy, budget deficits and fiscal policy, consumption, investment, asset pricing, overlapping generations models, real business cycle, search theory, and open-economy macro models.

**551-552 Economic Theory of Externalities (3,3)** Theory of consumer choice and demand, the theory of revealed preference, attributes of goods and implicit prices, market demand and supply, consumer surplus, labor surplus, labor supply, labor reward, uncertainty, theory of firm, theory of production and cost, market structures, derived demand and factor pricing, introduction to welfare economics, market failure and theory of second best, pure exchange.


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

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

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

**622 International Finance (3)** Analysis of macroeconomic adjustment in open economies, with attention to foreign exchange markets, balance of payments, international policy coordination, integration of world capital markets, liberalization of currency, and the international monetary system. Prereq: 512 and 514.

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

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

**631 Industrial Organization (3)** Standard models of imperfect competition, oligopoly, and asymmetric information. Topics include pricing with market power and strategic decision making. Prereq: Consent of instructor.

**632 International Organization II (3)** Economics of regulation and antitrust. Topics include public utility regulation, consumer product regulation, occupational safety and health, environmental regulation, and antitrust legislation. Prereq: Consent of instructor.

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

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

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

**662 Methods of Regional and Urban Analysis (3)** Theory of regional/urban economic structure and growth. Regional income and product accounts, shift and share analysis, economic base studies, and regional/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.
Education

(College of Education, Health, and Human Sciences)

MAJOR DEGREES

Education ........................................ Ph.D.

The College of Education, Health, and Human Sciences offers the Ph.D. in Education with concentrations and specializations (see parentheses) in the following:

- Counselor Education (Career Development; Rehabilitation; Group Process)
- Cultural Studies of Educational Foundations
- Curriculum, Educational Research, and Evaluation (Curriculum, Educational Research, and Evaluation; Educational Application of Technology)
- Early Childhood Education (Early Childhood Special Education)
- Educational Administration and Policy Studies (Educational Administration and Policy; Higher Education Administration)
- Educational Psychology (Adult Education; Applied Educational Psychology)
- Exercise Science (Biomechanics/Sport Medicine; Exercise Physiology; Physical Activity and Population Health)
- Instructional Technology
- Literacy, Language, and ESL Education (Literacy; Language Education; ESL Education)
- School Psychology
- Sport Studies
- Teacher Education (Literacy, Language, and ESL Education; Teacher Education)

Further information on the above programs of study is available in the Fields of Instruction (i.e., academic departments) section of this catalog.

ADMISSION TO THE PH.D. IN EDUCATION

Application Process

Individuals seeking admission to the Doctor of Philosophy degree in Education must first be admissible to the University of Tennessee (see the Graduate Studies: Admission Requirements section of this catalog) and then admitted to a concentration within the Ph.D. in Education. Prospective students are encouraged to make application at least 6 months before anticipated matriculation or one year in advance for School Psychology (i.e., Deadline: January 1). An online application process is available at http://www.cehs.utk.edu/departments.html.

Admission Criteria

An applicant seeking admission to the Ph.D. in Education should earn GRE scores equal to or higher than the 50th percentile for both the Verbal and Quantitative subtests of the GRE (minimum 1070-total points, based on October 1998-September 2001 norms for the Verbal and Quantitative subtests). An applicant scoring less than the 50th percentile on the Quantitative subtest will be expected to earn a sufficiently higher score on the Verbal subtest to equal or exceed the 1070-point total. Applicants are expected to submit a minimum score of 4.0 points on the Analytic Writing. Non-native English speaking applicants and applicants who took the GRE prior to October 2002 should consult the faculty staffing the concentration of interest for details regarding the GRE minimum scores.

Additional information on admission criteria (e.g., GRE, letters of reference, writing samples, etc.) is available at http://www.coe.utk.edu/degrees/phd/phd_guidelines(WebVersion).pdf and in the Fields of Instruction section of this catalog, see specific academic department.

CORE COURSE REQUIREMENTS

Courses Minimum Hours
Research Area ........................................ 15
Core Requirements:
- Seminar in primary concentration .......... 3
- Philosophy of science or history/philosophy of education (select one from Philosophy 446 or 546 or courses identified in the addendum to Ph.D. guidelines or Cultural Studies in Education 607) ......................... 3
- Theoretical foundations and/or applications (select one): ................... 3
- Learning and curriculum theory (Educational Psychology 609, 515, or Psychology 560) .................... 3
- Administrative/leadership theory (Educational Administration and Supervision 513, 680, or Educational Administration and Policy Studies 514) ........................................ 2
- Group dynamics (Counseling 554)
- Instructional technology (Instructional Technology and Educational Studies 573 or 575)
- Trans-college seminar: two consecutive semesters (Education 601) ............... 2

Concentration

Minimum 15 credit hours selected from a concentration .......................... 15

Specialization

Minimum 9 credit hours selected from a specialization .......................... 9

Cognate

Minimum 6 credit hours selected from outside the college (not to include research courses) .................. 6

Dissertation .............................................. 24

Note: Please refer to the Fields of Instruction (i.e., academic department) of this catalog for additional information on course requirements.

Residency

The residency requirement for students in the Ph.D. in Education is three consecutive semesters of full-time enrollment.

Contact Information

Additional information on the Ph.D. in Education is available in the Field of Instruction section of the college's academic catalog, through the College's Student Services Center, Claxton Complex A332, or at http://cehs.utk.edu/main.html.

GRADUATE COURSES

574 Analysis of Teaching for Professional Development (2) Strategies to document and analyze effectiveness of teaching and of professional development. Study and application of various approaches. Coreq: 575.

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/NC only.

576 Practicum in Classroom Teaching (1-8) Teaching and teaching-related experiences in elementary and secondary school settings. Specific hours and school level assignment determined by licensure or certification requirements. May not be used for probationary licensure year. May not be used toward degree requirements. May be repeated. Maximum 12 hrs. S/NC only.

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

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

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

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.

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

682 Advanced Topics in Cross-Section Econometrics (3) Models with limited dependent variables, panel data analysis, nonparametric estimation, selection models and duration models. Prereq: 582-583 or equivalent.

683 Time Series Econometrics (3) Univariate and multivariate time series modeling of economic data; AR, MA, ARMA, VAR; models of non-stationary time series-units root, cointegration and error correction models; time series models of heteroskedasticityARCH, ARCH-M, GARCH; exogeneity and causality. Prereq: 582-583 or equivalent.

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

693 Independent Study (1-3) Directed research on topic of mutual interest to faculty and student. Variable title for transcript purposes. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.
Educational Administration and Policy Studies

(College of Education, Health, and Human Sciences)

MAJORS

College Student Personnel ......................... M.S.
Educational Administration .......... M.S., Ed.S.
Educational Administration and Policy Studies ...................... Ed.D.
Education ........................................ Ph.D.

Olga Welch, Interim Head

Professors:
Bogue, Grady, Ed.D. ................. Memphis State
Brewer, Ernest W., Ed.D. .......... Tennessee
Mclin, Malcolm, Ph.D. ............... Florida State
Mertz, Norma T., Ed.D. .......... Columbia
Petty, Gregory C., Ph.D. .......... Missouri
Ubben, Gerald C., Ph.D. .......... Minnesota

Associate Professors:
Anfara, Vincent, Ph.D. ............... New Orleans
Norris, Cynthia, Ed.D. .......... Tennessee

Assistant Professors:
Patterson, Faye E., Ed.D. .......... Tennessee

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

• College Student Personnel
• Educational Administration

THE MASTER’S DEGREES

The department offers a Master of Science degree with a major in College Student Personnel and a Master of Science degree with a major in Educational Administration.

Admission Requirements

Students are admitted to the CSP program each spring for matriculation in the fall. Prospective students must submit current GRE scores (within the last five years). In addition, the following information must be submitted to the departmental office by March 15th:

1. A complete application form (http://web.utk.edu/~collsp);
2. A current resume;
3. Three letters of recommendation from present or former employers that identify a candidate’s strengths, weaknesses, and leadership potential.

Degree Requirements

The CSP program requires a minimum of 36 hours including six hours of practicum experience. Students are required to complete either a thesis or problems in lieu of thesis as a culminating activity.

THE SPECIALIST DEGREE

The department offers a Specialist in Educational degree with a major in Educational Administration. This degree is designed for those students who already possess a master’s degree. This degree may be used for the school administrator licensure (see admission and degree requirements under Leadership 21).

Admission Requirements

Applicants must complete all applications forms by March 15th. These include the School of Graduate Studies application and for those interested in licensure, the Leadership 21 application. A current GRE score is required for admission and a grade point average (GPA) of 2.7 or higher in undergraduate work and GPA of 3.2 or higher for prior graduate work is required. Applicants to the Leadership 21 program must possess a teacher licensure and three years teaching experience and must interview with an admission committee. Candidates for the Educational Administration major must possess leadership potential preferably demonstrated by previous leadership experience. Three rating forms must be provided with recommendations from three present or former employers that identify a candidate’s strengths, weaknesses, and leadership potential.

The M.S. degree in Educational Administration requires a minimum of 36 hours of study including a site-based internship. A comprehensive final examination is required including the presentation of a professional portfolio. For licensure, students must pass an examination required by the state of Tennessee.

Admission Requirements

Applicants must complete the graduate and Leadership 21 application forms by March 15th. A grade point average (GPA) of 2.7 or higher for undergraduate work or GPA of 3.2 or higher for prior graduate work is required. Applicants to the Leadership 21 program must possess a teacher licensure and three years teaching experience and must interview with an admission committee. Applicants to the Leadership 21 program must possess a teacher licensure and three years teaching experience and must interview with an admission committee. Applicants to the Leadership 21 program must possess a teacher licensure and three years teaching experience and must interview with an admission committee. Applicants to the Leadership 21 program must possess a teacher licensure and three years teaching experience and must interview with an admission committee. Applicants to the Leadership 21 program must possess a teacher licensure and three years teaching experience and must interview with an admission committee. Applicants to the Leadership 21 program must possess a teacher licensure and three years teaching experience and must interview with an admission committee. Applicants to the Leadership 21 program must possess a teacher licensure and three years teaching experience and must interview with an admission committee.

Degree Requirements

The M.S. degree in Educational Administration requires a minimum of 36 hours of study including a site-based internship. A comprehensive final examination is required including the presentation of a professional portfolio. For licensure, students must pass an examination required by the state of Tennessee.

Leadership 21 is an NCATE approved program that follows the Interstate School Leaders Licensure Consortium (ISLLC) Performance Standards and the National Policy Board for Educational Administration (NPBEA) recommendations for the knowledge, skills, and dispositions required today for school principals and administrators. The Leadership 21 program begins each year in the summer term. The four major themes of the program are as follows:

1. Expansion of the knowledge base that forms the framework for leadership and a broader conceptualization of educational organizations;
2. Emphasis on the performance dimensions of the principalship and administration with particular attention given to the knowledge, skills, and dispositions underlying performance;
3. Integration of theory and practice;

Admission Requirements

Applicants must complete the graduate and Leadership 21 application forms by March 15th. A grade point average (GPA) of 2.7 or higher for undergraduate work or GPA of 3.2 or higher for prior graduate work is required. Applicants to the Leadership 21 program must possess a teacher licensure and three years teaching experience and must interview with an admission committee. Candidates for the Educational Administration major must possess leadership potential preferably demonstrated by previous leadership experience. Three rating forms must be provided with recommendations from three present or former employers that identify a candidate’s strengths, weaknesses, and leadership potential.
Degree Requirements
Programs leading to the Ed.S. degree in Educational Administration require a minimum of 39 hours of study. A final comprehensive examination is required as is a culminating research paper or thesis depending on the program.

The Doctoral Degrees
Program Goals and Accents
Doctoral study in the Department of Educational Administration and Policy Studies is designed to prepare executive level administrators in school, college, and human services settings and to prepare policy scholars for policy organizations related to education. The Department offers the Doctor of Education (Ed.D.) degree and a Doctor of Philosophy (Ph.D.) degree.

Doctoral study is designed (1) to accent the heritage of educational enterprise and its centrality to the strength of a democratic society, (2) to equip students with the dispositions and capacities to engage in a challenge to the status quo and to engage in evaluative policy dialogue and scholarship regarding the role and performance of educational and workforce development/training organizations, (3) to link competence and conscience via the study of ethics and to exemplify in practice those values previously cited, (4) to emphasize involvement in and exposure to educational experiences with international import, and (5) to accent leadership as a conceptual, moral, and performing art built on reflective traffic between theory and practice.

The department places high value on community—a community of shared purpose and caring, of shared values and responsibility. The departmental Leadership Forum creates a regular and common opportunity for students and faculty to explore contemporary policy issues and to develop a community of scholarship. The Leadership Forum is an educational experience in which students, and faculty, learn to create and maintain community by holding competing impulses and ideas in balance—to revere heritage and to manage change, to honor access and to expect excellence, to insure rights and to call for responsibility, to respect competition and to esteem collaboration, to honor both service and profit motives.

Admission to Doctoral Study
Students must submit the UT Graduate Application for Admission and the EAPS Application for Graduate Study. Admission applications must be accompanied by GRE scores from the past five years and three (3) letters of reference from those who know of the candidate’s leadership record and promise. An overall GPA of 3.3 in previous graduate study is required for admission to doctoral study and an interview with the faculty may be required. Admissions decisions are made on a holistic basis to discern the promise for doctoral study and to ascertain the match of the candidate’s educational goals with the resources and goals of the department.

Course of Study
The doctoral program involves approximately 48 semester hours beyond the master’s degree, completion of a comprehen-

sive examination, completion of the residence requirement, and submission and defense of the doctoral dissertation. Core educational experiences in leadership and organizational theory, educational history/philosophy, ethics, and policy/research will be required of all doctoral students as outlined in the departmental Graduate Student Handbook and departmental brochures (Graduate Study in Educational Administration and Policy Studies). Core experiences are complemented by specialty study in two specializations (Educational Administration and Policy, Higher Education Administration via selected courses in the college, in cognate work of departments outside the college, and in readings/independent studies/internship course experiences.

Admission to candidacy requires successful completion of a written and oral comprehensive examination as required by the School of Graduate Studies, and an overall GPA of 3.5 on all doctoral work is required to sit for the departmental comprehensive examination.

The department offers two School of Graduate Studies approved options for satisfying residence requirements: (1) full time enrollment in two consecutive semesters or (2) enrollment in the Leadership Forum (EAPS 606) for six consecutive semesters concurrent with enrollment in two 3-hour courses during those semesters.

Financial Assistance Opportunities
The department offers a variety of scholarships and financial assistance opportunities for qualified students. Graduate Assistantships are also available. Application forms and information about financial aid and other information about the graduate programs in Educational Administration and Policy Studies, write to the Department of Educational Administration and Policy Studies, The University of Tennessee, A325 Claxton Complex, Knoxville, Tennessee 37996-3430.

Educational Administration and Policy Studies
Graduate Courses

500 Thesis (1-15) P/NP 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.


513 Administrative and Organizational Theory (3) Introduction to theoretical and administrative organizational foundations of management and leadership of educational programs and institutions.

514 Leadership Themes in Literature (3) Review and analysis of biographies, poetry, plays, essays, personal letters and speeches, history—for lessons that enhance understanding of leadership role, values, and effectiveness.

515 Human Relations and Communication in Administration (3) Development and use of effective interpersonal communication skills and channels, interpersonal relations, sensitivity to work climates, personnel motivation, conflict management skills, and role of values, attitudes, and expectations in administration.

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

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

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

529 Politics and Public Relations in Education (3) School/community relations in political context of modern, complex society and supervisory competencies: political, social, ethnic, cultural, and racial environments in which schools operate.

534 Program Evaluation in Education (3) (Same as Curriculum, Educational Research and Evaluation 534.)

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

536 Policy Issues in Higher Education Quality Assurance (3) Exploration of historic and contemporary approaches to definition and demonstration of quality in higher education. Identification and supervision of contemporary policy issues related to quality assurance in colleges and universities.

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

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

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

544 School Finance and Business Management (3) For prospective building level administrators. Financial and logical management tasks and procedures in individual school setting.

548 Supervision and Personnel Administration (3) Basic supervisory and personnel concepts and related competencies at the micro-organizational level: interviewing, personnel planning, collecting and maintaining employee information, managerial compensation, performance appraisal and staff development.

553 Strategic Planning (3) Processes for improving decision-making function through use of both quantitative and qualitative planning techniques. Policy analysis, CPM, PERT, Delphi.

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

560 Grant Writing and Project Management (3) Examinations processes and identifying funding for research efforts, as well as writing grant proposals, negotiating with funding sources, implementing and maintaining funded programs, and closing out projects at the end of funding support.
570 Student Affairs Administration in Higher Education: Theory and Practice (3) Historical, philosophical, and organizational perspective. Functional areas comprising field and major issues.

572 Student Development Theory and Practice in Higher Education (3) Theoretical framework of college student personnel services and practical application of theory in student services environment. Applicable to administrative theory, human development theory and evaluation assessment techniques.

574 The College Student (3) Critical examination of the characteristics and concerns of current college students in relation to the direction and provision of student services and student personnel administration.

580 Internship in Educational Administration (3) Field experience in appropriate educational setting working directly with administrator. May be repeated up to 6 hours.

583 Educational Leadership—Principalship (3) Knowledge, skills, and relationships for principals to be effective educational leaders. Simulation materials and field-based activities are used.

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

592 Field Problems in Educational Administration and Supervision (3) Topic to be assigned. May be repeated. Maximum 6 hours. S/NC or letter grade.

593 Independent Study (1-3) Consent of instructor required. May be repeated. Maximum 9 hours. Satisfactory/No Credit or letter grade.

595 Seminar in School Leadership, K-12 (3) On-site study of quality school processes throughout the region. May be repeated. Maximum 6 hours. S/NC or letter grade.

599 Internship in College Student Personnel (1-6) Prereq: Consent of instructor. May be repeated. S/NC only.

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

604 Seminar in Educational Administration and Policy Studies (1-4) Directed readings and research in educational administration. May be repeated. Maximum 6 hours. Satisfactory/No Credit grading only.

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

606 Leadership Forum (2) Development of research, evaluation, policy analysis skills and critical analysis and evaluation of philosophical principles underlying American education. Continuous enrollment for 2 years, on-campus, May be repeated. Maximum 12 hrs. Satisfactory/No Credit grading only.

610 Internship in Educational Administration (3) Opportunity for doctoral students and advanced graduate students to gain experience in performance of critical tasks of educational administration under supervision of practitioner and University representative. May be repeated at discretion of student's committee. Maximum 12 hrs. S/NC only.

612 Modes of Inquiry (3) Various inquiry approaches to research in education, related philosophical, methodological and ethical considerations in research design and in the use of research findings. (Same as Educational Psychology 612.)

614 Statistics for Educational Administrators (3) An introductory statistics course that focuses on the application of statistical procedures to problems in educational administration. Included are: scales of measurement, hypothesis testing, and descriptive and inferential statistical techniques. Computer applications are explored.

615 Research Design (3) The foundations of designing, conducting, and evaluating quantitative, qualitative, and mixed-methods research and the philosophical assumptions underlying these approaches. Topics covered include: identifying a research problem, reviewing the literature, specifying a purpose, writing research questions and hypotheses, and collecting and analyzing data.

616 Research Methods (3) The techniques of multiple regression, analysis of covariance, and multivariate analysis as applied to problems in educational administration. Computer applications are explored. Prereq: 614.

617 Case Study Methods in Educational Research (3) Methods, techniques and strategies consistent with case study approaches to inquiry in educational and related settings. Prereq: 615.

619 Administration and Governance of Higher Education (3) Trends, structure and process of collegiate governance. Development of understanding of administrative theory and practice in higher education.

629 Seminar in Policy Issues in Education (3) Local, state, and federal education policy; theory, analysis, development and implementation. Why education policy is changing rapidly, ways to follow and influence education policy, and conceptual frameworks to use for future understanding.

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

645 Curriculum and Instruction in Higher Education (3) Examination of teaching, learning and curriculum in higher education.

646 Personnel Administration (3) Personnel administration functions for professional and supporting staff in educational organizations. Recruitment, selection, placement, personnel policies, employee wage and salary administration, fringe benefits, collective negotiations, human relations, staff development, and staff evaluation.

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

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

658 Conflict Management (3) Social conflict and its management. Causes of interpersonal, intergroup, and organizational conflict, skills and strategies used to manage conflict, conflict management models associated with different sectors of human activity, and current organizational practices for managing destructive conflict.

670 Values and Ethics in Educational Leadership (3) Examination of moral and ethical dimensions of the work of educational leaders.

680 Administration of Complex Organizations (3) Concepts and theoretical formulations to understand, analyze, evaluate, and change complex educational programs and organizations.

690 Special Topics (1-3) May be repeated.

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

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**Educational Psychology and Counseling**

(College of Education, Health, and Human Sciences)

**MAJORS**

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**School Psychology ................................ Ed.S.**

R. S. McCallum, Head

Professors:

Brockett, Ralph G., Ph.D. .......... Syracuse
George, Thomas W., Ed.D. ........... Tennessee
Greenberg, Katherine H. ........... George Peabody
Ph.D. ............................... Northwestern
Huck, Schuyler W., Ph.D. ........... Tennessee
Kronick, Robert F., Ph.D. ........... Tennessee
McClain, R. S., Ph.D. ............. Georgia
McClain, T., Ph.D. ................ South Carolina
Peters, John M., Ed.D. ............ NC State
Peterson, Marla P., Ph.D. ......... Ohio State
Poppen, William A. (Liaison).  Ph.D. ............................... Ohio State
Skinner, Christopher H., Ph.D. .... Lehig
Thompson, Charles L., Ph.D. ....... Ohio State
Williams, R. L., Ph.D. .......... George Peabody
Woodside, M.R., Ed.D. ............. VPI

Associate Professors:

Bain, Sherry K., Ph.D. ............ Southern Mississippi
Davis, J., Ph.D. ................... New Mexico
Ziegler, Mary F., Ed.D. .......... Columbia

Assistant Professors:

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

Research Professors:

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

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

**Master of Science**

**Educational Psychology**

Adult education

Applied educational psychology

**Counseling**

Mental health counseling

Rehabilitation counseling

School counseling

**Educational Specialist**

School counseling

School psychology

**Doctor of Education**

Educational Psychology and Counseling

Collaborative learning

**Doctor of Philosophy**

Education

Counselor education

Educational psychology

School psychology

**EDUCATIONAL PSYCHOLOGY**

• Adult Education

The Adult Education program is designed for those interested in providing learning opportunities for adults. It is intended for educators of adults in a wide range of settings such as adult literacy, continuing higher
education, business and industry, government community-based organizations, volunteer agencies, and professional and staff development programs. The program prepares individuals for such roles as program planner, instructor, trainer, and administrator. Degrees offered are the Master of Science (M.S.) and Doctor of Philosophy (Ph.D.). For details, see we site at http://web.utk.edu/~appedpsy

MASTER OF SCIENCE (M.S.)
Educational Psychology major

Adult Education concentration

The Master’s program involves a minimum of 36 hours of course work (except for the Thesis option, which is 33 hours minimum). Programs typically consist of the following:

Adult Education Core (15 hrs.)
EP 513 - Reflective Practice in Education and Psychology (3 hrs.)
EP 520 - Survey of Adult Education (3 hrs.)
EP 521 - Program Development and Operation in Adult Education (3 hrs.)
EP 522 - Adult Development (3 hrs.)
EP 525 - Characteristics of Adult Learners (3 hrs.)
Research (3 hrs.)

Options could include:
EP 550 - Statistics and Research Design: Conceptual (3 hrs.);
CSE 560 - Introduction to Qualitative Research in Education (3 hrs.);
EAS 516 - Research for School Administrators (3 hrs.);
EP 530 - Methods of Collaborative Inquiry (3 hrs.);
ITCE 561 - Educational Statistics (3 hrs.); or
ITCE 580 - Techniques of Research in Curriculum and Instruction (3 hrs.)

Courses Outside of Educational Psychology (6 hrs.)
This category will include course work outside of Educational Psychology that provides a more specialized focus to the program or as a complement to current professional competencies. Some examples of possible supporting areas include: higher education, counseling, educational administration and supervision, cultural studies, sociology, psychology, human resource development, and agricultural and extension education.

Departmental Electives (12+ hrs.)
The remaining hours of course work can be taken in a combination of electives within adult education or course work in related areas. Examples of courses in Educational Psychology that meet this expectation include:
EP 460 - Self-Management in the Helping Professions (3 hrs.)
EP 504 - Special Topics (1-3 hrs.)

(Recent examples have included Multicultural Perspectives in Adult Education, Learning in the Workplace, and Writing for Professional Publication)
EP 509 - Internship in Adult Education (3 hrs.)
EP 510 - Psychological Theories of Human Development Applied to Education (3 hrs.)
EP 514 - Individual Study in Adult Education (3 hrs.)
EP 515 - Educational Applications of Behavioral Theories of Learning (3 hrs.)
EP 516 - Educational Applications of Cognitive Learning Theories (3 hrs.)
EP 523 - Post-Secondary Education for Adults (3 hrs.)
EP 524 - Continuing Professional Education (3 hrs.)
EP 527 - Controversies in Adult Education (3 hrs.)
EP 528 - Psychology of Aging (3 hrs.)
EP 529 - Facilitating Adult Learning (3 hrs.)
EP 573 - Meeting the Needs of Nontraditional and Underachieving Learners (3 hrs.)
EP 574 - Facilitating Group Change (3 hrs.)

Comprehensive Examination/Thesis
Most students opt to write a comprehensive examination. This involves preparing written responses to questions from the student’s graduate committee. Typically, these are done in a take-home format. However, a thesis option is also available. The thesis is an original piece of research. Students who opt to write a thesis register for 6 hours of EP 500. The final document is presented to the student’s graduate committee and discussed in an oral examination with the committee.

DOCTOR OF PHILOSOPHY (Ph.D.)
Education major
Educational Psychology concentration—Adult Education specialization

The Ph.D. specialization in Adult Education involves a minimum of 80 hours of study beyond the master’s degree. This includes at least 56 hours of coursework and 24 hours of dissertation. These hours are distributed as follows:

Concentration 15 hours
Specialization 9 hours
Research 15 hours
Ph.D. Core 11 hours
Cognate 6 hours

The concentration consists of courses selected from various areas within the Educational Psychology and Counseling, which can include selected courses in adult education. Courses for the specialization are from adult education courses such as those listed under the masters’ degree requirements and electives. To meet the research requirement, students take courses that provide them with knowledge and skills in both quantitative and qualitative research methods. The Ph.D. core consists of a seminar in the specialization along with courses listed elsewhere in this catalog. At least 6 hours must be taken in a cognate area outside the College of Education, Health, and Human Sciences. Finally, dissertation hours are taken after all or most coursework is completed; once begun, students must register for a minimum of 3 hours until the dissertation is completed.

• Applied Educational Psychology
The Applied Educational Psychology area is designed for individuals who seek to provide professional leadership in promoting and facilitating learning and/or its measurement. It offers two degree programs: Master of Science with a major in Educational Psychology, concentration in applied educational psychology, and Doctor of Philosophy with a major in Education, concentration in educational psychology, specialization in applied educational psychology. For details, see web site at http://web.utk.edu/~appedpsy

MASTER OF SCIENCE (M.S.)
Educational Psychology major
Applied Education Psychology concentration

The basic goal of the master’s program is to develop expertise in the promotion of adaptive learning for all kinds of learners in both individual and group settings. The program includes most of the traditional themes in educational psychology (e.g., development, learning principles, assessment, and psychoeducational intervention). It is unique because of a focus on promoting the collective knowledge of groups as well as the development of individuals.

The master’s program may be used as a stepping stone for entering a doctoral program in educational or school psychology or as additional preparation for functioning in an educational role in schools, mental health centers, and business programs devoted to personal and professional development. The faculty members in the Educational Psychology (EP) Department are committed to the creation and study of environments that enhance learning potential and promote lifelong learning for people of all ages, abilities, and backgrounds.

Each student completes 36 hours beyond the baccalaureate degree. A minimum of 24 hours must be at the 500 level or higher. At least 6 hours must be taken outside the department. These hours are distributed across the following categories:

1. Development 6
2. Learning Principle 9
3. Research 3
4. Assessment 3
5. Intervention 12

The courses related to development help students explore the role of development in learning for more successful learners. The courses related to learning principles provide an opportunity to compare behavioral and cognitive learning theories in depth and other theories in comparison. Students may study characteristics of adult learners as well as children. The emphasis is
Cognitive Science. For students with the Statistics/Testing emphasis, course options include (but are not limited to) Survey Design and Analysis, Categorical Data Analysis, Applied Multivariate Methods, and Scale Construction.

To meet the 15-hour requirement in Research, students can elect to take a full set of courses that deal with quantitative methodologies (e.g., experimental design, Seminar in Applied Psychometrics) or they can elect to take a full set of courses that deal with qualitative methodologies (e.g., phenomenology, ethnography) or they can elect to take a mix of these courses.

The Cognate requires a minimum of two courses outside the College of Education, Health, and Human Sciences. Many students set up their cognate to be psychology or statistics, although other cognates are possible.

The requirements/options for the Ph.D. Core are listed elsewhere in this Catalog, as are the requirements for the 24 hours of Dissertation.

COUNSELING

The programs within the Counseling area prepare individuals as professional counselors and counselor educators in community mental health, human service and rehabilitation agencies, educational institutions, and private practice, government, business and industrial settings. The courses of study focus on professional identity, social and cultural diversity, human growth and development, career development, helping relationships, group work, assessment, and research and program evaluation. The degrees offered are Master of Science in Counseling with concentrations in School Counseling, Mental Health Counseling, and Rehabilitation Counseling; Educational Specialist in School Counseling; Doctor of Philosophy in Education with a concentration in Counselor Education. Each degree leads to counseling licensure. The Mental Health Counseling and School Counseling programs are accredited by the Council for Accreditation of Counseling and Related Educational Programs (CACREP). The graduate program in Rehabilitation Counselor Education (RCE) is designed to prepare students for professional careers as clinicians in the field of rehabilitation counseling. The RCE Program is service-oriented and includes practica and internship experiences. Completion of the 2 year (16 month) Program culminates in a Master of Science Degree.

The Program is fully accredited by the Council on Rehabilitation Education (CORE). Students may be admitted to the Program either full- or part-time. Full-time students admitted to the Program follow a sequence of courses that facilitates degree completion in 16 months. The first (fall) and third (summer) semesters are didactic in nature, but the second semester adds an experiential component under RCE 547 – Practicum in Rehabilitation. The final (fall 2) semester is experiential, with students working full-time to fulfill the 600-hour requirement of RCE 548 – Internship in Rehabilitation Counseling.

Students who are interested in working with people who are deaf or hard of hearing may choose the optional deafness focus area for their RCE masters program. This allows individuals who have bachelor degrees in deafness related fields to expand their competencies to serve rehabilitation consumers who are deaf or hard of hearing. Interested students must have knowledge of American Sign Language. Contact Terry Osborne at the Center on Deafness (COD) for details: (865) 974-4147 (voice/TTY).
The following is the recommend course of study for full-time RCE Program students:

**Fall 1**
- COUN 551 Theory and Practice of Counseling
- RCE 500 Orientation to Rehabilitation
- RCE 543 Medical Aspects of Disability
- RCE 545 The Rehabilitation Interview
- RCE 592 Assistive Technology in Rehabilitation
- RCE 549 Internship (second year students only)

**Spring 1**
- EDUC PSYCH 550 Techniques in Research
- RCE 547 Practicum in Rehabilitation
- RCE 532 Caseload Management in Rehabilitation
- RCE 575 Vocational Evaluation: Clinical Methods
- RCE 579 Disability Management
- RCE 549 Internship (second year students only)

**Summer 1**
- RCE 533 Job Analysis and Placement
- RCE 579 Special Topics: Research Project in Rehabilitation
- COUN 570 Cross-Cultural Counseling (Elective)
- COUN 554 Group Dynamics
- RCE 549 Internship (second year students only)

**Fall 2**
- RCE 549 Internship (second year students only)

Students are admitted to RCE classes upon Program admission only. All RCE courses, with the exception of RCE 549, are offered only one semester per year. Students who are admitted to the Program must meet with an advisor each semester to plan their studies.

**Program Contacts**
- Dr. Amy L. Skinner LPC, CRC, NCC
- Program Coordinator, askinner@utk.edu
- LeeAnn R. Grubbs CRC
- Instructor & Recruitment Coordinator, lgrubbs@utk.edu
- Terry Osborne
- Instructor & Deafness-Focus Area Advisor, osborne@utk.edu

**Masters Program in School Counseling, a 48-semester hour program, is accredited by the Council for Accreditation of Counseling and Related Educational Programs (CACREP). The purpose of the program is to develop graduates who will assume the major responsibilities of a counselor within elementary and secondary schools. Applicants for degrees in this field must present satisfactory evidence of academic ability, adequacy of personal characteristics and goals as determined by recommendations of employers, instructors, and colleagues, and by scores of the aptitude portion of the Graduate Record Examination.**

The program requires a 600-hour internship in a school site during the second year to prepare students for practice. Students enrolled complete a program that includes core courses, clinical courses, and electives. Those applicants who have not had teaching experience may be required to complete additional classes. Graduates will fulfill the license requirements for K-12 School Counseling in Tennessee and in most states of the United States although some states may have additional experience and testing requirements.

**Year 1:**
- COUN 431 3
- COUN 525 3
- COUN 550 3
- COUN 551 3
- COUN 552, 553 6
- COUN 554 3
- EDUC PSYCH 550 3

**Year 2:**
- COUN 555 3
- COUN 558 6
- COUN 561 3
- COUN 570 3
- EDUC PSYCH 510 3
- EDUC PSYCH 515 3
- TPTE 470 3

Total program hours 48

**EDUCATIONAL SPECIALIST (Ed.S)**

**School Counseling major**

The Educational Specialist Program in School Counseling, a post Master's program designed to provide advanced training for school counselors and others with a Master's degree in a related area. Graduates must complete at least 60 hours beyond the bachelor's degree. Applicants for degrees in this field must present satisfactory evidence of academic ability, adequacy of personal characteristics and goals as determined by recommendations of employers, instructors, and colleagues, and by scores of the aptitude portion of the Graduate Record Examination. The program can serve the educational needs of the following: Experienced counselors whose original training pre-dated many recent advancements in counseling; Students holding M.S. degrees in guidance but wanting additional training; Individuals who wish to shift from one setting or level of counseling to another; Students from related areas who want to enter the school counseling profession.

Those applicants who have not had teaching experience may be required to complete additional classes. Graduates who desire to fulfill the license requirements for K-12 School Counseling in Tennessee and in most states of the United States are required to fulfill all the requirements for a license endorsement.*

For a student with a School Counselor License, the Ed S. program requires 22 semester hours beyond the MS. The program is individualized and planned by the student and a faculty committee. A minimum of six hours is required from outside the Counselor Education Program. Please refer to the current Graduate Catalog for general information on the Ed.S.

**Year 1:**
- School Counseling Core
- COUN 555, 659, 570, 504, 650 13
- Courses outside the program area (six hours of electives) 6
- General elective 3

Total program hours 22

* Students without a license in school counseling are required to complete those requirements before obtaining an Ed. S. in School Counseling.

**DOCTOR OF PHILOSOPHY (Ph.D.)**

**Education major**

**Counselor Education concentration**

The doctoral concentration in Counselor Education at The University of Tennessee is designed to prepare experienced counseling professionals to advance their careers in the education and supervision of counselors. The doctoral program is for those students who have completed a master's degree in counseling or counseling-related fields who aspire to one of the following careers: (1) college, university, or community college teaching positions in Counselor Education or related fields; (2) supervisory positions in schools, community agencies, state departments of education; (3) counseling positions in student development programs and counseling centers in higher education; (4) private mental health counseling/consultation practice; and/or (5) employee assistance positions.

The doctoral program requires a minimum of three full years of study beyond the master's degree. The Ph.D. concentration in Counselor Education will seek accreditation from the Council for Accreditation of Counseling and Related Educational Programs (CACREP). Graduates of the Ph.D. concentration in Counselor Education will receive endorsement for licensure as professional counselors and/or licensure as school counselors. If licensure has not been received prior to entering the doctoral program,

Courseswork for the program in Counselor Education includes the following:

**CEHHS/Counselor Education Ph.D. Coursework Guidelines**

- Concentration 33 Hours
  - COUN 553 (3 Hours): Career and Educational Information Systems and Resources
  - COUN 571 (3 Hours): Individual Cognitive Assessment OR COUN 671 (3 Hours): Personality and Vocational Assessment OR Educational Psychology 541 (3 Hours): Psycho Educational Assessment OR COUN 625 (3 Hours) Advanced Study in Personality
  - COUN 655 (3 Hours): Practicum in Counselor Education
  - COUN 660 (3 Hours): Advanced Theory and Practice in Counseling
  - COUN 665 (3 Hours): Group and Systems Theory and Interventions
  - COUN 670 (3 Hours): Theory and Practice of Counseling Supervision and Consultation
COLLABORATIVE LEARNING program addresses the advanced educational needs of professionals working in a variety of settings including business, government, higher education, and non-profit organizations. Participants study the collaborative learning process and engage in action research in the context of their own professional practices. The program offers the Doctor of Education (Ed.D.) degree. A cohort of doctoral students is admitted every other year. For details see web site at http://web.utk.edu/~collab.

DOCTOR OF EDUCATION (Ed.D.)

EDUCATIONAL PSYCHOLOGY AND COUNSELING

COLLABORATIVE LEARNING concentration

Doctoral students in Collaborative Learning are expected to complete a minimum of 93 hours of graduate credit above the baccalaureate degree. Required is a two-year residency, defined as a minimum of 6-9 credit hours of course work in each of six consecutive semesters, including summer terms. These hours are distributed among the following categories:

Concentration Core in Educational Psychology (15 hours). The Concentration Core consists of a minimum of one course in the area of Collaborative Learning and one course from each of the other specializations in Educational Psychology: Adult Education and Applied Educational Psychology.

Specialization Core in Collaborative Learning (24 hours). The specialization core consists of four courses in the area of Collaborative Learning plus the doctoral seminar. EP 630 Doctoral Seminar in Collaborative Learning is taken on a continuous basis, beginning with the first semester of the student’s residency and culminating at the end of the second year of residency, excluding summers. Three credit hours are awarded per semester for a total of 12 hours of credit.

Related Studies (30 hours). The related studies component incorporates three areas of study:
- Research Methods (12 hours). This set of courses normally includes courses in qualitative and quantitative research methods and statistics. EP 530, Methods of Collaborative Inquiry is required.
- Cognate (6 hours). Courses taken in an area outside the major area of study.
- Supporting Area (12 hours). Additional courses of the student’s choice that support his or her program emphasis.

Dissertation Research (24 hours). The focus of the student’s dissertation research is his or her own professional practice and therefore must involve some form of action research methodology.

SCHOOL PSYCHOLOGY

The School Psychology programs are based on a data-based decision making model and offer advanced training in psychological, educational, and professional foundations including training in assessment, research, consultation, and intervention. We offer two degree programs, an Ed.S. and a Ph.D. The school psychology programs are accredited or approved by the relevant bodies including the American Psychological Association (APA), the National Association of School Psychologists (NASP), the National council for Accreditation of Teacher Education (NCATE), and the Tennessee Department of Education. Admission occurs once a year and materials are due by January 15. For details see web site at http://web.utk.edu/~scpsyc.

SPECIALIST IN EDUCATION (Ed.S.) School Psychology major

Every School Psychology student is expected to meet UT School Psychology Training Programs knowledge and skill requirements. Opportunities for students to meet these requirements will occur in the classroom and during field experiences. The School Psychology faculty, along with current and previous students, practica and internship supervisors, and various other groups who help ensure quality control within our training programs have contributed to the development of our curricula. Various accrediting and curricula oversight agencies (i.e., NASP, SDE-Tennessee; UT Ph.D. Coordinating Committee; and UT Graduate Admissions and Records) have their own specific goals and objectives. The School Psychology Handbook, published by the EP Department describes how the UT School Psychology Training Programs meets the goals and objectives of these various training groups.

The UT Program is designed to provide graded, sequential, and hierarchical training across the following areas A) Professional School Psychology, B) Consultation and Intervention, C) Assessment, D) Research and Statistics, E) Psychoeducational Core, and F) Field Experience and Professional Practice.

I. Professional School Psychology (15 credit hours)
1. EP 540 Seminar in School Psychology (3)
2. EP 635 Ethical, Legal, and Professional Issues in Psychology (3)
3. EP 650 Professional Practice in School Psychology (3)
4. EP 549 Internship (6)

II. Consultation and Intervention (27 credit hours)
1. CECP 551 Theory and Practice of Counseling (3)
2. Group Process and Change Option (3)
3. EP 515 Educational Applications of Behavioral Theories of Learning (3)
4. EP 517 Direct Assessment and Intervention for Academic Skill Deficits (3)
5. EP 545 Psychoeducational Consultation (3)
6. EP 546 Practicum in Consultation (3)
7. EP 516 Educational Applications of Cognitive Learning Theories (3)
8. EP 549 Internship (6)

III. Assessment (24 credit hours)
1. EP 517 Direct Assessment and Intervention for Academic Skill Deficits (3)
2. CECP 525 Formal Measurement in Education and Counseling (3)
3. EP 541 Psychoeducational Assessment (3)
4. EP 542 Practicum in Psychoeducational Assessment (3)
5. EP 541 Psychoeducational Assessment (3)
6. EP 542 Practicum in Psychoeducational Assessment (3)
7. EP 549 Internship (6)

IV. Research and Statistics (15 credit hours)
1. STAT 524 Survey of Statistical Methods I (3) OR ITCE 561 Educational Statistics (3)
2. EP 655 Research in Psychoeducational Studies (6)
3. EP 505 Quasi-Experimental and Single Subject Design Research (3)
4. EP 500 Thesis or Problem in Lieu of Thesis (3)
V. Psychoeducational Core (33 credit hours)
1. SE 470 Psychology of the Exceptional Child (3)
2. CECP 570 Cross Cultural Counseling: Theory and Research (3)
3. PSY 461/561 Physiological Psychology (3)
4. EP 690 Psychopathology of Childhood (3)
5. EP 510 Psychological Theories of Human Development Applied to Education (3)
6. EP 650 Professional Practice in School Psychology (3)
7. EP 549 Internship (6)
8. Group Processes and Change Option
9. Family Studies Option
10. Social Basis of Behavior Option

VI. Field and practica experiences by semester

Years 1-3
Research in the schools or with children (75 hrs.).
EP 655 Research in Psychoeducational Studies (4-6)

First Year, Fall and Spring:
Knowledge, roles and functions (75 hrs.)

Second Year, Fall:
Introduction to consultation and intervention practices (50 hrs.)

Second Year, Spring:
Develop consultation skills (150 hrs.)
EP 546 Practicum in Consultation

Third Year, Fall and Spring:
Practice professional assessment skills (e.g., admin., inter., rept. writ.-75 hrs./sem.)
EP 542 Practicum in Assessment

Total: 425 hours structured field experience

Year 4, Fall and Spring:
EP 549 Internship (9) knowledge and skill development and mastery (1200-1500 hrs.)

DOCTOR OF PHILOSOPHY (Ph.D.)

Education major
School Psychology concentration

Every School Psychology student is expected to meet UT School Psychology Training Programs knowledge and skill requirements. Opportunities for students to meet these requirements will occur in the classroom and during field experiences. The School Psychology faculty, along with current and previous students, practica and internship supervisors, and various other groups who help ensure quality control within our training programs have contributed to the development of our curricula. Various accrediting and curricula oversight agencies (i.e., APA, NASP, SDE-Tennessee; UT Ph.D. Coordinating Committee; and UT Graduate Admissions) have their own specific goals and objectives. The School Psychology Handbook, published by the EP Department describes how the UT School Psychology Training Programs meet the goals and objectives of these various training groups. The UT School Psychology Program is designed to provide graded, sequential, and hierarchical training across the following areas a) Professional School Psychology, b) Consultation and Intervention, c) Assessment, d) Research and Statistics, e) Psychoeducational Core, and f) Field Experience and Professional Practice.

I. Professional School Psychology (26 credit hours)
1. EP 540 Seminar in School Psychology (3)
2. EP 635 Ethical, Legal, and Professional Issues in Psychology (3)
3. ED 601 Transcollege Seminar (2)
4. EP 650 Professional Practice in School Psychology (9)
5. EP 649 Internship (9)

II. Consultation and Intervention (30 credit hours)
1. CECP 551 Theory and Practice of Counseling (3)
2. Group Processes and Change Option (3)
3. EP 515 Educational Applications of Behavioral Theories of Learning (3)
4. EP 517 Direct Assessment and Intervention for Academic Skills Deficits (3)
5. EP 545 Psychoeducational Consultation (3)
6. EP 546 Practicum in Consultation (3)
7. EP 516 Educational Applications of Cognitive Learning Theories (3)
8. EP 649 Internship (9)

III. Assessment (27 credit hours)
1. EP 517 Direct Assessment and Intervention for Academic Skill Deficits (3)
2. CECP 525 Formal Measurement in Education and Counseling (3)
3. EP 541 Psychoeducational Assessment (3)
4. EP 542 Practicum in Psychoeducational Assessment (3)
5. EP 541 Psychoeducational Assessment (3)
6. EP 542 Practicum in Psychoeducational Assessment (3)
7. EP 649 Internship (9)

IV. Research and Statistics (37-41 credit hours)
1. STAT 531 Survey of Statistical Methods I (3)
2. STAT 532 Survey of Statistical Methods II (3) OR ITCE 561 Educational Statistics (3)
3. EP 505 Quasi-Experimental and Single Subject Design Research (3)
4. EP 655 Research in Psychoeducational Studies (4-8)
5. EP 600 Dissertation (24)

V. Psychoeducational Core (48 credit hours)
1. SE 470 Psychology of the Exceptional Child (3)
2. PSYCH 420/565 History and Systems of Psychology (3)
3. CECP 570 Cross Cultural Counseling: Theory and Research (3)
4. PSYCH461/561 Physiological Psychology (3)
5. EP 690 Psychopathology of Childhood (3)
6. EP 510 Psychological Theories of Human Development Applied to Education (3)
7. EP 650 Professional Practice in School Psychology (9)
8. EP 649 Internship (9)
9. Family Studies Option (3)
10. Curricula-Instruction Option (3)
11. Social Basis of Behavior Option (3)
12. Group Processes and Change Option (3)

VI. Field and practica experiences by semester

Years 1-4:
Research in the schools or with children (75 hrs.).
EP 655 Research in Psychoeducational Studies (4-8)

First Year, Fall and Spring:
Knowledge, roles and functions (75 hrs.)

Second Year, Fall:
Introduction to consultation and intervention practices (50 hrs.)

Second Year, Spring:
Develop consultation skills (150 hrs.)
EP 546 Practicum in Consultation

Third Year, Fall and Spring:
Practice professional assessment skills (e.g., admin., inter., rept. writ.-75 hrs./sem.)
EP 542 Practicum in Assessment

Total: 425 hours structured field experience

Year 4, Fall and Spring
Student developed plan (50-100 hrs)
EP 650 Professional Practice in School Psychology (3)

Total: 475 supervised field experience hours prior to internship
Counselor Education

GRADUATE COURSES

410 Gender Role Development: Implications for Education and Counseling (3) Theories and research: development of gender roles and their relevance to identity and behavior in socio-psychological, educational, and counseling settings. (Same as Women’s Studies 410.)

431 Personality and Mental Health (3) Various perspectives of mental health with application to education and other social institutions.

500 Thesis (1-15) P/NP 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 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.

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

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.

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.

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

552 Career Development: Vocational Theory, Research and Practice (3) Relationship of vocational theory, career development research and societal factors to life career roles.

553 Career and Educational Information Systems and Resources (3) Use of print and non-print materials: computer-based systems, for career and educational planning. Prereq: 552 or consent of instructor and Internet access account.

554 Group Dynamics and Methods (3) Theory and types of groups, descriptions of group practices, methods, dynamics, and facilitative skills, supervision of leadership skills. (Same as Psychology 567.)

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. (Same as Psychology 559.)

556 Orientation to Mental Health Counseling (3) Educational 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.

557 History, philosophy, professional standards, counselor role in relation to school staff and mental health professionals, and ethics of profession.

558 Group Dynamics and Methods (3) Theory and types of groups, descriptions of group practices, methods, dynamics, and facilitative skills, supervision of leadership skills. (Same as Psychology 567.)

559 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. (Same as Psychology 559.)

560 Group and Systems Theory and Interventions (3) Exploration of history and family systems theory: preparation as practitioners in facilitation of counseling and task groups, and examination of counseling and psychotherapy interventions applicable to group dynamics. Prereq: Admission to the Ph.D. program or permission of instructor.

565 Seminar in Gerontology (1) (Same as Educational Psychology 585; Exercise Science 585; Health 585; Nursing 585; Public Health 585; Social Work 585; Sociology 585.)

591 Practicum in School 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.

592 Directed Research (1-3) May be repeated. Maximum 12 hrs. S/NC only.

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

599 Internship in Mental Health Counseling (1-6) Supervised postpracticum employment at academic unit approved human services agency. Prereq: Admission to the Ph.D. program or permission of instructor. May be repeated. Maximum 12 hrs. Satisfactory/No Credit grading only.

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

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.

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

625 Advanced Study in Personality (3) (Same as Psychology 625.)

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

650 Seminar in Counselor Education (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.

655 Practicum in Counselor Education (3) Supervised practice and application of counseling skills with clients. Prereq: Admission to counselor education program and consent of instructor. May be repeated. Maximum 6 hrs.

660 Advanced Theory and Practice of Counseling (3) An in-depth exploration of theories of human nature and the practice of counseling. Prereq: Admission to the Ph.D. program or permission of instructor.

665 Group and Systems Theory and Interventions (3) Exploration of history and family systems theory: preparation as practitioners in facilitation of counseling and task groups, and examination of counseling and psychotherapy interventions applicable to group dynamics. Prereq: Admission to the Ph.D. program or permission of instructor.

670 Theory and Practice of Counseling Supervision and Consultation (3) Theory of counseling supervision and consultation, supervision of entry-level counselors, and agency consultation. Prereq: Admission to the Ph.D. program or permission of instructor.

671 Personality and Vocational Assessment (3) (Same as Psychology 667.)

675 Theory and Practice of University Teaching in Counselor Education (3) Emphasis on teaching and learning theories and classroom applications in the preparation of future mental health, school, and rehabilitation counselors. Prereq: Admission to the Ph.D. program or permission of instructor.

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

Educational Psychology

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 helpers and their clientele. Prereq: Introductory course in psychology or consent of instructor. S/NC or letter grade.

500 Thesis (1-15) P/NP 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 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.

505 Quasi-Experimental and Single-Subject Design Research (3) History, theory and research design techniques used to examine cause and effect relationships during applied psychoeducational research. Focus on controlling threats to internal validity through research design.

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.

510 Psychological Theories of Human Development Applied to Education (3) Theory and research on emotional, social, and intellectual development over life span with applications to educational and therapeutic settings.

513 Reflective Practice in Education and Psychology (3) Concepts, theories and processes of reflective practice applied to educational settings.

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.

515 Educational Applications of Behavioral Theories of Learning (3) Behavioral theories and research, conditioning, observational learning, and ethological learning as systems to apply to student motivation, discipline and learning.

516 Educational Applications of Cognitive Learning Theories (3) Cognitive theory and research, social learning, attribution and information processing as applied to education.

517 Direct Assessment and Interventions for Academic Skills Deficits (3) Theory, techniques and procedures shown to prevent and remedy academic skills deficits: curriculum-based assessment and direct intervention procedures.

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

520 Survey of Adult Education (3) Historical development, philosophies of adult education agencies, associations, programs, issues, and literature illustrating process of adult education and diversity of continuing education. Prereq: Consent of instructor.
521 Program Development and Operation in Adult Education (3) Theories and methods from research to practice in planning and operating adult education programs. Prereq: Consent of instructor.

522 Adult Development (3) Theory and research in adult development over lifespan and its implications for adult learning in formal and informal contexts.

523 Post-Secondary Education for Adults (3) History, evolution, philosophy, structure and functions of post-secondary, sub-university institutions, their programs and clientele. Prereq: Consent of instructor.

524 Continuing Professional Education (3) Theories and concepts supporting design and management of educational programs for adults in professions, professional development, and continuing education.

525 Characteristics of Adult Learners (3) Key characteristics of adult learners, current theory and research on adult learning, and implications for teaching and learning concepts.


527 Controversies in Adult Education (3) Controversies in adult education: development of critical analysis skills by looking at controversies from different perspectives.

528 Psychology of Aging (3) Theory and research of aging and gerontology related issues: psychological and related physiological changes that occur in later-life stages of human development. Implications for treatment programs and policy.

529 Facilitating Adult Learning (3) Theory, research, and practice related to working with adults in teaching and learning situations.

530 Methods of Collaborative Inquiry (3) Philosophical and theoretical frameworks for designing and conducting collaborative inquiry projects. Practice in conducting research.

540 Seminar in School Psychology (3) Essentials of theory and practice of school psychology as professional specialty. Consideration of history and current issues in school psychology.

541 Psychoeducational Assessment (3) Direct, psychometric and naturalistic assessment methods in learning and teaching situations. Prereq: Admission to school psychology program or consent of instructor, and Counselor Education and Counseling Psychology 525 or equivalent. May be repeated. Maximum 6 hrs.

542 Practicum in Psychoeducational Assessment (3) Assessment of assessment skills to clients in learning environments. Coreq: 541 or consent of instructor. May be repeated. Maximum 6 hrs. S/NC only.

545 Psychoeducational Consultation (3) Use of two and three-person models of consultation in educational and therapeutic settings based on behavioral, ecological, social learning and cognitive-behavioral theories.

546 Practicum in Consultation (3) Application of consultation skills to clients in learning environments. Coreq: 541 or consent of instructor. May be repeated. Maximum 6 hrs. S/NC only.

547 Professional Practice in School Psychology (3) Supervised experience as school psychologist in development of critical practice in classroom learning.

572 Cognitive Education: Models and Approaches (3) Models and approaches in the field of cognitive education: research and theoretical support for various program components, critical variables of organizational learning that affect success of implementation.

573 Meeting Needs of Nontraditional and Underachieving Learners (3) Exploration of students’ needs at any age and level of functioning who are not progressing up to their fullest potential. Causes of academic and motivational problems, and approaches to overcome them. Learning to learn, cultural alienation, and personal world view and interaction with effective teaching and learning.

574 Facilitating Group Change (3) Practical issues of group change. Analyses of group and individual experiences in all types of educational settings in relation to systems theory and collaborative learning theory. Needs of individuals and groups involved in change and roles of inside and outside change agents.

585 Seminar in Gerontology (1) (Same as Counseling Education 585; Exercise Science 585; Health 585; Nursing 585; Public Health 585; Social Work 585; Sociology 585.)

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

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

602 Directed Research (3-1) 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.

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

609 Advanced Seminar in Curriculum and Learning Theory (3) Team study of seminal trends, themes, and issues in curriculum and learning. Reading and discussions based on significant research and scholarly publications.

612 Modes of Inquiry (3) (Same as Educational Psychology and Policy Studies 612.)

620 Seminar in Adult Education (3) Issues in adult education, theories and concepts, philosophical positions, research trends and methodologies. Prereq: 520 or equivalent.

621 Advanced Seminar in Program Planning (3) Concepts, principles, and theories related to program planning in adult education. Prereq: 521 or equivalent.

622 Advanced Seminar in Adult Development and Learning (3) Adult development and adult learning theory and research. Prereq: 522, 525, or equivalent.


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

640 Seminar in Applied Educational Psychology (2) Issues, theories, concepts and research in applied educational psychology. Prereq: Admission to Ph.D. in Education. May be repeated. Maximum 12 hrs. S/NC only.

649 Advanced Internship in School Psychology (1-9) Supervised experience as school psychologist in an 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/NC only.

650 Professional Practice in School Psychology (1) Field setting to facilitate academic, social and interpersonal development of children and adults. School and mental health settings for intervention, consultation, prevention, and assessment services. May be repeated. Maximum 9 hrs. S/NC only.

655 Research in Psychoeducational Studies (1) Data analyses, collection, and interpretation. May be repeated. Maximum 9 hrs. S/NC only.


663 Scale Construction (3) Development, pilot testing, and revision of attitude inventories, rating scales, and other paper-and-pencil techniques for assessing beliefs, personality characteristics, and opinion. Prereq: Counselor Education and Counseling Psychology 525, and two-course sequence in statistical analysis.

665 Analysis of Research in Instructional Technology (3) Research on human learning, design of learning environments. Analysis of teacher behavior, test development, computer software design and video presentations.

686 Practicum in Instructional Planning (3) Development and management of course or program of instruction in educational psychology. Prereq: 665, or consent of instructor.

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

Rehabilitation Counselor Education

GRADUATE COURSES


593 Independent Study (1-3) May be repeated. S/NC or letter grade.
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 Disability (3) Psycho-social impact of disability 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. Restrictive measures to eliminate or minimize resulting handicaps. Skills necessary to communicate with lay 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.

549 Internship in Rehabilitation Counseling (12) Supervised practice in rehabilitation counseling. Full-time clinical experience for second-year students (600 clock hrs required).

579 Special Topics (1-3) Prereq: Admission to graduate program. May be repeated. Maximum 9 hrs. S/NC or letter grade.

592 Assistive Technology in Rehabilitation (3) Technology as applied to needs of school age and post-secondary age students/clients. Delivery of assistive technology services; software programs and assistive devices; delivery systems, interdisciplinary evaluation/planning, and funding issues.

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

Electrical and Computer Engineering

(College of Engineering)

MAJOR DEGREES

Electrical Engineering ..................... M.S., Ph.D.

Samir El-Ghazaly, Head

Professors:

Abidi, Mongi A., Ph.D. ................. Tennessee
Birdwell, J. Douglas, Ph.D. ............. MIT
Bomar, Bruce W. (UTSI), Ph.D. ..... Tennessee
Bouldin, Donald W., Ph.D., Vanderbilt
Lawler, J. S., Ph.D. ..................... Michigan State
Pace, Marshall O. (Liaison), PE,
Ph.D. ...................................... Georgia Tech
Pujoji, Alfonso Jr. (UTSI), Ph.D. ..... Vanderbilt
Roberts, M. J., Ph.D. .................... Tennessee
Roth, J. Reece, Ph.D. ................... Cornell

Associate Professors:

Cirily, Paul B., Ph.D. ............... New Mexico State
Islam, Syed, Ph.D. ..................... Connecticut
Koch, Daniel, Ph.D. ................... Missouri (Rolla)
Kong, Seong-Gen, Ph.D. .......... Southern Cal
Smith, L. Montgomery (UTSI),
Ph.D. ..................................... Tennessee

Assistant Professors:

Chiaowell, John, Ph.D. ............. Minnesota
Howlader, Mostofa, Ph.D. ......... Virginia Tech

Peterson, Gregory,
Ph.D. ............................. Washington (St. Louis)
Qi, Hairong, Ph.D. .................... NC State
Smith, Philip W. ....................... Virginia
Tolbert, Leon, Ph.D. ................. Georgia Tech

Emeriti Faculty:

Alexeff, Igor, Ph.D. ................. Wisconsin
Bodhmer, Peter E., Ph.D. Northwestern
Bose, Bimal K., Ph.D. ............... Calcutta
Gonzalez, R. C., Ph.D. .......... Florida
Green, Walter L., Ph.D. ........... Texas A and M

The Department of Electrical and Computer Engineering offers graduate degrees leading to the Master of Science and a Doctor of Philosophy with a major in Electrical Engineering. Graduate students are able to conduct research in a wide variety of electrical engineering areas including communication, computer engineering, computer vision and robotics, electromagnetics, electro-optics, image processing, information processing, intelligent control, microelectronics, mixed-signal VLSI, monolithic sensors, plasma engineering, power electronics and systems, sensor fusion, and signal processing.

The department sustains a strong joint program in mixed-signal VLSI and monolithic sensors with the Oak Ridge National Laboratory, Instrumentation and Controls Division. This program provides students with unique opportunities to receive career-related training at ORNL while satisfying thesis or dissertation requirements of the graduate program. Departmental graduate programs are also available at the Space Institute, Tullahoma. Further information about these various programs is available from the department.

The Departmental Graduate Committee is responsible for administering, promoting, and advancing the general well-being of the graduate program. Departmental actions regarding a graduate student may be appealed in writing, first to the departmental graduate committee and then to the department faculty.

THE MASTER'S PROGRAM

Graduate work leading to the Master of Science with a major in Electrical Engineering may be completed during one academic year of full-time study, or two to three years of part-time study.

Admission Requirements

Applicants for admission to the M.S. degree program are expected to have completed a bachelor's degree in Electrical Engineering with an average of at least 3.0 out of 4.0 both overall and in the senior year. All applicants whose native language is not English, including those who have earned degrees at U.S. institutions, must score at least 550 on the TOEFL exam to be considered for admission to the program.

Students who hold the bachelor's degree in a field other than electrical engineering are also expected to have a minimum cumulative grade-point average of 3.0 and a minimum senior year average of 3.0 in that field. The department will require that selected undergraduate courses be taken to make the background of these students comparable to that of students who hold a bachelor's degree in Electrical Engineering. These undergraduate courses may include electrical engineering courses from the sophomore and junior years and one senior electrical engineering sequence of the student's choice. The specific set of undergraduate courses required will be chosen in view of the applicant's prior education and experience.

The student will be admitted under non-degree status until the required undergraduate courses are successfully completed with a 3.0 average.

Master's Degree Requirements

Students may choose between a thesis option and a project (non-thesis) option M.S. program. All students must file a Master's Program Plan with the departmental graduate committee specifying which option they have selected, a semester-by-semester schedule of the courses they intend to take, and the members of the student's master's committee. Students may change between the thesis and project options, one time, by filing an amended Master's Program Plan.

Thesis Option: Specific requirements of the thesis option are a minimum of 30 semester hours including:
1. Electrical Engineering 503 and 504.
2. Six semester hours of mathematics at the 400 level or above selected from a list approved by the graduate committee, or 6 semester hours of EE courses at the 500 level or above, or 6 semester hours of non-EE courses approved by the student's master's committee and the graduate committee.
3. An additional 12 semester hours of 500-level work in electrical engineering including 6 semester hours in the student's major area of electrical engineering and 6 semester hours in a second area of electrical engineering approved by the student's master's committee.
5. A final oral examination covering the thesis and related coursework.

Non-Thesis Option: Specific requirements of the project (non-thesis) option are a minimum of 33 semester hours including:
1. Electrical Engineering 503 and 504.
2. Six semester hours of mathematics at the 400 level or above selected from a list approved by the graduate committee, or 6 semester hours of EE courses at the 500 level or above, or 6 semester hours of non-EE courses approved by the student's master's committee and the graduate committee.
3. An additional 18 semester hours of 500-level work in electrical engineering courses, with at least 6 hours of 500-level work in each of two areas of electrical engineering.
4. Electrical Engineering 501 (project in lieu of thesis) with a minimum grade of B. This course will be administered by the student's master's committee. A written project proposal describing what the student will do in the course must be submitted in advance for the graduate committee's approval. A written final report and oral presentation is required and one copy of the final draft must be submitted to the graduate committee.
5. A final written and oral examination covering the project and related coursework.
THE DOCTORAL PROGRAM

The Ph.D. degree program with a major in Electrical Engineering may be pursued in the concentration areas of circuit theory, computers, electronics, communication theory, electromagnetic theory, plasma engineering, power systems, solid-state electronics, power electronics, and control systems.

Applicants are required to submit scores on the Graduate Record Exam. A TOEFL score of 550 is required for non-native speakers of English, including those who have earned degrees at U.S. institutions. Specific departmental requirements for the Ph.D. include the following:

1. A Master of Science or Master of Engineering degree.
2. A minimum of 24 semester hours of coursework beyond the Master's, excluding research and dissertation credit. These hours must include:
   a. A minimum of 12 semester hours in electrical engineering at the 500 and 600 level.
   b. A minimum of 9 semester hours of 600-level coursework. At least 3 hours of this work must be in an area other than the student's major area.
   c. A minimum of 6 hours of mathematics courses at the 500 level or above and approved by the electrical engineering graduate committee.
3. One foreign language if the student's faculty committee feels that a reading knowledge of a foreign language is crucial to the student's research efforts.
4. Satisfactory performance on a qualifying examination and on a comprehensive examination. The qualifying examination is prepared by the Electrical Engineering faculty and consists of two 4-hour written examinations covering courses required in the undergraduate electrical engineering curriculum through the junior year. The qualifying examination is offered twice each year (January and August) and is to be taken the first time it is offered after the student enters the doctoral program. The student who fails the qualifying examination must take and pass the examination the next time it is offered to remain in the program. A minimum of 18 hours of coursework must be completed after the student has taken the qualifying examination for the first time.

A comprehensive examination is required by the Graduate Council. 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 comprehensive exam consists of both written and oral parts. The written part consists of at least two sections: a complete review of the literature in the student's dissertation topic, and a review of the major tools to be used in the dissertation work. The student's committee may require additional written sections. The students must demonstrate a mastery of the dissertation area, ability to think analytically and creatively, ability to access technical resources, and ability to complete the dissertation satisfactorily. The oral part consists primarily of a professional presentation of a proposal for dissertation work and its defense. The committee may cover additional topics in the oral part.
5. Participation in departmental seminars.

GRADUATE COURSES

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


432 Electronic Amplifiers (4) Feedback amplifier principles; wideband linear amplifier design; low-noise preamplifier design; radio power amplifier design; linear regulated power supply design and switching regulator principles. Radio frequency amplifier design; oscillators. Laboratory experiments on design projects. Level 2 design projects which require laboratory work. Prereq: 316 Signals and Systems II, 325 Electric Energy System Components, 332 Electronic Circuits.

442 Communication System Design (4) Application of communication theory to system design. Development of communication system specifications. System simulation utilizing graphical programming language. Hardware and software design and simulation. Construction and performance evaluation of complete analog or digital transmitter and receiver or significant system subsystems. Level 2 design projects. Prereq: 441.


446 Electromagnetic Compatibility (3) Principles and practices to avoid interference among and within electrical devices. Parameters and coupling for dipole, biconical, and log-periodic antennas. High frequency effects in circuit elements. Radiated and conducted emissions and susceptibility. Crosstalk, shielding, electrostatic discharge, and EMC regulations.

Level 1 design projects that require laboratory work. Prereq: 316 Signals and Systems II, 341 Fields, 342 Communications.


452 Design of Digital Systems and Computers (4) Considerations for design and application of digital systems and computers: embedded systems concepts and design, microprocessors, CPU issues, interrupt structures, memory and I/O channels. Level 3 projects that require laboratory work. Prereq: 206 AND 316 Signals and Systems II.

471 Introduction to Pattern Recognition (3) Statistical decision theory, adaptive classifiers, and supervised and unsupervised learning. Application of techniques in areas of current interest: face recognition, speech processing, remote sensing, data mining and biometrics. Level 1 design project. Prereq: 316 Signals and Systems II, 325 Electric Energy System Components, 332 Electronic Circuits.

472 Introduction to Digital Image Processing (3) Mathematical foundations and practical techniques for digital image manipulation. Enhancement, segmentation, restoration, compression, segmentation, and color image processing. Level 2 design projects. Prereq: 316 Signals and Systems II.

481 Power Electronics (3) Principles and characteristics of power semiconductor devices, single-phase and polyphase phase controlled converters, converter control, and design concepts. Level 1 design projects. Prereq: laboratory work. Prereq: 316 Signals and Systems II.


491 Special Topics (3) Basic design and current practice. May not be repeated to satisfy senior requirements for graduation. Prereq: Completion of all junior Electrical and Computer Engineering courses or consent of instructor. Level 1 or 2 design projects that may require labora- tory work. Prereq: 481.

495 Senior Seminar (1-5) P/N only. Prereq: Completion of all junior Electrical and Computer Engineering courses or consent of instructor. S/N C or letter grade.

500 Thesis (1-15) P/N only.
501 Project in Lieu of Thesis (3) Capstone course taken under supervision of student’s major professor and master’s committee. Individual project involving literature survey, development of some software or hardware, testing, writing a white paper or journal paper, or other suitable project. Prereq: Consent of graduate committee. May be repeated. Maximum 6 hrs.

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.

503 Modern Transform Methods (3) Frequency-domain transform methods, relevant fundamentals of various complex variable methods, and applications of transforms, its inversion with residues, and its relation to the Fourier transform and series. Sampling theory. Two-sided z-transform and its inversion by residues. The discrete Fourier transform and fast Fourier transform.

504 Random Process Theory for Engineers (3) Probability and random variables as approached by set theory. Statistical averages and transformations of random variables. Random processes, stationarity, correlation functions and temporal analysis, power spectrum and spectral analysis as applied to response of systems to random signals.

505 Digital Signal Processing I (3) Discrete-time signals and systems, sampling, fast Fourier transform (FFT) and fast convolution, design of FIR filters and IIR filters.

506 Digital Signal Processing II (3) Filter properties in the Z and Fourier transform domains, structures for digital filters, sampling and reconstruction, hardware implementation of digital filters.

507 Application of Linear Algebra in Engineering Systems (3) (Same as Chemical Engineering 507, Materials Science and Engineering 507, and Mechanical Engineering 507.)

511 Linear Systems Theory (3) State space models of linear dynamical systems, linear algebra, state transition map, matrix exponential, controllability, observability, realization theory, and stability theory. Coreq: 507.

512 Multivariable Linear Control System Design (3) Design of controllers, for multivariable systems, which satisfy constraints on robustness to plant uncertainties, disturbance rejection, command follow- ing. Prereq: 511.


518 Control Systems Design I (3) Analysis and design of continuous and discrete time control systems, feedback theory, stability, steady-state performance, compensation, Engineering aspects of control systems.

519 Control Systems Design II (3) Digital control, variable structure control, state-space design of SISO systems, use of estimators and observers, comparison of classical and state-space methods of control system design, considerations for control system instrumenta- tion. Prereq: 518.

521 Power Systems Analysis I (3) Matrix-vector representations of power networks, sequence model- ling of power system components, unbalanced shunt and series faults. Formulating and solving problems in matrix-vector form with application to large scale power systems. Prereq: 421 or equivalent.

522 Power Systems Analysis II (3) Operation and control of interconnected power systems, transient stability, classical and some modern techniques, and problems in matrix-vector form with application to large scale power systems. Prereq: 521.

523 Power Electronics and Drives (3) Forced com- mitted inverters, advanced PWM techniques, current-fed inverters, digital system modeling, vector and scalar control of induction machines, parameter varia- tions, control principles of synchronous machines.


531 Advanced Analog Electronics I (3) Physical operation of modern electronic devices; semiconductor devices; devices; diodes, bipolar transistors, J-FETs, and MOs-FETS. Small-signal equivalent circuits and noise models of active devices and feedback network. Laboratory. Prereq: 431, 432, or consent of instructor.


541 Electromagnetic Fields (3) Maxwell’s equations, special relativity, wave reflection and transmission, generalized media, guided waves, radiation from cur- rent elements. Prereq: Mathematics 404.


545 Introductory Microwave Networks and Com- ponents (3) Scattering and transfer representation for microwave and millimeter wave devices. Component and system parameter measurement by modern network analyzers. Electronic oscillators and amplifiers, frequency swept oscillators, transit time devices, parametric devices, mixers, switches.


556 Plasma Diagnostics I (3) Principles of active, passive, perturbing and nonperturbing diagnostic measurement techniques using microwave techniques, microwave and high-temperature plasmas of interest in fusion research. Laboratory safety, data reduction and presentation, microprocessor based data handling and analysis, and reduction of time series data. Prereq: 461, 463, or consent of instructor.

557 Plasma Diagnostics II (3) Laboratory instruction in operation of plasma diagnostic instruments in plasma science laboratory, experience with high voltage, vac- uum, RF, and digital data handling techniques. Prereq: 561.

565 Industrial Plasma Engineering I (3) Low tem- perature plasma physics relevant to industrial appli- cations: kinetic theory, particle dynamics in electro- magnetic fields, gaseous discharges, and elec- tron, ion, and plasma sources. Prereq: Graduate stand- ing or consent of instructor.

566 Industrial Plasma Engineering II (3) Continuation of 565. Production of plasma in gaseous media, plasma deposition and etching, space propul- sion systems, plasma chemistry, plasma lighting de- vices, inertial confinement fusion, materials processing with plasma arcs, and related topics. Prereq: 565 or consent of instructor.

571 Pattern Recognition (3) Decision-theoretic and structural approaches to pattern recognition. Deter- ministic and stochastic models for pattern extrac- tion and representation, syntactic and semantic meth- ods. Prereq: 471 or consent of instructor.


573 3D Methods in Robot Sensing, Vision, and Visualization (3) Tools used in image synthesis and analysis; 3D recovery by nonlinear estimation. Project- related geometric, photometric, range sensing, lighting models, differential geometry, and 3D rendering.

574 Advanced Computer Vision (3) Principles and methods for analysis of time and space varying images. Imaging physics and color theory, shape- form-X, feature correspondence and tracking, stereo Vision, structure from motion, optical flow, motion- based tracking, and selected topics in current literature. Prereq: 573 or consent of instructor.


598 Graduate Seminar (1) Topics of interest dis- cussed in weekly seminar. May be repeated. Maxi- mum 6 hrs. S/NC or letter grade.

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

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

614 Optimal Control (3) Deterministic and stochastic dynamic programming in continuous and discrete time, minimum principle and matrix minimum principle, com- putational 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 geo- metric system theories, and distributed parameter sys- tems. 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 geo- metric system theories, and advanced design meth- ods. Prereq: 617.

623 Advanced Power Electronics and Drives (3) Phase-controlled cycloconverters, cycloconverter-fed ac systems, used in modern electronic devices and control of synchronous machines, static Kramer drives, static Scherbius drives, VSFC generation, modern control theory in ac drives.

624 Electrical Insulation (3) Principles, testing, and case studies. Basic principles of aging, losses, charg- ing, conduction, and breakdown in vacuum, gas, liq- uid, solid, and composite insulation systems. Testing with high voltage instrumentation, dielectric analysis, optical, acoustics, and bridges; associated statistics and distributed parameter effects. Case studies drawn from active research, power systems, electronic cir- cuits, and devices, high voltage, and television grading. Prereq: 503, 504, and consent of instructor.

631 Advanced Topics in Electronic Instrumenta- tion I (3) Based on particular interests of students. Fundamental physical processes in instrumentation and measurement: optical, acoustical, electronic, electromagnetic, and 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: 643.

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

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

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, 461-2 or 563-4, or consent of instructor.

664 Advanced Plasma Physics II (3) Plasma heating and radiation phenomena. Advanced topics of current interest. Must be taken in sequence. Prereq: 663.

671 Image Processing and Robotics I (3) Three-dimensional scene modeling and recognition, multi-sensor systems. Prereq: 572 or 573 or consent of instructor.

672 Image Processing and Robotics II (3) Stereo- vision, 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/NC or letter grade. Prereq: 691.

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

### Engineering Science

See Mechanical, Aerospace, and Biomedical Engineering

### English

(College of Arts and Sciences)

#### MAJOR

**DEGREES**

<table>
<thead>
<tr>
<th>English</th>
<th>M.A., Ph.D.</th>
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John Zomchick, Head

Professors:

Carroll, D. Allen (J. Douglas Bruce Professor), Ph.D. North Carolina

Cox, Don R., Ph.D. Missouri

Dumas, Bethany K., Ph.D. Arkansas

Dunn, Allen, Ph.D. Washington

Ensor, Allison R., Ph.D. Indiana

Finneran, Richard J. (Hodges Chair of Excellence), Ph.D. North Carolina

Garnier, Stanton B., Jr. (Lindsay Young Professor), Ph.D. Princeton

Goslee, David F., Ph.D. Yale

Goslee, Nancy M. (Distinguished and Lindsay Young Professor), Ph.D. Yale

Heffernan, Thomas J. (Kenneth Curry Professor), Ph.D. Cambridge

Kallet, Marilyn, Ph.D. Rutgers

Keene, Michael, Ph.D. Texas

Kelly, Richard M. (Lindsay Young Professor), Ph.D. Duke

Leggett, B. J. (Distinguished Professor), Ph.D. Florida

Lek, Ionan, Ph.D. Illinois

Lofaro, Michael A., Ph.D. Maryland

Maland, Charles J. (Lindsay Young Professor), Ph.D. Michigan

Smith, Arthur, Ph.D. Houston

Stillman, Robert, Ph.D. Pennsylvania

Trahern, Joseph B., Jr. (Alumni Distinguished Professor), Ph.D. Princeton

Wier, Allen (Distinguished Teaching Chair), M.F.A. Bowling Green

Zomchick, John, Ph.D. Columbia

Associate Professors:

Anderson, Misty G., (Liaison), Ph.D. Vanderbilt

Atwill, Janet, Ph.D. Purdue

Bensel-Myers, Linda D., Ph.D. Oregon

Elias, Amy J., Ph.D. Penn State

Hammond, Patsy G., M.A. Tennessee

Hirst, Russell, Ph.D. Rensselaer

Howes, Laura L., Ph.D. Columbia

Jennings, La Vinia, Ph.D. North Carolina

Papke, Mary E., Ph.D. McGill

Assistant Professors:

Billone, Amy, Ph.D. Princeton

Black, Joseph L., Ph.D. Toronto

Haddox, Thomas, Ph.D. Vanderbilt

Hirschfeld, Heather, Ph.D. Duke

Ikard, David, Ph.D. Wisconsin

Knight, Michael, M.F.A. Virginia

Reiff, Mary Jo, Ph.D. Kansas

Schoenback, Lisi, Ph.D. Virginia

Seshagiri, Urmila, Ph.D. Illinois

Snyder, Natalia, Ph.D. Yale

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. The Department also offers a creative writing dissertation option in the doctoral program. Detailed information about the master’s and doctoral programs, and about individual graduate courses, may be obtained by writing the Director of Graduate Studies in English, 306 McClung Tower. A prospective student must contact the department to receive the proper information and forms with which to apply. For additional information, please visit the graduate web site through the College of Arts and Sciences homepage at www.artsci.utk.edu.

The Department of English does not accept students in non-degree or provisional status. A student who wishes to enter the department must apply in degree-seeking status for his/her application to receive consideration for admission to any graduate program in English.

### THE MASTER’S PROGRAM

#### Requirements

**Coursework:** A minimum of 24 semester hours in English beyond the B.A., to include 6 hours at the 600 level; 12 additional hours at the 500-600 level (Only 3 hours of 593 Independent Study may be applied toward the M.A.); and 6 hours for graduate credit at any level, including the 400 level. In this coursework, students must maintain at least a 3.0 GPA.

**Thesis Option:** Written under the direction of a faculty member of the department and approved by a committee of two other faculty members. Six semester hours of credit will be given.

**Non-Thesis Option:** Six hours of additional courses at the 500-600 level, making a total of 30 hours of required coursework.

**Language Requirement:** Evidence of proficiency in one foreign language, to be fulfilled in one of the following ways:

1. Completion of the second year of a language at college level with a grade of C or better.
2. Completion of French 302 or German 332 at UT with a grade of B or better.
3. Passing of the regular Ph.D. foreign language examination as currently administered at UT.

**Capstone Experience Requirement:** An integral part of all options in the master’s degree program in English is a capstone experience which allows the student to synthesize and apply the knowledge and skills gained through the completion of the program in a substantial way. Examples of capstone experiences include, but are not limited to, the completion of a thesis or the formal public presentation of a paper at a professional meeting or departmental colloquium. All capstone experiences normally occur after the completion of 24 hours of coursework and must be approved by the Director of Graduate Studies.

**Final Examination:** A candidate presenting a thesis must pass a one-hour oral examination; a candidate presenting a creative project must pass a ninety-minute oral examination. The examination consists of a short thesis defense, but chiefly of questions covering the general history of English and American literature, not merely the coursework taken. A reading list of primary works designed to help the student prepare for these questions is available in the office of the Director of Graduate Studies in English.

A non-thesis student must pass a written examination, followed by a one-hour oral examination, both consisting of the same sort of questions as the examination taken by the thesis student.

**Residence Requirement:** There is no residence requirement for the M.A., but students should attempt to pursue a full-time program whenever possible.

### WRITING CONCENTRATION

The master’s program with writing concentration is intended for those students who plan to do free-lance writing, specialize in teaching writing courses at the college level, or work as professional writers in business or industry.
Requirements

The requirements for the writing concentration are the same as those for the thesis option above with the following exceptions:

Coursework: Writing students may substitute two 300-level writing courses for two 500-level courses. Students must take at least 9 hours in writing and 9 in literature, the remaining 6 to be selected from any English courses at the proper level. Of the courses in writing, at least 3 hours must be taken at the 500 level; additional 500-level courses are strongly recommended.

Writing Projects: One of the following writing projects for six hours of credit:

1. A thesis, using research to analyze some aspect of writing or rhetorical theory.
2. A creative project, such as a collection of poems or short stories, a short novel, a play, or a creative work of non-fiction prose.

The nature and length of each project will be determined by the Director of Graduate Studies after consulting with the student and the project director. Two other English Department faculty members will supervise and approve the project; at least one should be from the literature faculty.

Final Examination: The reading list may be modified by the M.A. examining committee, meeting as a body with the student, to reflect the candidate’s particular writing emphasis. However, most of the oral examination should focus upon the literature outlined in the original reading list.

THE DOCTORAL PROGRAM

Requirements

A student must successfully complete a program of study, normally 6 full semesters as outlined below, approved by the candidate’s committee or the Director of Graduate Studies in English.

Coursework: At least 54 semester hours beyond the B.A. (of which at least 24 semester hours beyond the M.A.) to include at least 21 semester hours at the 600 level; at least 15 semester hours at the 500 level or above (only 3 hours of 593 Independent Study may be applied toward the M.A. and 3 after the M.A.); a 3-hour course in teaching composition and 15 additional hours at any level approved for graduate credit (including a maximum of 12 hours at the 400 level if approved by the Director of Graduate Studies).

Up to 6 of these additional hours may be taken in some cognate field or fields such as history, philosophy, French. These courses must be drawn from those approved for graduate credit. All other coursework must be in the English department. In this coursework, students must normally maintain a 3.5 GPA.

Dissertation: Twenty-four semester hours of dissertation. These represent the research for and writing of the dissertation. The research and dissertation will be directed by a faculty member of the department and approved by a doctoral committee of three or four other faculty members.

Language Requirement: A language requirement met in one of the following ways:

1. Two languages approved by the Director of Graduate Studies in English. The requirement for each language may be fulfilled by (a) completion of French 302 or German 332 with a grade of B or better; (b) completion at UT of any two courses on the 300 level or above in the foreign language or literature with at least a grade of B in each course; (c) passing of the regular Ph.D. foreign language examination as currently administered at UT.
2. One modern language approved by the Director of Graduate Studies in English. This requirement must be fulfilled by a passing grade on the language examination given by UT and completion of two courses given in the foreign language at the 400 level or above, at least one course to be at the 500 or 600 level. A minimum grade of B must be received in each course.

3. One modern language approved by the Director of Graduate Studies in English and intensive study of the English language. This requirement must be fulfilled by completion of (a), (b), or (c) in option 1. for one foreign language; and completion of 6 semester hours in English language courses with grades of B or better, at least three of which must be from English 508 or 509 History of the English Language (offered in alternate years, not every year). For the other 3 hours, the student may either complete the history of the language sequence or choose one other course in language taught in the Department of English at the 500 or 600 level and approved by the Director of Graduate Studies in English. These courses will not count toward the minimum number of courses for the Ph.D., and anyone electing this language option may not take the comprehensive examination in linguistics.

Examinations:

1. A 4-hour qualifying examination taken before the end of the first year of Ph.D. coursework; the examination is given three times a year, with the M.A. written examination. (2) A comprehensive written examination which may be divided as the department directs; see the English Department graduate brochure. The comprehensive examination is given twice a year, normally in March and September. Before a student may take it, he/she must have completed all coursework required. A student must also have met all requirements for foreign languages before beginning the first part of the examination.

Dissertation Defense: A one-hour examination on the dissertation and other related areas.

Residence Requirement: Two consecutive semesters as a full-time student. For students not on teaching assistantships, full-time consists of 9 or more hours of coursework and/or dissertation hours each semester. For students on assistantships, full-time consists of at least 6 hours of courses and/or dissertation hours and 3 hours of teaching each semester.

GRADUATE COURSES

Note: Students enrolling in English graduate courses must first register in the office of the Director of Graduate Studies in 306 McClung Tower.

401 Medieval Literature (3) Reading and analysis of selected medieval literary masterpieces in modern English.

402 Chaucer (3) Reading and analysis of Canterbury Tales and Troilus and Criseyde in Middle English.

404 Shakespeare I: Early Plays (3) Shakespeare’s dramatic achievement before 1601. Reading and discussion of selected plays from romantic comedies, including Twelfth Night; English histories, including Henry IV; and early tragedy, including Hamlet.

405 Shakespeare II: Later Plays (3) Shakespeare’s dramatic achievement between 1601 and 1613. Reading and discussion of selected plays from great tragedies, including Othello; problem plays, including Measure for Measure; and dramatic romances, including The Tempest.

406 Renaissance Drama (3) English theatre between 1590 and 1640 through reading of representative plays by Shakespeare’s contemporaries: Marlowe, Webster, Jonson.

409 Spenser and his Contemporaries (3) Principal achievements in prose and poetry of sixteenth century authors; Spenser, Wyatt, Marlowe, More, Sidney, and Bacon.

411 Milton, Donne and their Contemporaries (3) Principal achievements in prose and poetry of first two-thirds of seventeenth century: poetry of Milton, Donne, Marvell; and prose of Browne, Bacon, Walton.

412 Literature of Restoration and Early Eighteenth Century: Dryden to Pope (3) Survey of English literature and culture from 1660 to 1745.

413 Restoration and Eighteenth-Century Genres and Modes (3) A major genre or literary mode; drama, novel, poetry, non-fiction prose, satire, romance, or epic, written between 1660 and 1800. May be repeated.

414 Romantic Poetry and Prose I (3) Wordsworth, Coleridge, and Blake; readings from Lamb, De Quincey, and other prose writers.

415 Romantic Poetry and Prose II (3) Keats, Shelley, and Byron; readings from Hazlitt, Peacock, and other prose writers.

416 Early Victorian Literature (3) May include poetry by Tennyson and the Brownings; prose by Carlyle, Newman, and Mill.

419 Later Victorian Literature (3) May include poetry by the Pre-Raphaelites, Arnold, Hopkins, and Hardy; prose by Arnold, Ruskin, and Carroll; plays by Gilbert and Wilde.

420 The Nineteenth-Century British Novel (3) Scott to Hardy.

421 Modern British Novel (3) Works from authors such as Joyce and Woolf through contemporary British fiction writers.

422 Women Writers in Britain (3) Literary consciousness and works of women writers in Britain. Topics vary: Marie de France, Margery Kempe, Amelie Langlois, Elizabeth Cary, Aphra Behn, Frances Burney, Mary Wollstonecraft, Mary Shelley, George Eliot, Virginia Woolf, and Doris Lessing. May be repeated. Maximum 6 hrs. (Same as Women’s Studies 422.)

431 Early American Literature (3) From earliest texts to 1830: exploration and discovery, Native American, colonial, revolutionary, and early national works.

432 American Romanticism and Transcendentalism (3) Prose and poetry of American Renaissance, from c. 1830 to end of the Civil War; Cooper, Poe, Hawthorne, Melville, Emerson, Thoreau, Stowe, Douglass, Whitman, and Dickinson.

433 American Realism and Naturalism (3) Literature from time of the Civil War to World War I: Twain, Howells, James, Jewett, Freeman, Crane, and Norris.

434 Modern American Literature (3) World War I to present.

435 American Novel before 1900 (3) From earliest sentimental novels through Brown and Cooper, and major figures to 1900: Hawthorne, Melville, Stowe, Clemens, and James.


441 Southern Literature (3) Southern writing from colonial period into twentieth century: frontierhumorists, local color writers, and Southern literary renaissance.

442 American Humor (3) Early nineteenth century to twentieth century: Mark Twain.
443 Topics in Black Literature (3) Contents vary: particular genres, authors, or theories from 1845 to present: Langston Hughes and Harlem Renaissance, Richard Wright and Gwendolyn Brooks, writing by Black women, international Black literature in English, and Black American autobiography. (Same as African and African-American Studies 443.)

451 Modern British and American Poetry (3) From Yeats and Frost to Auden, Stevens, and more recent poets.

452 Modern Drama, 1880-1945 (3) Survey of British, American, and international drama since the advent of modern drama to the end of World War II. (Same as Comparative Literature 452.)

453 Contemporary Drama (3) American, and international drama from the advent of American literature to the present. May be repeated. Maximum 6 hrs.

454 Twentieth-Century International Novel (3) Fiction in English translation from such writers as Kafka and Camus through contemporary authors. (Same as Comparative Literature 454.)

455 Persuasive Writing (3) Writing and analyzing persuasive materials: public, private, personal, and technical. Prereq: Advanced Expository Writing or consent of instructor.

456 Contemporary/Postmodern Literature (3) Studies in literature written after World War II. Content will vary. May be repeated with consent of instructor. Maximum 6 hrs.

460 Technical Editing (3) Editing technical material for publication. Principles of style, format, graphics, layout, and production management. Prereq: Techni-
cal and Professional Writing or consent of instructor.

462 Writing for Publication (3) Principles and prac-
tices of writing for publication. Dissertation, theses, articles, and reports in science and technology. Prereq: Technical and Professional Writing or consent of instructor.

463 Advanced Poetry Writing (3) Further development of skills acquired in basic writing poetry course. Prereq: 363 or consent of instructor.

464 Advanced Fiction Writing (3) Further deve-
lopment of skills acquired in basic writing fiction course. Prereq: 365 or consent of instructor.

466 Writing, Layout, and Production of Technical Documents (3) Principles of design for desktop pub-
lishing. Production of various documents to be incor-
oporated into professional portfolio. Prereq: Technical and Professional Writing or consent of instructor.

470 Special Topics in Rhetoric (3) Topics vary. Prereq: Advanced Expository Writing or consent of instructor. May be repeated with consent of department. Maximum 6 hrs.

471 Sociolinguistics (3) Study of language in relation to society. Empirical and theoretical focus. Large
core units: tribes, nations, social groups. Prereq: 371 or 372 or Linguistics 200 or consent of instructor. (Same as Linguistics 471 and Sociolinguistics 471.)

472 American English (3) Phonological, morpho-
logical, and syntactic characteristics of major social and regional varieties of American English; origins, functions, and implications for cultural pluralism. Prereq: 371 or 372 or Linguistics 200 or consent of instructor. (Same as Linguistics 472.)

474 Teaching English as a Second or Foreign Language I (3) Major issues surrounding teaching ESL/EFL: political implications of teaching ESL/EFL; introduction to second language acquisition: learner variables in language learning; traditional and innova-
tive approaches to ESL/EFL: basic features of Ameri-
can English grammar necessary for teaching ESL. Prereq: 474 or of foreign language or consent of instructor. (Same as Linguistics 474.)

475 Teaching English as a Second or Foreign Language II (3) Issues, principles, and techniques in teaching grammar, speaking, pronunciation, reading, and writing in ESL. Observations and teaching practice in ESL classes and development of ESL materials and tests. Prereq: 474. (Same as Linguistics 475.)

476 Second Language Acquisition (3) How humans learn second languages. Theoretical models and re-
search: differences between first and second lan-
guage acquisition; learner variables; sociocultural factors; and implications for second/foreign language instruction. (Same as Linguistics 476.)

477 Pedagogical Grammar for ESL Teachers (3) Aspects of English syntax and morphology presenting difficulties for non-native learners of English. Basic and complex sentence structures; noun and article system; and verb tense, aspect, modality, and comple-
mentation. (Same as Linguistics 477.)

479 Literary Criticism (3) Historical survey of major works of literary criticism.


481 Studies in Folklore (3) Topics vary. May be repeated with different topic. Maximum 6 hrs.

482 Major Authors (3) Content varies. Concentrated study of at least one of the most influential writers in British or American literary history: e.g., Donne, Pope, Austen, Tennyson, Whitman, Faulkner, Lawrence, Baldwin, or Morrison.

483 Special Topics in Literature (3) Topics vary. May be repeated. Maximum 6 hrs.

484 Special Topics in Writing (3) Original writing integrated with reading, usually taught by professional author. Topics vary. May be repeated. Maximum 6 hrs.

485 Special Topics in Language (3) May be re-
peated. Maximum 6 hrs with consent of department. (Same as Linguistics 485.)

486 Special Topics in Criticism (3) Content varies. Theoretical and practical approaches to British and American literature. May be repeated with consent of department. Maximum 6 hrs.

489 Special Topics in Film (3) Content varies. Par-
ticular directors, film genres, national cinema move-
ments, or other topics. May be repeated with consent of department. Maximum 6 hrs. (Same as Cinema Studies 489.)

490 Language and Law (3) Anglo-American legal process; focus on differences be-
tween spoken and written language; lexical and syn-
tactic ambiguity; pragmatics; speech act analysis; and language rights of linguistic minorities. Prereq: Foun-
dations of the English Language or The Structure of Modern English or consent of instructor. (Same as Legal Studies 490 and Linguistics 490.)

495 Introduction to Rhetoric and Composition (3) Historical, theoretical, and empirical modes of inquiry in rhetoric and composition. Prereq: Advanced Expository Writing or consent of instructor.

496 Rhetoric of Legal Discourse (3) Application of basic principles of persuasive writing to legal materi-
als, issue identification and argument through written position papers, briefs, and memoranda. Critical read-
ing and discussion. Introductory research techniques. Prereq: Adv. Expository Writing or consent of instructor.

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

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

505 Teaching Freshman Composition (3) Intro-
duction to teaching Freshman English through study of various techniques and philosophies of compi-
ssion. Required of all first-year teaching associates.

506 Introduction to Literary Research (3) Critical examination of aims of English studies, profession of English teacher, theory of literature, and methods of research: critical, comparative, evaluation of ma-
terial, and transmitting of results of scholarship.

507 Applied Criticism: The Rhetoric of Literary Forms (3) Study and application of ways in which major critics have analyzed form in poetry and prose fiction. May be repeated. Maximum 6 hrs.

508 History of the English Language I (3) Phonology, morphology, and syntax of development of English language; Old and Middle English.

509 History of the English Language II (3) Phon-
ological, morphological, and syntactic development of the English language with concentration on dev-
lopments after 1500 especially American English.

513-14 Readings in Medieval Literature (3,3) Read-
ing and analysis of selected masterpieces of Old and Middle English literature and their Continental sources in Modern English. May be repeated. Maximum 9 hrs. each.

520-21 Readings and Analysis in Selected Areas of Sixteenth- and Seventeenth-Century Prose, Po-
etry, and Drama (3,3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

530-31 Readings in English Literature of the Resto-
ration and Eighteenth Century (3,3) Topics vary. Genre; poetry, prose, fiction, drama; or period: Resto-
ration, early eighteenth century, late eighteenth cen-
tury. May be repeated. Maximum 9 hrs. each.

540-41 Readings in English Literature of the Nine-
teenth Century I and II (3,3) Content varies; genre, theme, literary movement, or other coherent empha-
sis. May be repeated. Maximum 9 hrs. each.

550-51 Readings in American Literature (3,3) Con-
tent varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs.

552 Readings in Black American Literature (3) Content varies: genre, theme, literary movement, or other coherent emphasis. May be repeated. Maximum 9 hrs.

560-61 Readings in Twentieth-Century Literature (3,3) Content varies: genre, theme, literary move-

tment, or other coherent emphasis. May be repeated. Maximum 9 hrs. each.

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

580 Fiction Writing (3) Advanced fiction projects under supervision of instructor and time for indepen-
dent 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 continuation of project begun in 463. Indi-
vidual consultation with instructor supplements class anal-
ysis; 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. May be repeated. Maximum 6 hrs.

584 Topics in Feminist Studies (3) Topics vary. May be repeated. Maximum 9 hrs.

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

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

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

588 Readings in Applied Rhetoric (3) Content var-
es: Writing across curricula in American centers, techni-
cal communication, text linguistics. May be repeated. Maximum 6 hrs.

589 Special Topics in Language (3) Topics vary. May be repeated. Maximum 6 hrs.

590 Topics in Critical Theory (3) Topics vary. May be repeated. Maximum 9 hrs.
Entomology and Plant Pathology

(College of Agricultural Sciences and Natural Resources)

**MAJOR**
Entomology and Plant Pathology .............. M.S.
Plants, Soils, and Insects .................... Ph.D.

Carl J. Jones, Head

**Professors:**
Bernard, Ernest C., Ph.D. ................. Georgia
Bost, Steven C., Ph.D. ............... NC State
Burgess, Edward E., Ph.D. ............ Tennessee
Gerhardt, Reid R. (Liaison), Ph.D. ... NC State
Grant, Jerome F., Ph.D. ............. Clemson
Jones, Carl J., Ph.D. ............... Wyoming
Lambdin, Paris L., Ph.D. ............... VPI
Newman, Melvin A., Ph.D. ....... Texas A and M
Patrick, Charles R., Ph.D. ............ Georgia
Trigiano, Robert N., Ph.D. ............ NC State
Windham, Alan S., Ph.D. ............ NC State
Windham, Mark T., Ph.D. ............. NC State

**Associate Professors:**
Canaday, Craig H., Ph.D. ............. Ohio State
Gawin, Kimberly D., Ph.D. ........... NC State
Hale, Frank A., Ph.D. .............. NC State
Lentz, Gary L., Ph.D. ............... Iowa State
Owley, Bonnie H., Ph.D. ............. NC State
Skinner, John A., Ph.D. ............... California (Davis)
Stewart, S. D., Ph.D. ............... Auburn
Vail, Karen M., Ph.D. ............. Florida

**Assistant Professors:**
Lamour, K. H., Ph.D. .......... Michigan State
Moulton, J. K., Ph.D. .......... Arizona

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 Council and must have completed (1) general botany or biology, 8 hours; (2) advanced biological sciences, 8 hours; (3) general mathematics, 6-8 hours; (4) organic chemistry, 3 hours. In addition, three completed rating forms and a written statement of career goals and interest in entomology or plant pathology are required.

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

**THE DOCTORAL PROGRAM**
A Ph.D. in Plants, Soils and Insects (PSI), with concentrations in entomology, plant pathology, integrated pest management and bioactive natural products, is offered under a multi-departmental doctoral program. Three departments participate: Plant Sciences, Entomology and Plant Pathology, and the faculty in Biosystems, Engineering, and Environmental Sciences. Other concentrations within the PSI major include horticulture, crop sciences, weed biology, plant improvement, and environmental and soil sciences. Please see the doctoral program links on the homepage of the Department of Entomology and Plant Pathology for additional information, http://epsserver.ag.uky.edu/, or contact a faculty member in the area of interest.

**Admission Requirements**
Submit application, fee, official transcripts, and scores from the general portion of the Graduate Record Examination to the Graduate Admissions Office. In your application, indicate that you are applying to the Plants, Soils and Insects doctoral program. Submit resume, three letters of reference (or three Graduate Rating Forms), photocopy of GRE scores and a short statement of professional goals and reasons for applying to EPP PhD Program Coordinator, Department of Entomology and Plant Pathology, 2431 Center Drive, 205 PSB, University of Tennessee, Knoxville, Tennessee, 37996-4560. In your statement letter and application, please indicate your concentration of interest and intended major professor.

**Degree Requirements**
To obtain the doctorate, the student must meet the following requirements:
1. The student and the major professor will select a minimum of three additional faculty, holding the rank of assistant professor or above, to serve on the student's doctoral committee. The major professor and two committee members must be approved to direct doctoral research by the Graduate Council, and at least half of the committee must hold teaching appointments. At least one member of the committee must be from outside the department. The doctoral committee must be formalized by the end of the second semester of graduate study.
2. Submission of an approved program of study by the end of the second semester of graduate study. A candidate for the doctoral degree must complete a minimum of 24 hours of graduate coursework numbered 503 or higher beyond the master's degree.
Candidates not having a masters degree must complete a minimum of 48 hours of graduate coursework beyond the baccalaureate degree, 24 hours of which must be numbered 500 or higher. A minimum of 12 of the 24 hours, or 30 of the 48 hours, must be graded A or higher. At least 6 of the student’s course work must be from outside the PSI major, and a minimum of 6 semester hours must be taken in UT courses numbered 601 or higher. In addition, 24 hours of course 600 Doctoral Research and Dissertation are required.

3. Satisfactory preparation of a written dissertation proposal and its oral defense to the student’s committee. This must be completed during the first two semesters of graduate study and before enrollment in 600.

4. Passing both written and oral sections of the comprehensive examination. The candidate will be tested on his/her knowledge of the proposed dissertation and related fields.

5. Presentation of at least two departmental seminars (2 hours of EPP 541), in addition to an exit seminar (no credit).


Please see the Degree Program Requirements/Doctoral Degrees section at the front of this catalog for additional information.

GRADUATE COURSES

410 Diseases and Insects of Ornamental Plants (3) Symptoms, identification and management of diseases and insect pests that affect plants in greenhouses, nurseries, and landscape environments. Prereq: Plant Pathology or Economic Entomology or consent of instructor.

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

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

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.)

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.

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.

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.

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.

521 Plant Virology (3) Symptomatology, epidemiology, and management of virus infection; structure, morphology, replication, transmission, purification, characterization, and classification of plant viruses: serology; plant pathogenic viroids, mycoplasmas and spiroplasmas. Prereq: 313 or consent of instructor. 2 hrs and 1 lab.

523 Field Crop and Vegetable Insects (2) Identification, biology and management of insects affecting commercial vegetable and home garden crops. Prereq: 321 or basic entomology course. 1 hr and 1 lab.

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.

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.)

531 Special Problems in Entomology (1-3) Comprehensive individual study of current problems. May be repeated. Maximum 6 hrs.

532 Special Problems in Plant Pathology (1-4) Comprehensive individual study of current problems. May be repeated. Maximum 6 hrs.

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.

541 Seminar (1) Review of literature and current research in entomology and plant pathology. May be repeated. Maximum 2 hrs.

543 DNA Analysis (2) Practical experience in isolating and analyzing DNA from prokaryotic and eukaryotic organisms, amplification of DNA using arbitrary nucleotide primers. DNA profiling techniques (DAF, ASAP, ITS ribosomal DNA and 18S bacterial gene) isolation and purification of amplified products. Data collection and analysis of relationships between organisms. Prereq: 12 hrs biological sciences, 8 hrs chemistry, written consent of instructor. 1 hr and 4 labs weekly for 7 weeks. (Same as Plant Sciences and Landscape Systems 543.)

544 Protein Gel Electrophoresis (1) Practical experience with isolating native and denatured proteins from plants and fungi, determining protein concentrations, PAGE of proteins including total proteins and assays for specific enzymes (isozyme) analysis. Prereq: 8 hrs biological/botanical sciences, 8 hrs chemistry, consent of instructor. 1 hr and 4 labs weekly for 5 weeks. (Same as Plant Sciences and Landscape Systems 544.)

545 Plant Microtechnique (1) Practical light and scanning electron microscopy methods for investigating aspects of plant development, histochemistry and pathological structures in ornamental forest and crop species. Prereq: 8 hrs biological/botanical sciences and consent of instructor. 1 hr and 4 labs weekly for 5 weeks. (Same as Plant Sciences and Landscape Systems 545.)

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

602 Advanced Topics in Entomology (1-3) Morphology, systemsatics, physiology, ecology and genetics of arthropods, apiculture, medical and veterinary entomology, insect biodiversity, and insect pathology. May be repeated. Maximum 12 hrs.

604 Advanced Topics in Plant Pathology (1-3) Biological control, disease diagnosis and management, epidemiology, fungal plant pathogens, integrated pest management, molecular plant-microbe interactions, nematology, plant pathogenesis, plant-pathogen bacteria, soil- and seed-borne pathogens, and virology. May be repeated. Maximum 12 hours.

606 Advanced Topics in Bioactive Natural Products (1-3) Bioactive pesticides, ethnomycology and paleoethnobotany, ethnomedicine, biocatalysis and control of plant pathogens, bioassays, natural product diversity, alternative bioactive crops, organic agriculture, allelopathy in agriculture, regulatory issues in natural product development, and bioactivity-guided isolation. May be repeated. Maximum 12 hours.

Environmental Engineering

See Civil Engineering

Finance

(College of Business Administration)

MAJOR

DEGREES

Business Administration .......... MBA, Ph.D.

James W. Wansley, Head

Professors:

Black, Harold A. (James F. Smith, Jr., Professor), Ph.D.,........... Ohio State

Boehm, Thomas P. (AmSouth Scholar), Ph.D. ...................... Washington (St. Louis)

DeGennaro, Ramon P., Ph.D. ........ Ohio State

Ehrhardt, Michael C. (Castagna Professor), Ph.D. ................. Georgia Tech

Philippatos, George C. (Distinguished Professor), Ph.D. ........ New York

Shriever, Ronald E. (Voight Professor), CPAs, Ph.D. ............ UCLA

Wachowicz, John M., Jr. (AmSouth Scholar), CPA, Ph.D. .......... Illinois

Wansley, James W. (Clayton Homes Chair of Excellence) (Liaison), CFA, Ph.D. .................. South Carolina

Associate Professors:

Auzier, Al L., Ph.D. ................. Iowa

Collins, M. Cary (Home Federal Fellow), Ph.D. ................. Georgia

Daves, Philip R., Ph.D. .......... North Carolina

Murphy, Deborah L., Ph.D. ........ Florida

Emeriti Faculty:

Dottenweich, William W., Ph.D. Pennsylvania

BUSINESS ADMINISTRATION CONCENTRATIONS

For complete listing of MBA and Ph.D. program requirements, see Business Administration.
MBA Concentration: Finance.

The curriculum offers courses for those interested in careers in corporate financial management, security analysis and investment, banking and financial institutions, and real estate.

Minimum course requirements are three courses: 511 plus two from the following: 512, 525, 532, 581, and 599 (Torch Fund only).

Ph.D. Concentration: Finance.

Minimum course requirements are finance seminars 641, 651, 652, and 654.

GRADUATE COURSES

502 Registration for Use of Facilities (1-15)
Requir ed 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.

511 Strategic Management for Creation of Financial Value (3)
Strategic issues in corporate finance, investments, and capital markets: how firms can employ financial strategies to create value. Use of derivatives, risk management, real options, fixed income securities, venture capital, initial public offerings and financial restructuring. Prereq: Business Administration 511, 512, and 513, or consent of instructor.

512 Problems in Financial Management (3)
Readings and cases that apply finance theory to real-world investment, financing, and asset management problems. Prereq: 511 and Business Administration 511, 512, 513, and 514, or consent of instructor.

525 Investment Analysis and Portfolio Management (3)
Investment process, portfolio applications. Asset allocation decision in global setting; organization and functioning of financial markets; equity and bond valuation; asset valuation models; equity and bond portfolio management; options, forwards and futures contracts; evaluation of portfolio performance; and review of alternative economies and emerging markets. Prereq: 511 and Business Administration 511, 512, 513, and 514, or consent of instructor.

532 Commercial and Investment Banking (3)
Analysis of management policies of financial institutions and investment banking firms. Legal, economic and regulatory environment and implications for management. Financial institution structure and competition and changes in the U.S. financial system. Analysis of raising new funds through underwriting new issues of corporate stocks, bonds and other instruments. Analysis of securities brokerage, market-making, merchant banking, and mergers and acquisitions. Prereq: 511 and Business Administration 511, 512, 513, and 514, or consent of instructor.

551 Financial Management of a New Enterprise (3)
Financial issues associated with formation, control, and long-term planning of new enterprise. Acquisition of venture capital. Prereq: 511 and Business Administration 511, 512, 513, and 514, or consent of instructor.

581 Real Estate Investment and Finance (3)
Financial and market analysis used to make real estate investment decisions. Effects of variety of financing options on rate of return on income-producing properties. Effect of various financing options on consumer's decisions to purchase. Relationship between primary and secondary mortgage markets and impact of those markets on cost and availability of funds for real estate lending. Effects of government intervention (taxation, subsidization, and regulation) in both real estate and mortgage markets. Prereq: 511 and Business Administration 511, 512, 513, and 514, or consent of instructor.

599 Special Topics in Finance (1-3)
Topics vary. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. S/NC or letter grade.

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

641 Seminar in Finance (1-3)
Capital markets, utility theory, asset pricing, theory of the firm, capital structure, dividend policy. Prereq: Consent of instructor. S/NC or letter grade.

651 Seminar in Corporate Finance (1-3)

652 Seminar in Asset Pricing and Markets (1-3)

653 Seminar in Financial Institutions (1-3)
Theoretical and empirical studies of financial institutions. Topics: modeling banking firm, efficiencies in banking, bank lending arrangements, asymmetric information, international competitiveness, and deposit insurance. Prereq: 641 and consent of instructor. May be repeated. Maximum 6 hrs. S/NC or letter grade.

654 Special Topics (1-3)

Food Science and Technology

(College of Agricultural Sciences and Natural Resources)

MAJOR DEGREES
Food Science and Technology ..... M.S., Ph.D.

Clark J. Brekke, Head

Professors:
Brekke, Clark J., Ph.D. .............. Wisconsin
Davidson, P. Michael,
Ph.D. .................................. Washington Sate
Draughon, F. Ann, Ph.D. ............ Georgia
Morris, William C., Ph.D. ......... Iowa State
Penfield, Marjorie P., Ph.D. ...... Tennessee

Associate Professors:
Golden, David A. (Liaison), Ph.D. ...... Georgia
Loveday, H. Dwight, Ph.D. .......... Kansas State
Mount, John R., Ph.D. .............. Ohio State

Assistant Professors:
Weiss, Jochen, Ph.D. .............. Massachusetts
Zivanovic, Svetlana, Ph.D. .......... Arkansas

Emeriti Faculty:
Collins, Jim L., Ph.D. .............. Maryland
Jaynes, Hugh O., Ph.D. .......... Illinois
Milton, Sharon L., Ph.D. .......... Tennessee
Miles, James T., Ph.D. .......... Wisconsin

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.

Admission requirements of the Graduate Council of UT apply. In addition, applicants must submit scores from the general section of the Graduate Record Exam (GRE), a written statement of educational and career goals, and Graduate Rating Forms or letters of recommendation from at least three people familiar with the applicant's scholastic ability and professional potential. Admission to the program is contingent upon faculty evaluation of the applicant's undergraduate/graduate GPA, GRE scores, rating forms, relevant work experience, and scores from the Test of English as a Foreign Language (TOEFL), if applicable.

THE MASTER'S PROGRAM

Applicants must have a B.S. in food technology, food science or a related scientific field.

Thesis Option
1. Prior to research for the thesis, the student must develop a detailed written research plan. Registration for 6 hours of 500 Thesis is required.
2. In addition to the thesis requirement, a minimum of 24 semester hours of graduate coursework is required. This work must be approved by the student's committee and a minimum of 14 hours must be courses numbered above 500. The committee may require additional coursework if the student's progress or background indicates such need.
3. All students are required to take 2 hours of 501 Seminar in their program and are expected to attend this course and participate in discussions during their master's program. Completion of 510 or equivalent is also required.
4. An oral, final examination covering the thesis and coursework is required.

Non-Thesis Option
1. In lieu of a thesis, students are required to complete a problem in cooperation with their employer (company or governmental agency) and their faculty committee. Students working on a problem must register for 6 hours of 503.
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.
3. A minimum of 72 hours beyond the Bachelor’s degree, excluding credit for the master’s thesis, is required. Of this, 24 semester hours must be 600 Doctoral Research and Dissertation.

4. At least 30 semester hours of coursework numbered above 500 are required exclusive of doctoral research and dissertation. At least 6 of the 24 hours must be courses numbered above 600.

5. A minimum of 6 hours of courses for graduate credit must be taken outside the Department of Food Science and Technology.

6. All candidates must complete 601 (2 hrs.) and are expected to attend 601 during their Ph.D. program.

7. Each candidate must pass both written and oral comprehensive examinations prior to admission to candidacy. Major professors will advise candidates on competencies expected. A final oral examination is required that includes a defense of the dissertation and subject matter that the student’s committee considers appropriate.

GRADUATE COURSES

410 Food Chemistry (4) Reactions of water, proteins, lipids, carbohydrates, minerals, enzymes, vitamins, and additives in foods. Prereq: Chemistry 110 Introduction to Organic and Biochemistry, Biochemistry and Cellular and Molecular Biology 310 Physiological Chemistry. 3 hrs and 1 lab.

420 Food Microbiology (2) Physical, chemical and environmental factors moderating growth and survival of foodborne microorganisms; pathogenic and spoilage microorganisms affecting quality of foods and their control. Prereq: Microbiology 210 General Microbiology. Coreq: 429.


430 Sensory Evaluation of Food (3) Principles and methods of sensory evaluation of foods. Prereq: Basic statistics. 2 hrs and 1 lab.

460 Meat Science (3) Carcass characteristics of meat animals, muscle structure and composition, cut identification, curing, freezing and cookery. Prereq: Food Industry or consent of instructor.

469 Meat Science Lab (1) Slaughter and processing methods for beef, pork, lamb and poultry. Coreq: 460.

490 Food Laws and Regulations (3) Laws and regulations designed to preserve safety, wholesomeness, and nutritional quality of United States food supply; precedent case studies and their impacts on laws and regulations. Prereq: The Food Industry; consent of instructor for non-majors. Recommended Prereq: Core courses in Food Science and Technology.

495 Quality Assurance and Sanitation Practices (3) Design and evaluation of food processing operations to produce safe and acceptable quality food products. Prereq: Food Chemistry, Food Microbiology, Food Preservation or consent of instructor.

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

501 Seminar (1) Individual reports and discussion on topics from current literature. May be repeated. Maximum 3 hrs.

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.

503 Problems in Lieu of Thesis (2-3) May be repeated. S/NC only.

507 Professional Development Seminar (1) Same as Agriculture and Natural Resources 507, Animal Science 507, Biosystems Engineering 507, Biosystems Engineering Technology 507, Environmental and Soil Sciences 507, Plant Sciences and Landscape Systems 507, S/N only.

510 Instrumental Analysis of Food (3) Modern instrumental methods for control of food manufacturing processes. Prereq: Food Chemistry, 2 hrs and 1 lab.

511 Color of Foods (2) Chemical basis, measurements, and reactions involved in color changes in foods. Manufacture and application of materials used to modify color of foods. Prereq: Food Chemistry or equivalent. 1 hr and 1 lab.

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.

515 Food Carbohydrates, Proteins and Lipids (4) Advanced study of chemical and physical properties of carbohydrate, protein, and lipid components of foods; effects of components on production of safe and consistent quality food products; and changes during processing and/or distribution of food products. Prereq: Food Chemistry or equivalent. 3 hrs and 1 lab.

521 Advanced Food Microbiology (3) Extrinsic and intrinsic factors associated with foods and food processing that relate to growth, survival, inhibition, detection, and recovery of foodborne pathogens and spoilage organisms; traditional and current approaches to microbiological food safety and quality. Prereq: Food Microbiology and Lab or equivalent.

540 Food Product Development (3) Art, science and technology of developing and marketing new food products. Prereq: Food Preservation. 2 hrs and 1 lab.

560 Advanced Meat Science (3) Physical and chemical changes that occur in conversion of muscle to meat; effect of postmortem treatments on meat quality, composition and palatability; packaging, preservation and quality control. Prereq: 460. 2 hrs and 1 lab.

590 Special Topics in Food Technology and Science (1-3) Critical views of current research and production concerns of food industry. May be repeated. Maximum 9 hrs.

593 Directed Studies (1-3) Research on non-thesis topics chosen by student and major professor. Supervised experience in food industry or governmental laboratories. May be repeated. Maximum 6 hrs.

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

601 Seminar (1) Reports and directed discussion on research topics from current literature. May be repeated. Maximum 3 hrs.

620 Food Toxicology (3) Basic and applied concepts in food toxicology; toxicological aspects of processed foods. Mode of action, prevention and control of food toxicants in food supply. Prereq: Food Chemistry, 521, or consent of instructor.

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.

Forestry, Wildlife and Fisheries

(College of Agricultural Sciences and Natural Resources)

MAJORS DEGREES

Forestry ............................................. M.S.
Natural Resources .................................. M.S.
Wildlife and Fisheries Science ................. M.S.

George M. Hopper, Head

Professors:
Dearden, B. L. .......... Colorado State
Hill, T. K., Ph.D. .......... Auburn
Hopper, G. M. (Liaison), Ph.D .... Virginia Tech
Ostermeier, D. M., Ph.D .......... Syracuse
Pelton, M. R., Ph.D .......... Georgia
Rials, Timothy G., Ph.D .......... Virginia Tech
Scharbaum, S. E., Ph.D .. Colorado State
Speer, C. A., Ph.D .......... Utah State
Strange, R. J., Ph.D .......... Oregon State
Wilson, J. L., Ph.D .......... Tennessee

Associate Professors:
Buehler, D. A., Ph.D .......... Virginia Tech
Clark, J. D., Ph.D .......... Arkansas
Clatterbuck, W. K., Ph.D .... Mississippi State
Fly, J. M., Ph.D .......... Michigan
Hay, R. L., Ph.D .......... Duke
Hodges, D. G., Ph.D .......... Georgia

Assistant Professors:
Bond, B. H., Ph.D .......... Virginia Tech
Buckley, D. S., Ph.D .......... Michigan Tech
Harper, C. A., Ph.D .......... Clemson
King, S. L., Ph.D .......... Texas A&M
Knowe, S. A., Ph.D .......... Georgia
Muller, L. I., Ph.D .......... Georgia
Van Manen, F. T., Ph.D .......... Tennessee
Wang, S. Ph.D .......... Nanjing Forestry (China)
Young, T. M., M.S .......... Tennessee

Emeriti Faculty:
Buckner, E. R., Ph.D .......... NC State
Dimmick, R. W., Ph.D .......... Wyoming
Rennie, J. C , Ph.D .......... NC State
Schneider, G., Ph.D .......... Michigan State

Graduate study leading to the Master of Science with majors in Forestry and in Wildlife and Fisheries Science and the Doctor of Philosophy with a major in Natural Resources is offered by the Department of Forestry, Wildlife and Fisheries.

The mission of the Department of Forestry, Wildlife and Fisheries is to advance management, conservation, and utilization of natural resources in Tennessee, the region and beyond through programs in teaching, research and extension.

THE MASTER'S PROGRAMS

Both thesis and non-thesis options are available for the major in Forestry; a thesis is required in Wildlife and Fisheries Science. For admission, the student must have a Bachelor's degree from an accredited institution in forestry, wildlife, fisheries, or other natural resource area. Applicants must take the general Graduate Record Examination (GRE) with minimum scores required. Graduate 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 Office of Graduate Admissions.

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 thesis requirement, a minimum of 24 hours of graduate coursework is required. This work must be approved by the student's committee and no more than 10 hours of the minimum 30 can be below the 500 level. The committee may require additional coursework if the student’s progress or background indicates such need.

3. All students are required to include Forestry 512 or Wildlife and Fisheries Science 512, Seminar, in their programs. This is required of each graduate student in residence fall semester.

4. An oral examination covering the thesis and coursework is required.

Non-Thesis Option (Forestry only)

1. Thirty-five hours of graduate coursework of which 23 must be at the 500 level or above is required.

2. A graduate committee of no fewer than 3 faculty members will be selected. At least one member shall be from outside the department. The committee will meet and schedule the student’s program during the first semester in residence.

3. Three hours of Forestry 511 are required.

4. Nine hours of coursework in the department must be at the 500 level or above, exclusive of Forestry 511.

5. Final comprehensive written and oral examinations shall be taken upon completion of no fewer than 28 hours of approved study.

THE DOCTORAL PROGRAM

The doctoral program with a major in Natural Resources emphasizes interdisciplinary research approaches toward the understanding and management of natural resources in a broad context. Areas of study include forest, wildlife, and fisheries biology; ecosystem function and structure; natural resource economics and policy; human dimensions of natural resource management; natural resource organization administration and management; wood sciences; and multidisciplinary natural resources management.

Admission Requirements

Applicants to the Ph.D. program normally should have completed a master’s degree prior to beginning the doctoral program. Specific admission requirements include:

1. A minimum grade-point average of 3.0 on a 4.0 scale.

2. A minimum composite score from the general Graduate Record Examination (GRE) on the verbal, quantitative, and analytical sections of 1560, with a minimum of 1100 on the verbal and quantitative sections.

3. A statement of professional goals, natural resource management philosophy, and reasons for applying to the program.

4. Three letters of reference from individuals capable of evaluating the applicant’s potential for graduate work in interdisciplinary natural resource management.

Degree Requirements

A candidate for the doctoral degree must complete 72 semester hours of coursework beyond the bachelor’s degree. Forty-eight hours must be in graduate coursework approved by the student’s doctoral committee. Up to 24 hours of master’s coursework may be applied to the 48-hour requirement. A minimum of 6 hours must be taken in UT courses at the 600-level, exclusive of dissertation hours. Specific requirements are:

1. Three to six hours required of all doctoral students that will include participation in an interdisciplinary team to address a significant national or regional natural resource issue.

2. Professional Development (6 credits)

Teaching - All students will be expected to complete FWF 601 and assist in teaching a course during their tenure in the program.

Problem Solving—FWF 610 will be required of all doctoral students that will include participation in an interdisciplinary team to address a significant national or regional natural resource issue.

Professional Communications—All students will be required to complete FWF 612 as part of their program of study. Part of the seminar requirement will consist of assisting in the development and conduct of FWF 512.

4. FWF 600 Doctoral Research and Dissertation (24 credits)

A doctoral committee consisting of at least four faculty members must be identified by the student and major professor. At least two of the committee members must be from the Department of Forestry, Wildlife and Fisheries and one member must be from an academic unit other than Forestry, Wildlife and Fisheries. Three of the committee members, including the major professor, must be approved by the Graduate Council to direct doctoral research. The committee should be formed during the first year of the student’s program.

All students are required to successfully complete an oral and written examination on all coursework completed as part of the Ph.D. requirements. The exam is scheduled when the student has completed all or nearly all of the coursework. The Ph.D. committee will determine the content, nature, and schedule of the comprehensive exam and certify the results.

During the first year, the student should develop a research prospectus that outlines the research problem to be addressed as part of his/her doctoral research. The prospectus is presented to the student’s committee and the committee will approve the research topic and approach.

All students are required to complete, present, and defend a dissertation. The student should provide each member of the committee a copy of the dissertation at least two weeks prior to the scheduled defense. All students are required to present a seminar on their dissertation as part of the degree requirements. The seminar can be part of the dissertation defense or presented before the formal defense.

MINOR IN ENVIRONMENTAL POLICY

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

Forestry

GRADUATE COURSES

421 Forest and Wildland Resource Economics (3) Production functions, supply-demand and market analysis; non-market programs and projects; economic analysis and decision models; investment and financial analysis; managerial economics; taxes; forest products marketing. Prereq: Resource Analysis or consent of instructor.

422 Forest and Wildland Resource Policy (3) Policy formulation; criteria for policy determinations; forest and wildland law and regulation; theory of conflict resolution; formal and informal resolution. Prereq: Senior standing or consent of instructor.

423 Wildland Recreation Planning and Management (3) Planning process and site planing, site design projects; management strategies; methods of visitor and recreation site management; case studies. Weekend field trips. Prereq: Forest and Wildland Recreation or consent of instructor. 2 hrs and 1 lab.

433 Wood Adhesives and Glued Wood Products (2) Theory and practice of adhesive bonding of wood; wood substrate-adhesive interface for bonding; principles of adhesives; gluing of solid wood and composite wood manufacturing practices; laboratory manufacture and/or testing of adhesives, adhesive bond strength and glued-wood product performance; day field trips. Prereq: Wood Properties and Uses and Wood Identification, or consent of instructor. 1 hr and 2 labs.

434 Wood Processing and Machining (2) Primary log breakdown and secondary processing into major products. Fundamentals of machining technology for major types of cutting operations: sawing, boring, planing, veneer cutting, and laser machining; day field trip. Prereq: Wood Properties and Uses and Wood Identification, or consent of instructor. 1 hr and 2 labs.

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

511 Problem Analysis in Forest Resources (3) Problem identification, analysis and solution in forest resources 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.

512 Seminar (1) Current developments in forestry. Required of all graduate students in residence in fall. May be repeated. Maximum 2 hrs. S/N/C only.

515 Forest Conservation Workshop (1-3) Relation of forest biology, ecology and management to conservation issues; integration of current conservation issues into classroom work and student projects; environmental education strategies. Not available to students in forestry or wildlife and fisheries science. May be repeated. Maximum 3 hrs.

520 Advanced Forest Ecology (3) Physiological ecology and adaptations of trees; relationships between overstory structure, microclimate, and understory response; regeneration ecology; competition and effects of fire and human disturbance regimes at multiple scales; forest succession and stand dynamics. Prereq: Graduate standing in forestry or biological science, or consent of instructor.
525 Woodlot Management (3) Current technologies and management strategies concerning wise use of forest resources for private, non-industrial forest landowners necessary for decision-making and implementation. Prereq: 6 hrs of biological sciences or consent of instructor. Not available to students in forestry or wildlife and fisheries science. 6.5 hrs and 1 lab weekly for 6 weeks.

530 Advanced Forest Resource Management (3) Analysis of forest management problems in public and private organizations. Classical forest regulation; linear and goal programming, as applied to resource management problems; advanced forest investment analysis; decision making methods for primary forest management activities; and methodologies for incorporating non-timber values in forest management operations. Prereq: Senior-level forest management or consent of instructor.

540 Genetics in Forestry (3) Genetic improvement of forest trees, selection of superior phenotypes; field testing methods; seed orchards; hybridization; tree cytolgy and tissue culture; use of biochemical variation; planning and conducting forest genetics research. Prereq: Silvicultural methods and Biology 220 or consent of instructor.

550 Recreation Planning for Forests and Associated Lands (3) Planning process for recreation development and development of associated lands. Analysis and critique of specific contemporary alternatives. Overnight field trips. Prereq: Senior level in forest recreation or consent of instructor.

570 Management and Policy of Forest Resource Organization (3) Theory and application of management as applied to natural resource organizations: institutional direction and culture, and strategic management. Development of policy as planning tool and as results from conflict resolution. Linkage between policy development and execution, and structure and management of organizations. Prereq: Forest administration or consent of instructor.

580 Advanced Silviculture (3) Silvicultural characteristics, silvicultural practices and systems applied to commercially important hardwoods and softwoods. In-depth analyses 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.

585 Advanced Forest Biometry (3) Application of sampling techniques to forest inventory; fixed and variable plot sampling; list sampling; Poison sampling; regression estimation; multistage and phase sampling. Growth and yield predictors for even-aged and uneven-aged forests. Prereq: Land Measurement, and Forest Resource Inventory or consent of instructor.

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.

593 Independent Study in Forestry (1-4) May be repeated. Maximum 6 hrs.

630 Forest Growth and Development (3) Forest stand dynamics, analysis of changes in species composition and forest stand structure (physical and temporal) during forest succession, response of stands to disturbances (anthropogenic and natural), modeling techniques to make predictions of future stand development. Prereq: Undergraduate silviculture course or consent of instructor. 2 hrs and 1 lab.

Forestry, Wildlife and Fisheries

GRADUATE COURSES

410 Wildlife Habitat Evaluation and Management (3) Ecological relationships between wildlife and habitat. Evaluation, modeling, and management of wildlife habitat. Effects of land-use practices on wildlife habitats. Prereq: Field and wildlife management or consent of instructor. Applicable to majors in Forestry and in Wildlife and Fisheries Science. Prereq: Senior standing 1 hr and 2 labs.

416 Planning and Management of Forest, Wildlife and Fisheries Resources (3) Integrated forest and wildland resource management through developing land management plans and analyzing case studies that demonstrate concepts of sustainable development in Forestry and in Wildlife and Fisheries Science. Prereq: Senior standing 1 hr and 2 labs.

520 Natural Resource Issues at International Level (2) Identification and analyses of issues regarding forestry, wildlife, fisheries and wildlife management beyond U.S. borders. Political, economic, social, and biophysical elements impacting natural resources in different parts of the world: Northern Europe, Latin America, Asia, Africa, and South America. In-depth case study and class presentation required by student teams. Not available for students who have taken 420.

535 Environmental Impacts to Natural Ecosystems (3) Current environmental problems impacting natural ecosystems: climatic change, acid deposition, air pollution, species declines, and introductions of exotic species. Management methodologies to mitigate environmental problems. Overnight field trips. Prereq: 416 or equivalent or consent of instructor. Applicable to majors in Forestry and in Wildlife and Fisheries Science.

540 Seminar on Integrated Resources Manage- and Fish Biodiversity (3) Integrated forest and freshwater resources. UNESCO-sanctioned global conservation initiative. Analysis of integrated resources management practices, principles and concepts of wild mammal management and fishery management. Environmental policy and application of science to management practice. Applicable to majors in Forestry and in Wildlife and Fisheries Science.

541 Seminar on Endangered Species (3) An examination of endangered species in the United States. Prereq: 1 yr biology, 444 or 445, or consent of instructor. 2 hrs and 1 lab.

542 Seminar in Natural Resources (2) Selected issues in natural resources and natural resource management at regional, national, or international level. Development of interdisciplinary approach to addressing problems: evaluating current state of knowledge, developing alternative actions to address problems, and identifying criteria for evaluation of alternatives.

612 Seminar in Forestry, Wildlife and Fisheries (1) Current issues and developments in forestry, wildlife and fisheries. Required of all doctoral students in residence during fall. May be repeated. Maximum 3 hrs.

Wildlife and Fisheries Science

GRADUATE COURSES

440 Wildlife Techniques (3) Methods of wildlife damage control, forest, farmland, wetland wildlife habitat management, identification of wildlife field signs, wildlife capturing techniques and management plan preparation. Prereq: Field and wildlife management or consent of instructor. 1 hr and 1 lab.

442 Fisheries Techniques (3) Active and passive sampling techniques for fish and aquatic organisms; population estimation methods; handling and transport; food habits analysis; marking and tagging techniques; age determination and incremental growth analysis; stream assessment; equipment and instrumentation usage and maintenance; safety in sampling methods. Prereq: Field and wildlife management or consent of instructor. 1 hr and 1 lab.

444 Ecology and Management of Wild Mammals (3) Biological and ecological characteristics of game mammals and endangered mammals. Current principles and practices of wild mammal management. Prereq: Principles of Wildlife and Fisheries Management or consent of instructor. 2 hrs and 1 lab. One weekend field trip required.

445 Ecology and Management of Wild Birds (3) Biological and ecological characteristics of game birds, endangered birds, and bird pests. Current principles and practices of wild bird management. Prereq: Principles of Wildlife and Fisheries Management or consent of instructor. 2 hrs and 1 lab.

490 Ethics in Wildlife and Fisheries Management (1) Ethical bases for decision-making and application of methodologies in practice of wildlife and fisheries management. Seminars by ethicists, wildlife and fisheries scientists and managers, and foresters to acquaint students with diverse perspective of ethical behavior in practices of wildlife and fisheries management. Lectures, panel discussions, and case studies. Team taught. Prereq: Senior standing. S/NC only.

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

502 Registration for Use of Facilities (1-15) Re- quired for the student not otherwise registered during any semester when student uses University facilities and is not otherwise enrolled. Prereq: Consent of instructor. 2 hrs and 1 lab.


515 Seminar in Avian Ecology and Management (1-2) Readings and discussion based on current litera- ture on contemporary topics in avian ecology and management. Prerequisites: awards for writing review paper on contemporary topic of interest to student. Prereq: Consent of instructor.

525 Endangered Species Management and Con- servation of Biodiversity (2) Status, ecology and management of endangered wildlife and plant species. Historic aspects, policy implications and philo- sophical issues surrounding recovery efforts. Approaches to monitor and manage for biodiversity. Prereq: Graduate standing or consent of instructor.

530 Wildlife Diseases (2) Necropsy of birds and mammals. Recognition of various diseases and methods of preparing pathological materials in field and lab. Investigative procedures concerning wildlife diseases. Prereq: 1 yr biology, 444 or 445, or consent of instructor. (Same as Comparative and Experimental Medicine - Veterinary Medicine 530.)
535 Floodplain Ecosystems (3) Ecology, restoration and management of floodplain ecosystems: biotic and abiotic processes, social considerations, and wildlife and forest management; Lower Mississippi River Alluvial Valley. Prereq: Consent of instructor.

540 Predator Ecology (2) Dynamics of terrestrial vertebrate predator populations in human-altered and relatively unaltered environments. Use of computers. Prereq: Animal Science 571 or Statistics 538 or consent of instructor.

545 Advanced Population Analysis (2) Detail characteristics, assumptions, goals, methods, and current technologies for fish and wildlife population analysis. Use of computers. Prereq: Animal Science 571 or Statistics 538 or consent of instructor.

546 Advanced Habitat Analysis (2) Habitat analysis as tool to evaluate habitat use and predict occurrences of animal and plant species: principles and goals of modeling, habitat analysis theory, GIS and statistical techniques. Use of computer programs. Prereq: Forestry, Wildlife and Fisheries 410 or Geography 411 or consent of instructor.

550 Fish Physiology (3) Mechanisms of gas transfer, circulation, excretion, osmoregulation, locomotion, and neural/hormonal control of these systems in fishes. Comparisons and contrasts with physiology of terrestrial animals. Practical applications of fish physiology to aquaculture, pollution assessment, and fisheries management. Prereq: Senior or graduate standing in life sciences.

555 Fish Culture (3) Principles, concepts and techniques of culturing economically important fish and shellfish species. Prereq: 443 or consent of instructor. 2 hrs. and 1 lab.

556 Recirculating Aquaculture (3) Growing fish in intensive, indoor systems with reconditioned water. Techniques of solids removal, nitrification, and gas balance. Practical experience with operating system. Prereq: 443 or consent of instructor.

560 Advanced Topics in Wildlife and Fisheries Science (1-3) Recent advances and concepts, research techniques and analysis of current problems. Prereq: 443, 444, 445, or consent of instructor. May be repeated. Maximum 6 hrs.

593 Independent Study in Wildlife and Fisheries Science (1-4) May be repeated. Maximum 6 hrs.

French
See Modern Foreign Languages and Literatures

Geography
(Graduate program in Geography)

Associate Professors:
Orvis, Kenneth H., Ph.D. ................. California Shaw, Shih-Lung, Ph.D. ............... Ohio State

Assistant Professor:
Grisino-Mayer, Henri, Ph.D. .............. Arizona

The department offers the Master of Science and Doctor of Philosophy degrees. The master's degree emphasizes development of professional competence as a geographer and offers opportunities to gain substantial depth in a concentration or a major technique. An emphasis in geographic information science is available for students who have appropriate backgrounds in mathematics and computer science. The doctoral program is for those who have demonstrated proficiency in conducting independent research. The department is particularly well-qualified to direct graduate work in location analysis, transportation geography, urban and rural geography, cultural ecology, and the geography of the natural environment (especially biogeography and geomorphology). The faculty is qualified to direct students from a variety of approaches ranging from historical and humanistic to rigorously analytic and GIS-based.

THE MASTER'S PROGRAM

The department offers the thesis and non-thesis options for the Master of Science. Both options require a minimum of 30 semester hours beyond the completion of a sound undergraduate major program. The M.S. program requires students to have background in quantitative methods equivalent to the course content of Geography 415, and some familiarity with key themes and approaches in both physical and human geography. At least two-thirds of the total hours in the degree program must be at or above the 500 level and must include 501 (at each offering during residency), 504, and 3 semester hours at the 600 level. In the thesis option, 6 hours must be Thesis 500. A final examination is required in both programs.

THE DOCTORAL PROGRAM

The doctorate is a research degree and is granted only to those who demonstrate proficiency in conducting independent research. Students must have a broad foundation and understanding of the discipline; these should have been achieved in a comprehensive master's program. Course requirements for the degree shall be determined by the student's faculty committee in accordance with specific interests and needs. The program must include 504, 515, 599, 9 hours of 600-level seminars, and (at each offering during residency) 501. A minimum of 9 semester hours must be earned in collateral fields, with courses selected for their relevance to the special fields. Ph.D. students whose Master's level work was in a field other than geography and for whom the Master's area remains close to their Ph.D. specialization may substitute geography units in courses outside of their specialty areas for up to 3 of the 9 required outside units. Competency in quantitative methods and basic human and physical geography is required. Additional tools, including languages, will be required as appropriate to the student's area of research specialization.

Examinations required for admission to candidacy include a written comprehensive examination, comprised of two written examinations in which the student will be tested on his/her knowledge of two special fields, and related areas of geography; an oral examination on the student's program, the special fields and related areas, and the dissertation proposal. All parts of the written comprehensive examination should be taken within the same semester.

MINOR IN ENVIRONMENTAL POLICY

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

GRADUATE COURSES

410 Global Positioning Systems and Geographic Data Collection, field and laboratory use of Global Positioning Systems for capturing digital geographic data; management of geographic data: coordinate systems, datum issues, scanning and digitizing, map standards, and uncertainty in Geographic Information Systems. 2 hrs and 1 2-hr lab.

411 Computer Mapping and Geographic Information Systems (3) Concepts, management, and presentation of digital data for spatial analysis: cartographic data structures. Prereq: 310 Introduction to Cartography or consent of instructor. (Same as Information Management 431) 2 hrs and 1 2-hr lab.

412 Advanced Cartography Techniques (3) Cartographic design and data display techniques for reference and thematic maps. Basic principles and methods of map reproduction. Prereq: Introduction to Cartography or consent of instructor. 2 hrs and 2 labs.

413 Remote Sensing: Types and Applications (3) Principles and uses of remote sensing imagery, digital data, and spectral data; geographic interpretation and mapping techniques. Prereq: Introduction to Cartography or consent of instructor.

415 Quantitative Methods in Geography (3) Geographical application of statistical techniques: point pattern analysis, and analysis of areal units. Prereq: Mathematics 115 Statistical Reasoning or Statistics 201 Introduction to Statistics or consent of instructor.

421 Geography of Folk Societies (3) Geographical study of folk culture, folklore, traditional culture and rural settlement, examples from eastern North America and selected foreign areas.

423 Geography of American Popular Culture (3) Geographical study of regional variation in popular cultures, youth cultures in United States. (Same as American Studies 423.)

432 Dendrochronology (4) Principles, techniques, and interpretation in tree-ring science. Applications in geography, climate, ecology, forestry, archaeology, and regional interrelationships. People as evaluators and agents of change. Prereq: Geography of the Natural Environment 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. Climatic change and modification, and interrelationships of climate and human activity. Prereq: Geography of the Natural Environment or Meteorology or consent of instructor.

435 Biogeography (3) Changing distribution patterns of plants and animals on variety of spatial and temporal scales. Effects of continental drift, Pleistocene climatic change, and human activity on world biota. Prereq: Geography of the Natural Environment or consent of instructor.
436 Water Resources (3) Global water resources and hydrologic processes: water availability, flooding, and water quality issues from physical and economic geographical perspectives. Prereq: Geography of the Natural Environment or consent of instructor.

439 Plant Geography of North America (3) Characteristics and distribution of major plant communities of Canada, the U.S., Mexico, and Central America. Relationships: climate, fire, and human disturbance. Long-term history and future prospects. Prereq: Coursework in geography or botany or consent of instructor.

441 Urban Geography of the United States (3) Concepts and theories concerning development and significance of systems of cities and internal morphology of cities in the United States. Writing emphasis course. (Same as Urban Studies 441.)

443 Rural Geography of the United States (3) Geographical appraisal of rural areas of the United States including small towns and urban fringes. Problems and potentials of rural America. Writing emphasis course.

449 Geography of Transportation (3) Examination of transportation systems and their effects on patterns, land use, location problems, and development.

450 Process Geomorphology (3) (Same as Geology 450.)

466 Teaching and Learning Geography (3) Preparation of prospective teachers in content, skills, strategies, and understandings needed for effective teaching and assessment of geography in K-12 schools. Course organization and content based largely on that of National Geography Standards.

495 Special Topics in Geography (1-4) Topics vary. Prereq: consent of instructor. May be repeated with consent of instructor. Satisfactory/No Credit or letter grade. Maximum 8 hrs.

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

501 Colloquium in Geography (1) Discussion of departmental research, current research literature, and general topics. Registration required of resident graduate students when course is 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 who is using University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

504 Introduction to Geographical Research (1) Research interests and methods of departmental faculty. Research frontiers in geography. Required of new graduate students. S/NC only.

505 Directed Research (2-6) Research on problems as defined by individual students. Prereq: Written consent of instructor and department prior to registration. May be repeated with consent of instructor. Maximum 9 hrs. S/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.

510 Geographic Software Design (3) Algorithms for spatial analysis, software design, and program implementation in stand alone and distributed computing environments. Prereq: Consent of instructor. (Same as Information Management 531.)

513 Topics in Remote Sensing (3) Applied research using imagery for interpretation and mapping of geographic data. Prereq: 413 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

515 Topics in Quantitative 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.

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. (Same as Information Management 532.)

518 GIS Project Management (3) Interactions between management, technical, and application aspects of Geographic Information Systems project through simulated environment of real-world GIS sites. Prereq: Computer Mapping and Geographic Information Systems or consent of instructor.

519 Graduate Practicum in Cartography/Remote Sensing/GIS (2-6) Prereq: Written consent of department before registration. May be repeated with consent of instructor. Maximum 6 hrs.

521 Topics in Cultural Geography (3) Examination of trends, problems, and methods in cultural geography. Prereq: 421 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

532 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.

533 Topics in Physical Geography (3) Trends, problems, and methods in geomorphology or other areas of physical geography. Prereq: Consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

534 Topics in Climatology (3) Trends, problems, and methods in area of climatology. Prereq: 434 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

535 Topics in Biogeography (3) Examination of trends, problems, and methods in biogeography. Prereq: 435 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

536 Topics in Watershed Dynamics (3) Trends, problems and methods in study of watershed processes. Prereq: Consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

541 Topics in Urban Geography (3) Analysis of research on urban systems, internal morphology, urban problems and urban spatial behavior. Prereq: 441 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

549 Topics in the Geography of Transportation (3) Examination of trends, problems, and methods in transportation geography and transportation networks. Prereq: 449 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

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, space, concepts, and methods of geography. Prereq: Consent of instructor.

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

609 Seminar in Geography (2-3) Topics vary. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

631 Seminar in Natural Hazards (3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

532 Seminar in Dendrochronology (3) Prereq: 432 or consent of instructor. May be repeated. Maximum 6 hrs.

533 Seminar in Physical Geography (3) Prereq: 533 or consent of instructor. May be repeated. Maximum 6 hrs.

624 Seminar in Climatology (3) Prereq: 534, 532 or consent of instructor. May be repeated. Maximum 6 hrs.

635 Seminar in Biogeography (3) Prereq: 535 or consent of instructor. May be repeated. Maximum 6 hrs.

641 Seminar in Urban Geography (3) Prereq: 541 or consent of instructor. May be repeated. Maximum 6 hrs.

643 Seminar in Rural Geography (3) Prereq: 443 or consent of instructor. May be repeated. Maximum 6 hrs.

649 Seminar in Geography of Transportation (3) Prereq: 549 or consent of instructor. May be repeated. Maximum 6 hrs.

663 Seminar in Geography of the American South (3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.
Assistant Professor: Klein, Diane S., Ph.D. ............... Arizona State

The Health and Exercise Science Department fosters development of those with career interests in health education/promotion, exercise science, public health, and safety. The Department of Health and Exercise Science offers graduate programs leading to degrees, majors, and concentrations in:

**Master of Science**
- Health Promotion and Health Education
- Safety

**Exercise Science**
- Exercise Physiology
- Biomechanics/Sports Medicine

**Master of Public Health**

**Master of Science - Master of Public Health (Dual Degree)**

**Doctor of Philosophy**
- Education
  - Exercise Science (Exercise Physiology or Biomechanics/Sports Medicine)
  - Human Ecology
  - Community Health

**MINOR IN GERONTOLOGY**

An intercollegiate/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 Education, Health, and Human Sciences 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 Education, Health, and Human Sciences' form. Copies of this form are available in the Department of Health and Exercise Science.

**Core Experience**

Students must complete a core experience of 12 semester hours taken from at least three different departments including nine hours taken from outside the major department. Coursework needs to comply with the following framework:

1. Coursework, 9 hours required. A variety of coursework may be taken toward satisfaction of this requirement. Courses which are offered on a regular basis include: Health 406, 465, Health/Public Health 650, Nutrition 518, Public Health 523, Social Work 566, Sociology 415, Educational Psychology 504, 522, 525, 528.
2. Applied practicum. 2 hours required. Students should register under practicum experiences in the "home" department of the supervising faculty.
3. Health 585. 1 hour required. Cross-listed with participating departments.
4. Successful completion of a written comprehensive examination covering subject matter of the minor.

**Graduate Committee**

At least one faculty member from the Gerontology Policy Committee who is qualified to work with graduate students, must serve on the graduate committee of each student who declares a gerontology minor.

**Admission to Candidacy**

When application is made for admission to candidacy, indication of the minor must be noted on the Admission to Candidacy form.

**Exercise Science**

The Exercise Science concentration is dedicated to promoting and integrating scientific research and education on the health benefits of exercise. Through a program of interdisciplinary graduate study, using both experimental and epidemiological methods, students gain a greater understanding of the role of exercise in the prevention of various cardiovascular, metabolic, and musculoskeletal disorders. The Exercise Science faculty offers graduate degrees (M.S. and Ph.D.) in two specialties: Exercise Physiology and Biomechanics/Sports Medicine.

The Exercise Physiology specialty involves the study of the acute and chronic effects of exercise on the human body. At the Master's level, students may choose from two tracks: (1) adult fitness/cardiac rehabilitation, or (2) applied physiology research. Students may elect to do internships in cardiac rehabilitation at several area hospitals, and are encouraged to take the ACSM Exercise Specialist® exam upon graduation. The Ph.D. Program requires course work in the life sciences, physiological chemistry, statistics and advanced topics in exercise physiology. Graduate students collaborate with an exercise physiology faculty member to perform research in the areas of physical activity assessment, metabolism, the health benefits of exercise, and body composition.

The Biomechanics/Sports Medicine specialty involves the study of biomechanical implications to exercise and rehabilitation. This program area focuses on the mechanism, prevention, and rehabilitation of musculoskeletal injuries. The emphases in courses taught in this area include biomechanical as well as medical considerations related to exercise and/or rehabilitation. The Ph.D. Program requires course work in engineering mechanics, numerical analysis, statistics, and advanced topics in biomechanics. Graduate students work with biomechanics/sports medicine faculty to pursue research in the areas of biomechanics of lower extremity function, footwear biomechanics, core stability, flexibility, and the biomechanics of injury mechanism and prevention.

**Graduate Assistantships**

A limited number of graduate assistantships are available for qualified students who are graduates of accredited colleges or universities. These assistantships are open to students in the master's and doctoral programs. Students interested in these opportunities should file their applications before February. Letters should be addressed to Graduate Assistantships Coordinator, Health and Exercise Science Department, The University of Tennessee, Knoxville, TN 37996-2700.

**MASTERS' PROGRAMS**

- **Exercise Physiology Concentration**
  - Exercise Science 508 (or Health 590), 553, 565, 567, 635, 601 (1 hr seminar, 2 enrollments).

- **Biomechanics/Sports Medicine Concentration**
  - Exercise Science 508 (or Health 590), 513, 516, 531, 581 (1-2 cr), 601 (1 hr seminar, 2 enrollments).

**Ph.D.—EDUCATION**

- **Exercise Science Concentration**
  - 15 hours in Exercise Science.
  - 9 hours in an Exercise Science specialization: Biomechanics/Sports Medicine, Exercise Physiology, Physical Activity and Population Health, or other area approved by committee.
  - 3 registrations in ES 601 Seminar.
  - 6 hours in a cognate selected from outside the student's major field. The cognate must be related to and supportive of the Concentration and Specialization.
  - 15 hours in research methodologies or research experience.
  - 24 dissertation hours.

*The above are viewed as minimum requirements and are subject to modification by the student's committee.*
Health

The Health and Exercise Science Department offers graduate programs leading to the Master of Science with majors in Health Promotion and Health Education and in Safety; and to the Master of Public Health degree in Public Health. The department provides doctoral preparation through a concentration in Human Ecology. Inquiries should be directed to the department head. Application packets are available by request to the department.

The department fosters development of pre-professional and professional competencies by those with career interests in the disciplines of health education/promotion, public health, and safety. The Health, Safety, and Exercise Science academic programs emphasize strategies of health promotion (education and lifestyle behaviors) and health protection (regulatory, environmental, and safety) for improving individual and community health and well-being. The faculty are committed to the educational value of community-based service learning, applied research, and community outreach. For more information, http://hss.he.utk.edu.

Ph. D.—HUMAN ECOLOGY

-Community Health 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 the department.
4. Minimum 6 hours in a cognate area.

Public Health

Graduate study with a major in Public Health leads to the Master of Public Health (M.P.H.). Three professional preparation concentrations are available: community health education, gerontology, and health planning/administration. Preparation for professional practice in improving community health emphasizes a population perspective, service-learning and application opportunities through rigorous internships. The M.P.H. program is accredited by the Council on Education for Public Health. A minor in statistics is available to interested M.P.H. students due to public health affiliation with the Intercollegiate Graduate Statistics Programs.

ADMISSION REQUIREMENTS

A statement of the applicant’s educational and career goals and three rating forms are required. Request application packet from the department. Preference 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, no dependent degree courses are considered for department recommendation. Deadlines for completed applications are 1 February for Summer term and 1 April for Fall semester.

THE MASTER’S PROGRAM

The M.P.H. is a non-thesis program requiring completion of 38 semester hours of coursework including 9 weeks of field practice. The field internship provides a full-time experience with an affiliated health agency or organization offering one or more health programs. Of importance, field practice allows the student to apply academic theories, concepts, and skills in an actual work setting. Students must complete all assigned prerequisite courses and 21 semester hours of the curriculum with a minimum overall GPA of 3.0 prior to placement in the field.

As an alternative to field practice, preparation of a master’s essay may be used to fulfill the professional skills development component of the curriculum. Approval must be received from the Public Health Academic Program Committee and is contingent on consent of major advisor, formal written proposal by the student, and completion of an additional research methods course. Written guidelines stipulating expectations and eligibility criteria are available.

Requirements include:
1. Public Health Foundation courses (16 hours): 509, 510, 520, 530, 540, 555.
2. Internship (6 hours): 587, 588.
3. Concentration of Study (16 hours). Required and recommended electives will be selected by the student in consultation with the major advisor. A list of courses is available for each concentration: community health education, gerontology, and health planning/administration.

For more information, refer to the web site: http://hss.he.utk.edu/pubhealth.

DUAL M.S.-M.P.H. PROGRAM

Also offered is 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. The program accommodates the interests of students who: 1) plan a career in public health nutrition and want to acquire the knowledge and skills of the nutritionist and public health professional; 2) plan a career in nutrition and want to acquire the knowledge and skills and the perspective of the public health professional; or 3) plan a career in public health and want to acquire the knowledge, skills and perspective of the nutritionist.

Admission Requirements

Applicants for the M.S.-M.P.H. program must make separate application to, and be competitively and independently accepted by, the Department of Nutrition for the M.S., Department of Health and Exercise Sciences for the M.P.H., and the Public Health Academic Program Committee.

Students who have been accepted by both departments may apply for approval to pursue the dual program anytime prior to, or after, matriculation in either or both departments. Such approval will be granted, provided that dual program studies be started prior to entry into the fourth semester of the M.S. and M.P.H. programs.

Curriculum

A dual degree candidate must satisfy the requirements for both the M.S. (public health nutrition concentration) and the M.P.H. degrees, as well as the requirements for the dual program. All candidates for the dual degree must successfully complete Health and Society (PH 555), two credits of Seminar in Public Health (PH 509), and a minimum of 60 credits. The Department of Nutrition will award a maximum of 9 semester hours of credit toward the M.S. degree for successful completion of approved graduate level courses offered in the Department of Health and Exercise Science. The department will award a maximum of 11 semester hours of credit toward the M.P.H. degree for successful completion of approved courses offered in the Department of Nutrition. All courses for which such cross-credit is awarded must be approved by the Public Health Academic Program Committee and the student’s graduate committee. A single block field experience (or public health internship) is required of all students and the analytical field paper incorporates public health nutrition and the student’s public health concentration.

Dual degree students who withdraw from the program before completion of the requirements for both degrees will not receive credit towards the M.S. or M.P.H. degree for courses taken in the other program, except as such courses qualify for credit without regard to the dual program.

Approved Dual Credit

M.S. courses to be counted toward the M.P.H. program must include 10 semester hours of Field Study in Community Nutrition (NTR 515) and 1 semester hour of Graduate Seminar in Public Health (NTR 509). M.P.H. courses to be counted toward the M.S. include Public Health Administration (PH 520), Biostatistics (PH 530), and Epidemiology (PH 540).

MINOR IN GERONTOLOGY

Graduate students in Public Health may pursue a specialized minor in gerontology. This interunit/interdisciplinary minor gives the student an opportunity for combining the knowledge about aging in American society with his/her major concentration.

Health and Exercise Science

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COURSE REGISTRATION

Non-degree students must obtain permission from the M.P.H. program director to register for 500-level public health courses. Prerequisite coursework assigned as a condition 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.

Safety

Graduate study with a major in Safety (thesis and non-thesis options) leads to the Master of Science degree. Graduate students may concentrate in safety management or in emergency management. The M.S. degree program requires completion of 33 semester hours. Degree requirements include completion of the 18-hour core curriculum and completion of a concentration area (15 hrs.).

The graduate program contributes to The University of Tennessee’s mission of health protection by preparing safety professionals with the knowledge and skills necessary to create and maintain safer human environments in the workplace (industrial and commercial), home, school, and community. The offering of all core classes and required concentration courses on an evening class schedule enables those working full-time in a concentration courses on an evening class schedule. The M.S. degree with a major in Safety on a part-time basis.

For more information, refer to the web site: http://hhs.he.utm.edu/safety.

Exercise Science

GRADUATE COURSES

480 Physiology of Exercise (3) Functions of body in muscular work: physiological aspects of fatigue, training and adaptation to environment. Prereq: Biochemistry and Cellular and Molecular Biology 230 Human Physiology or 440 General Physiology. (Same as Biochemistry and Cellular and Molecular Biology 480.)

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

501 Special Project (3) Culuminating experience for non-thesis major. Research study suitable for publication, or practicum requiring special written work. S/NC only.

502 Registration for Use of Facilities (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.

508 Research in Exercise Science (3) Research for writing of thesis and institutional review board proposals; presentation of research through free communica- tions and poster presentations; calculation and interpretation of statistics related to common research designs used in research; and use of computer software.

509 Graduate Seminar in Public Health (1) (Same as Public Health 509, Nutrition 509, Nursing 509, and Social Work 509.)

513 Biomechanics of Orthopedic Rehabilitation (3) Effect of physical activity on musculoskeletal tissue: flexibility development and measurement, surgical implications, and rehabilitation related research.

516 Therapeutic Exercise (3) Current research in therapeutic exercise: role of nervous system, soft tissue healing, proprioception, muscle activation patterns, and strength.

521 Analytic Epidemiology (3) Epidemiologic strategies for evaluating research questions concerning causes, prevention and treatment of morbidity and mortality. Prereq: Course in research methods and ability to design a research study suitable for publication.

525 Epidemiology of Injury and Violence (3) Epidemiologic methods to describe magnitude and examine etiology of unintentional injury. Alternative approaches for preventing or controlling occurrence of injury and violence in both general population and high risk sub-populations.


533 Exercise Physiology (3) Physiology of human performance: acute and chronic effects of exercise on metabolism, cardiovascular, pulmonary, and skeletal systems. Prereq: Human physiology or general physiology, general chemistry, 2 hrs and 1 lab.

541 Special Topics (1-3) Advanced study in selected areas of exercise science. May be repeated.

563 Laboratory Techniques in Exercise Physiology (3) Laboratory course in experimental methodology and instrumentation: respiratory and metabolic measurements, blood chemistry, and gas analysis. Prereq: 480 or 533.

565 Advanced Physiology of Exercise (3) Systematic study of skeletal muscle and metabolism related to acute exercise and physical training: lectures, discussions of major scientific reviews, and appropriate laboratory experiments. Prereq: 480 or 533.


569 Clinical Exercise Physiology (3) Cardiac structure and function, interpretation of 12-lead electrocardiograms, exercise considerations for cardiac and pulmonary patients, and safety. Prereq: 480 or 533, and 567. (Same as Public Health 569.)

570 Cardiac Rehabilitation Practicum (1-3) Supervised experience in hospital-based experience exercises for patients with cardiac and/or pulmonary disorders. Students will be evaluated in the education and counseling aspects of cardiac rehabilitation. Prereq: 533 and 567, or consent of instructor. Coreq: 569. May be repeated. Maximum 6 hrs.

581 Biomechanics Instrumentation (1) Kinematic, kinetic and muscle activity measurement of human movements using computerized videography, force platform, electromyography and other relevant instru- ments may be repeated. Maximum 3 hrs. S/NC only.

585 Seminar in Gerontology (1) (Same as Counseling Education 585; Nursing 585; Educational Psychology 585; Health 585; Nursing 585; Public Health 585; Social Work 585; Sociology 585.)

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

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

601 Research Seminar in Exercise Science (1) Research topics in different aspects of exercise science. May be repeated. S/NC only.

622 Directed Independent Research (3-6) Prereq: Doctoral student or consent of instructor. May be repeated. S/NC or letter grade.

625 Mortality and Survival (3) Life table and other population-based approaches to studying international and sociodemographic patterns and differentials in mortality, morbidity, and disability. Prereq: 2 graduate statistics courses or consent of instructor.

635 Physical Activity and Positive Health (3) Review of clinical, epidemiological, and experimental evidence concerning relationship and effects of exercise on health-related components of fitness. Prereq: Elementary statistics, 480 or 533 and 567 or consent of instructor. (Same as Public Health 635.)

661 Seminar in Exercise and Applied Physiology (1-3) Selected topics in exercise and environmental physiology. Prereq: 480 or 533. May be repeated with consent of instructor.

664 Research Participation in Exercise Science (1-6) Participation in research with faculty member whose interests coincide with those of student. S/NC only.

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

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

Health

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.)

405 Alcoholism and Alcohol Education (3) Problems of alcoholism. Factors which make alcoholism serious health and safety problem. Various types of instructional/educational and intervention programs.

406 Death, Dying and Bereavement (3) Aspects of dying, death and handling of trauma. Medical, financial, physical, legal and social implications of death.

420 Sex Education As It Relates to Human Sexuality (3) Exploration of science of human sexuality. Trends, issues, and content of sex education.

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.)

430 Suicide and Crisis Intervention (3) Factors which make suicide serious health problem. Assessment, intervention, and prevention techniques.

435 Substance Use and Abuse (3) Drug and alcohol abuse problems and suspected causes; pharmacology of drugs and effects on society; strategies for intervention and education.

465 Aging and Health (3) Aging process in health perspective as related to health promotion and wellness of aged.

500 Thesis (1-15) P/NP 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.
Public Health

GRADUATE COURSES

400 Consumer Health (3) (Same as Health 400.)

410 Worksite Health Promotion (3) Foundations of health promotion programs delivered in worksite that revolve around issues related to employees and management: theory, program design, implementation and evaluation from perspective of health promotion specialist. Prereq: Health Education, Promotion, and Behavior.

493 Directed Independent Study (1-3) Individual in-depth study of selected issues. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

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

528 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.

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.

540 Evaluation in Health Promotion and Health Education (3) Evaluation principles and methodologies as related to health promotion products, processes and programs. Construction of instruments for use in assessing health education outcomes.

570 Special Topics (1-3) For graduate students, in-service training to enhance professional skills. Speakers both internal and external to UT. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

585 Seminar in Gerontology (1) Scope of gerontology as discipline and as related to other academic and professional disciplines. Speakers both internal and external to UT. Prereq: Consent of instructor. May be repeated. Maximum 3 hrs. (Same as Counselor Education 585 Educational Psychology 585, Exercise Science 585: Nursing 585: Public Health 585, Social Work 585, and Sociology 585.)

590 Research Methods in Health (3) Basic research techniques in variety of health settings. Development of research skills and problem identification for research topic. (Same as Public Health 590.)

593 Directed Independent Studies (1-3) Individual identification and study of health/wellness or health promotion problem/issue. Specific proposal to instructor before registration. May be repeated. Maximum 12 hrs.

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

601 Internship/Research in Safety and Health (3-6) (Same as Safety 601.)

610 Critical Analysis of Writing and Research (3) Analysis of writing and research in health related areas.

620 Advanced Research Techniques in Health (3) Advanced theory and techniques of research design and methodologies in health discipline. Prereq: 590, 610.

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.)

655 Seminar in Nation’s Health (3) Comprehensive study of definition, determinants, resources and health status of nation. (Same as Public Health 655.)

660 International Health (3) Study of quality of health, health care and health services in countries throughout world. (Same as Public Health 660.)

509 Graduate Seminar in Public Health (1) In-depth discussion of timely topics reflecting scope of public health as discipline and its interrelation with many other academic and professional disciplines. Speakers both internal and external. May be repeated. Maximum 4 hrs. (Same as Nutrition 509, Nursing 509, Exercise Science 509 and Social Work 509.) S/NC only.


520 Public Health Policy and Administration (3) Administrative considerations of community-based health problems and public health characteristics of health policy formulation. Political environment and governmental involvement in health, legal responsibilities, and managerial concepts/techniques/ processes.

521 Organization Theory and Health Care Delivery (3) Administrative and Organization theory related to health facilities; operation and management of community hospital. Case discussions and problem-solving exercises; group process and administrative practices.

523 Management in Extended Care Settings (3) Managerial concepts and theoretical foundations essential to supervision and administration of domiciliary health services programs. Management and operation of health services programs for patients and clients in settings which provide activities of daily living and special psychosocial environmental needs. Opportunities to apply techniques in variety of health settings. Prereq: 521 or consent of instructor.

525 Financial Management of Health Programs (3) Application of concepts and techniques of financial management to health services. Financial management as discipline and as related to other academic and professional disciplines. Speak-ers both internal and external to UT. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

530 Biostatistics (3) Application of descriptive and inferential statistical methods to health-related problems and programs. Microcomputer applications, use and interpretation of vital statistics and introductory research methodology preparatory for first course in epidemiology. Prereq: Introductory statistics or consent of instructor.

540 Principles of Epidemiology (3) Distribution and determinants of health-related outcomes in specific populations, with application to control of health problems. Historical origins of discipline, hypothesis formulation, statistical inference and epidemiologic research. Study of processes and measures of frequency and association and application to problem situations. Prereq: Consent of instructor.


550 Principles and Practices of Community Health Education (3) Theoretical foundations for community health education; opportunities for skill development in variety 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 application of program planning and evaluation techniques. Opportunity to practice skills in realistic setting. Prereq: Consent of instructor.


560 Theories and Techniques in Health Planning (4) Overview of health planning concepts and methodologies; systems-oriented planning process. Major elements of planning: formulation and conceptualization of problem, plan design, evaluation and implementation. Health problems of institutions, communities and selected population groups, appropriate diagnostic programs for addressing needs.

569 Clinical Exercise Physiology (3) (Same as Exercise Science 569.)

580 Special Topics (3) Prereq: Consent of instructor. May be repeated under different topic. Maximum 6 hrs.

585 Seminar in Gerontology (1) (Same as Counselor Education 585, Educational Psychology 585, Exercise Science 585: Nursing 585, Social Work 585, Sociology 585.)

587-88-89 Internship (3,3,3) Internship (community health education, gerontology, or health planning/administration) in either approved organization or research setting under supervision of designated preceptor. Prereq: M.P.H. major, one semester advance notice and consent of major advisor. 589: available for approved extended placements. S/NC only.

590 Research Methods in Health (3) (Same as Health 590.)

593 Directed Independent Study (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

635 Physical Activity and Positive Health (3) (Same as Exercise Science 635.)

650 Health Aspects of Gerontology (3) (Same as Health 650.)

655 Seminar in Nation’s Health (3) (Same as Health 655.)

660 International Health (3) (Same as Health 660.)
History

(College of Arts and Sciences)

MAJOR DEGREES

History .......................................... M.A., Ph.D.

Todd A. Diacon, Head

Professors:

Brummell, Palmir R., Ph.D. .............. Chicago
Cutler, E. Wayne, Ph.D. ..................... Texas
Farris, W. Wayne, Ph.D. ..................... Harvard
Feller, Daniel, Ph.D. ........................ Wisconsin
Mosier, Harold, Ph.D. ........................ Wisconsin
Norrell, R. Jeff (Bernadotte Schmitt Professor), Ph.D. Virginia
Wheeler, W. Bruce, Ph.D. ................. Virginia

Associate Professors:

Appier, Janis, Ph.D. .............. California (Riverside)
Ash, Stephen V., Ph.D. ..................... Tennessee
Bast, Robert J., Ph.D. ....................... Arizona
Bohstedt, John, Ph.D. ....................... Harvard
Bradley, Owen P., Ph.D. .................... Cornell
Burman, Thomas E., Ph.D. .............. Toronto
Diacon, Todd A., Ph.D. .................... Wisconsin
Fleming, Cynthia G., Ph.D. .............. Duke
Freeburg, Ernest, Ph.D. ..................... Emory
Glover, Lorri, Ph.D. ......................... Kentucky
Higgs, Catherine A., Ph.D. ............. Yale
Lulevicus, Vejas G., Ph.D. .............. Pennsylvania
Pielker, G. Kurt, Ph.D. .................... Rutgers
Pinckney, Paul J., Ph.D. .................. Vanderbilt

Assistant Professors:

Brosnan, Kathleen, Ph.D. ............... Chicago
Dessel, J. P., Ph.D. ......................... Arizona

DeWeerdt, Hilde, Ph.D. ............... Harvard
Kulikowski, Michael, Ph.D. ............ Toronto
Liu, Lu, Ph.D. ........................... California (San Diego)
Shahadee, Jeff, Ph.D. ................. Illinois
White, George, Jr., Ph.D. ............. Temple

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 or non-thesis option. The doctoral program has concentrations in American and European history with special focuses in the areas identified under Group II doctoral fields and Group III teaching fields. Detailed information may be obtained from the Director of Graduate Studies in History who also advises all incoming students.

THE MASTER’S PROGRAM

Admission Requirements

1. Successful completion of a baccalaureate degree from an accredited institution, preferably with a major in history.
2. Acceptable scores on the Graduate Record Examination (general).

General Requirements

Complete 510 and a 600-level research seminar normally during the fall and spring semesters of the first year in the graduate program. Complete 521 in preparation for the M.A. examination. As many as 9 related hours may be taken outside the department. As many as 9 graduate credits taken elsewhere may be applied toward the M.A. degree. Except by prior approval of the Director of Graduate Studies, a student's coursework must be at the 500 level or above.

Thesis Option

Twenty-four hours of coursework and 6 hours of Thesis 500 for a total of 30 hours are required. Thesis students are required to select one M.A. field and write a thesis. At the end of the program the thesis student will stand for a two-hour oral examination on both the thesis and the field.

Non-Thesis Option

A total of 30 hours of coursework is required. At least 6 hours must be completed in each of two M.A. fields. The primary field is examined by a two-hour written followed within one week by a one-hour oral examination. No examination is given on the secondary field.

M.A. Fields

United States (colonial to present) Premodern Europe
Modern Europe Asia

Retention and Termination

A 3.0 overall grade-point average is required to remain in good standing. M.A. students must take the M.A. examination no later than the semester following the completion of 30 hours. A student who fails the M.A. examination must complete the examination no later than the following semester. A student who fails the examination a second time or does not take the examination when required will be dropped from the graduate program.

THE DOCTORAL PROGRAM

Admission Requirements

1. Successful completion of the M.A. degree from an accredited institution.
2. Acceptable scores on the Graduate Record Examination (general).

Residence and Coursework

Before being admitted to doctoral candidacy, a student must:

1. Complete History 510 at UT (may be waived for comparable experience elsewhere).
2. Spend two consecutive semesters in residence.
3. Complete 9 hours in one Group I doctoral field. There is no minimum hours requirement for a Group II field. Complete 9 hours in one Group III field, including the appropriate 511, 512, or 513 course and two additional courses at the 500 level. The Group III field must be in a different geographic area from the Group II field. Courses taken to fulfill M.A. degrees may be counted toward all field requirements.
4. Fulfill the foreign language requirement.
5. Complete two 600-level research seminars. (One must be completed at UT.)

Students who have completed a master’s thesis need complete only one research seminar (must be taken at UT).

Students who have completed a master’s thesis need complete only one research seminar. (Must be taken at UT.)

6. Maintain a 3.0 overall grade-point average in graduate work attempted.
7. Complete 24 hours of graduate coursework (21 hours graded A-F) at UT beyond that required for the M.A. Up to 6 hours may be taken outside of the department.
8. 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 statistical analysis, essential for the student’s preparation. The foreign language requirement must be fulfilled before taking the comprehensive examination.

Group III (Teaching Field) Examination

This is a one-hour oral exam which must be completed at any time before the comprehensive examination is taken. If a student fails this, he or she may retake the exam one time only and must do so the following semester.

Comprehensive Examination

The comprehensive examination consists of a written exam (Group I) and an oral exam (Group II) and must be taken no later than the semester following the semester in which the student completes the residence, coursework, and language requirements (summer excluded). Failure to take the comprehensive examination within the required time will be counted as a failure on the examination. No student will be permitted to take the comprehensive examination unless he or she has passed the Group III examination (see above) and has an overall grade-point average of at least 3.0. Qualified students will be examined in one field selected from the Group I list.
below and one field selected from the Group II list below. The two exams are taken in the same semester. The Group I is an 8-hour written exam. It must be passed before the Group II can be taken. The Group II is a 2-hour oral exam. A student who fails either exam must repeat it the following semester (summer excluded). A second failure on either exam will cause the student to be dropped from the History graduate program. A student who does not repeat a failed exam within the required time will likewise be dropped from the program.

Admission to Candidacy
Upon successful completion of the above requirements, a doctoral student may be admitted to candidacy.

Doctoral Fields
Group I: Premodern Europe
Modern Europe
United States (colonial to present)

Group II: To be defined by the student’s doctoral committee from within one of the following fields:
United States
Colonial and Early Republic
19th century
20th century
Regional
Military and Foreign Relations
Social and Cultural
American Political
European
Medieval
Early Modern
Modern
Political and Diplomatic
Intellectual and Cultural
Social and Economic
National Fields

Group III (Examined Teaching Field):
World History
Western Civilization
U.S. Civilization

Dissertation and Defense
Original research forms the basis for the dissertation. Doctoral candidates must register for a minimum of 3 hours of 600 Dissertation Research each semester and must complete 24 hours of dissertation credit. A final oral defense is given on the dissertation in its historical context. The program must be completed within eight years from admission as a potential candidate.

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

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

510 Foundations of Graduate Study in History (3) Assumptions and methods of historians. Required of all candidates for advanced degrees.

511 Teaching World History (3) Methodology, conceptualization, historiography, text-book selection and syllabus construction to prepare students to teach courses in world history.

512 Teaching Western Civilization (3) Methodology, conceptualization, historiography, text-book selection and syllabus construction to prepare students to teach courses in western civilization.

513 Teaching United States History (3) Methodology, conceptualization, historiography, text-book selection and syllabus construction to prepare students to teach courses in U.S. history.

521 M.A. Readings (3) Directed readings in preparation for M.A. examinations. Open only to master’s candidates in history. May be repeated. Maximum 6 hrs. S/NC only.

531 Topics in Premodern Europe (3) Reading seminar: secondary sources on premodern European movements and trends. Focus varies. May be repeated. Maximum 15 hrs.

532 Topics in Modern Europe (3) Reading seminar: secondary sources on movements and trends that are multinational in focus. Focus varies. May be repeated. Maximum 15 hrs.

533 Topics in European National History (3) Reading seminar: secondary sources on 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.


544 Topics in U.S. Environmental History (3) Reading seminar: secondary sources on U.S. environmental history. Focus varies. May be repeated. Maximum 15 hrs.

551 Topics in the History of Foreign Relations (3) Reading seminar: secondary sources on foreign relations. Focus varies. May be repeated. Maximum 15 hrs.

552 Topics in European History (3) Reading seminar: secondary sources on European history. Focus varies. May be repeated. Maximum 15 hrs.

553 Topics in European Social and Economic History (3) Reading seminar: secondary sources on European social and economic history. Focus varies. May be repeated. Maximum 15 hrs.

554 Topics in European Political History (3) Reading seminar: secondary sources on European political history. Focus varies. May be repeated. Maximum 15 hrs.

555 Topics in United States Social and Economic History (3) Reading seminar: secondary sources on U.S. social and economic history. Focus varies. May be repeated. Maximum 15 hrs.

556 Topics in European Social and Economic History (3) Reading seminar: secondary sources on social or economic history of European nations. Focus varies. May be repeated. Maximum 15 hrs.

557 Topics in Cultural and Intellectual History (3) Reading seminar: secondary sources on cultural and intellectual history. Focus varies. May be repeated. Maximum 15 hrs.

558 Topics in United States Regional and Local History (3) Reading seminar: secondary sources on regions, states and cities of the United States. Focus varies. May be repeated. Maximum 15 hrs.

559 Topics in Jewish History (3) Reading seminar: secondary sources on Jewish history. Focus varies. May be repeated. Maximum 15 hrs.

561 Topics in Latin American History (3) Reading seminar: secondary sources in Latin American history. Focus varies. May be repeated. Maximum 15 hrs.

562 Topics in Asian History (3) Reading seminar: secondary sources on Asian history. Focus varies. May be repeated. Maximum 15 hrs.

580 Topics in History (3) Reading seminar: secondary sources for new topics. Focus varies. May be repeated. Maximum 15 hrs.

585 Topics in World History (3) Reading seminar in transnational themes involving analysis of two or more world cultures. Focus varies. May be repeated. Maximum 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.

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 a scholarly paper in modern European history. Focus varies. May be repeated. Maximum 15 hrs.


651 Seminar in Military and Foreign Relations History (3) Research seminar in primary sources culminating in a scholarly paper in military or foreign relations history. Focus varies. Not restricted by national groupings. May be repeated. Maximum 15 hrs.

658 Seminar in United States Regional and Local History (3) Research seminar in primary sources culminating in a scholarly paper in regional and local history. Focus varies. May be repeated. Maximum 15 hrs.

Human Ecology

(College of Education, Health, and Human Sciences)

MAJOR

DEGREE

Human Ecology ....................................... Ph.D.

The College of Education, Health, and Human Sciences offers the Doctor of Philosophy in Human Ecology with concentrations in the following:

Child and Family Studies
Community Health
Hospitality and Tourism Management
Nutrition Science
Retail and Consumer Sciences

Further information on the on the above concentrations is available in the Fields of Instruction (i.e., academic departments) section of this catalog.

Application Process

Individuals seeking admission to the Ph.D. in Human Ecology must be first admissible to The University of Tennessee (see Graduate Studies: Admission Requirements section of this catalog) and then admitted to a concentration within the Ph.D. in Human Ecology. Prospective students are encouraged to make application at least 6-months before anticipated matriculation. Applications are reviewed February 1, June 1, and November 1.

Overview of Program

A major challenge of the doctoral program is to draw upon basic research generated by the natural sciences, humanities, and social sciences so as to provide a holistic perspective that contributes to the improvement of
both individuals and families. The Ph.D. is a research degree granted only to individuals who demonstrate proficiency in conducting original research. Course requirements are determined by each student’s faculty committee and are based on the needs and interests of that particular student, as well as department and College requirements. Further information is available in the Fields of Instruction (i.e., academic departments) section of this catalog and online at http://cehs.utk.edu/main.html.

**GRADUATE COURSES**

450 Special Topics: Human Ecology (1-3) Study in selected professional area within the college. Topics vary. May be repeated. Maximum 6 hrs.

500 Thesis (1-15) P/NP 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.

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.

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**Human Resource Development**

(College of Business Administration)

**MAJORS**

Business Administration ......................... Ph.D. Human Resource Development ............. M.S.

Michael Lane Morris (Liason), Director

Associate Professors:
Kupritz, Virginia, Ph.D. ................. Virginia Tech
Morris, Michael Lane, Ph.D., CPLE ................. Tennessee
Stout, Vickie J., Ed.D. .................. Tennessee

Assistant Professors:
Bartley, Sharon, Ph.D. ................. Tennessee
Lim, Doo, Ph.D. ..................... Illinois
Pierce, Randal, Ph.D. .................. Ohio State

Lecturer:
Mackey, Debbie L., Ph.D. .............. Tennessee

The Human Resource Development Program integrates occupational education, training, career development, and organizational development. The curriculum goal of the program centers around producing organizational effectiveness through a guiding framework that focuses on developing human resource skills and understanding of organizational culture, systems and structures, and decision-making: individual, group, organizational learning; high performance teams; organizational change, communication processes; and analysis, action, measurement of economic outcomes. Human Resource Development required (core) courses and Human Resource Development electives are offered in diverse formats enabling working professionals to obtain the master’s or doctoral degree.

**THE MASTER’S PROGRAM**

The Master of Science degree with a major in Human Resource Development provides a flexible graduate program for professionals wishing to pursue in-depth study within and across subject areas of Human Resource Development.

**Admission Requirements**

Applicants for admission should request information and application forms from both the Office of Graduate and International Admissions (218 Student Services Building) and the Human Resource Development Program (408 Stokely Management Center, The University of Tennessee, Knoxville, Tennessee, 37996).

Applicants are to submit an application for admission to Graduate Admissions. Additionally, applicants are to submit an application, three letters of reference from individuals familiar with their potential for success in academic work, and a statement describing personal career objectives directly to the Human Resource Development Program.

Applicants must hold a bachelor’s degree from an accredited institution and present evidence of ability to do graduate work, including a GPA of 3.0 on a 4.0 scale for the last two years of undergraduate work. Any student below this level of academic quality must justify admission via other exceptional credentials. If the applicant has prior work experience in human resource development, a reference letter should also be provided by the work supervisor. Applicants without an undergraduate degree in an area related to human resource development, previous HR employment experience, or a statistical background may be required to complete additional course work as part of their program.

Recent Graduate Record Examination scores are required of all applicants. Minimum GRE composite scores (quantitative and verbal) of 1000 are required. Deadline: New students are admitted in fall semester only. Applications must be received by March 1.

**Degree Requirements**

The HRD Master’s degree program is a 39 hour non-thesis program. All students must take the program core of 18 hours consisting of HRD 510 (Foundations of Human Resources), HRD 556 (Organizational Development Strategies), HRD 557 (Design Strategies), HRD 559 (Evaluation Strategies), HRD 561 (Strategic Human Resource Development), and HRD 563 (Organizational Communication Strategies).

**Course Requirements:**

<table>
<thead>
<tr>
<th>Course Requirements</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRD Core</td>
<td>18</td>
</tr>
<tr>
<td>HRD 510 (Foundations of Human Resources)</td>
<td></td>
</tr>
<tr>
<td>HRD 556 (Organizational Development Strategies)</td>
<td></td>
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<tr>
<td>HRD 557 (Design Strategies)</td>
<td></td>
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<tr>
<td>HRD 559 (Evaluation Strategies)</td>
<td></td>
</tr>
<tr>
<td>HRD 561 (Strategic Human Resource Development)</td>
<td></td>
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<tr>
<td>HRD 563 (Organizational Communication Strategies)</td>
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</tr>
</tbody>
</table>

HRM Core

Management 521 (Human Resource Management) Select two additional 400/500 level courses from human resource management.

**Total 39**

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**THE PH.D. PROGRAM**

**Admission Requirements**

Applicants for admission should request information and application forms from both the Office of Graduate Admissions, 218 Student Services Building, and the Human Resource Development Program, 408 Stokely Management Center, The University of Tennessee, Knoxville, Tennessee, 37996.

Applicants are to submit an application for admission to Graduate Admissions. Additionally, applicants are to submit an application, three letters of reference from persons familiar with their potential for success in doctoral work, a statement describing personal career objectives, and a sample of written work directly to the Human Resource Development Program. Deadline: New students are admitted in fall semester only. Applications must be received by the Graduate Admissions Office and Human Resource Development Program by March 1.

Applicants must hold a master’s degree from an accredited institution and present evidence of ability to do Ph.D. work, including having maintained a graduate GPA of 3.3 on a 4.0 scale or better. Applicants without a graduate degree in an area related to human resource development may be required to complete additional course work as part of their program. If the applicant has prior work experience in human resource development, human resource management, or a related occupational area, a reference letter should be provided by the work supervisor. Graduate Record Examination scores are required of all applicants. Minimum GRE composite scores (quantitative and verbal) of 1100 are required.

Any person whose native language is not English must submit results of the Test of English as a Foreign Language (TOEFL). A minimum score of 600 is required for admission consideration.
Degree Requirements

The Doctor of Philosophy degree is 60 hours with a major in Business Administration and a concentration in Human Resource Development for graduate students who seek careers in higher education or as managers/administrators of HRD. The curriculum is designed to enable students to achieve professional objectives, develop needed competencies, and gain desirable experiences and understanding of human resource development. Students not possessing a master’s degree before acceptance to the program may be required to complete additional course work before enrolling into any courses associated with the doctoral program. Students must be in residence full time for one year; must maintain an overall 3.0 grade-point average with no more than one grade below B in the HRD Courses. Research Core, and Business Core; students who did not complete a thesis in their Master’s program must complete a pre-doctoral research project prior to beginning dissertation work; and must pass a comprehensive examination and must pass a final oral examination on their dissertation research. Detailed information regarding the Ph.D. concentration program of study may be obtained from the Program Liaison.

Course Requirements:

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRD Core</td>
<td>6</td>
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<tr>
<td>HRD 602 (Proseminar I in Human Resource Development-Fall 1st Year)</td>
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<td></td>
</tr>
<tr>
<td>HRD 603 (Proseminar II in Human Resource Development)-Spring 1st Year</td>
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<tr>
<td>HRD Seminars</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Students consult with doctoral advisor and committee to select 3 courses</td>
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<tr>
<td>HRD 605 (Seminar in Organization Theory and Environmental Context)</td>
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<tr>
<td>HRD 606 (Research in Human Resource Development)</td>
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<td></td>
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<tr>
<td>HRD 607 (Seminar in Communication Processes)</td>
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<tr>
<td>HRD 608 (Seminar in Work/Life Interface Issues)</td>
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<tr>
<td>HRD 609 (Seminar in Technological Frameworks for Human Resource Development)</td>
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<tr>
<td>HRD 610 (Seminar in Selected Topics)</td>
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<tr>
<td>Research Core</td>
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<tr>
<td>Statistical Principles (Statistics 531-532 or Statistics 537-538 or equivalent</td>
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<tr>
<td>Advanced Statistics (Statistics 579) or (I/O Psychology 627)</td>
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<tr>
<td>Seminar in Research Methods (Marketing 612)</td>
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<tr>
<td>Business Core</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Seminar in Theoretical Foundations (Marketing 611)</td>
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<tr>
<td>International Management (Management 571)</td>
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<tr>
<td>Proseminar in I/O Psychology (Industrial/Organizational Psychology 568)</td>
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<tr>
<td>Dissertation</td>
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<tr>
<td>Total 60</td>
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GRADUATE COURSES

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
<th>Type</th>
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</thead>
<tbody>
<tr>
<td>500 Thesis (1-15)</td>
<td>P/NP only.</td>
<td></td>
</tr>
<tr>
<td>502 Registration for Use of Facilities (1-15)</td>
<td>Required for the student not otherwise registered during any semester, to reserve facilities and/or faculty time before degree is completed. May not be repeated.</td>
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<tr>
<td>503 Problems in Lieu of Thesis (3)</td>
<td>May be repeated. Maximum 6 hrs.</td>
<td></td>
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<tr>
<td>509 Implementation of HRD Systems (3)</td>
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<tr>
<td>The internship provides experiential learning for students who come to HRD without practical real world experience. The internship is an opportunity to apply classroom knowledge, obtain additional human resource experience, and reflect on the knowledge and experience.</td>
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</tr>
<tr>
<td>510 Foundations of Human Resources (3)</td>
<td>Students develop a working definition and understanding of the foundations that give rise to the academic discipline and profession of Human Resources. Students develop knowledge of the historical, theoretical, and philosophical foundations as well as the core models of learning, performance, change and management that promote best practices in the field. Students are introduced to the disciplines of training and development, human resource development, and management including HRM goals and activities.</td>
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<tr>
<td>513 Special Topics in Human Resource Development (1-3)</td>
<td>Topics vary in research, theory and current issues in Human Resources. Prerequisite: Consent of instructor. May be repeated. Maximum 9 hrs.</td>
<td></td>
</tr>
<tr>
<td>514 Individual Study in Human Resource Development (3)</td>
<td>Prerequisite: Consent of supervising instructor. Approval form must be filed in office of the Program Liaison. May be repeated. Maximum 6 hrs.</td>
<td></td>
</tr>
<tr>
<td>517 Career Development (3)</td>
<td>Examination of processes and practices that facilitate the individual’s leadership development, performance improvement and career growth in relation to the organization’s present and future human resource needs, including identification of personal responsibilities and organizational opportunities through successful career development systems.</td>
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<tr>
<td>518 Performance Improvement Systems and Technologies (3)</td>
<td>Provides studies of concepts, strategies, tools, and trends of performance improvement technologies. Major emphasis will be on the planning, facilitating, and implementation of performance technologies that support HR functions and facilitate their value to organizational stakeholders. Prerequisite: HRD 510 (Foundations of Human Resources).</td>
<td></td>
</tr>
<tr>
<td>519 Human Resource Problems (3)</td>
<td>Prerequisites: HRD 510 (Foundations of Human Resources) and HRD 511 (Issues and Trends in HRD).</td>
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</tr>
<tr>
<td>520 Collaborative Strategies in HRD (3)</td>
<td>Examines the strategies for collaboration and teambuilding within organizational systems. The course assists HR professionals understand processes associated with teambuilding including defining types of teams, rewarding and evaluating team performance, operating principles and communication within teams. The primary focus of the course will be to create an accountable and individual accountability for creating, sustaining, and improving OC systems, processes, and environments. Prerequisites: HRD 602 and 603 (Proseminars I and II in Human Resource Development).</td>
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</table>

556 Organization Development Strategies (3) Overview of the roles, strategies, and challenges of organizational development with a focus on the dynamics of organizational change and the internal integration of organizational culture in a global context. Co-requisite: HRD 510 (Foundations of Human Resources). | |
| 557 Design Strategies (3) Design methodology for business and industry development of instructor-based, technology-based, and self-directed training for training and development and consulting. Co-requisite: HRD 510 (Foundations of Human Resources) | |
| 559 Evaluation Strategies (3) Evaluation strategies for professional settings. This course examines the importance of evaluation, how to conduct appropriate evaluations, instrumentation and analysis strategies, how to assess the return-on-investment, and guidelines for creating an evaluation report. Prerequisite: HRD 557 (Design Strategies). | |
| 561 Strategic Human Resource Development (3) | An overview of human resource development (HRD) increases organizational competitive advantage. Human capital theory, systems theory and systems integration emerge as theoretical frameworks for linking HRD with business strategies to implement strategic initiatives. Value creation for HRD stakeholders, management of HRD resources, and continuous improvement processes in HRD are emphasized. Students explore the role of HRD in organizational visioning, planning, leadership development, innovating, and organizational development. Co-requisite: HRD 510 (Foundations of Human Resources). | |
| 563 Organizational Communication Strategies (3) | Students investigate organizational communication theory, purposes, channels, practices, styles, approaches, skills, and tools. Process improvement strategies span internal and external communication and target oral, written, and nonverbal communications that occur in face-to-face, technology-mediated, and blended organizational communication contexts. | |
| 600 Doctoral Research and Dissertation (3-15) | P/NP only. | |
| 602 Proseminar I in Human Resource Development (3) Basic thought, concepts, and issues required for advanced graduate study in human resource development. Must be taken during first year of study in program. Consent of instructor for non-HRD students. | |
| 603 Proseminar II in Human Resource Development (3) Basic thought, concepts, and issues required for advanced graduate study in human resource development. Must be taken during first year of study in program. Consent of instructor for non-HRD students. | |
| 605 Seminar in Organizational Theory and Environmental Context (3) | Students critically review basic systems influencing individual, group and organizational behavior with an emphasis on environmental context impacting worker performance and opportunities for learning transfer. Ecological approach to organizational effectiveness is addressed. Prerequisites: HRD 602 and 603 (Proseminars I and II in Human Resource Development). | |
| 606 Research in Human Resource Development (3) | Theory and application of qualitative approaches to social science and human resource development research. Emphasis is on ethnographic methods to obtain in-depth information about behaviors and beliefs of people in natural settings. Use of methods: structured interviews using heuristic elicitation methodologies; case studies; and case studies. Prerequisites: HRD 602 and 603 (Proseminars I and II in Human Resource Development). | |
| 607 Seminar in Organizational Communication Processes (3) | Students study the elements and complexities of organizational communication (OC) to lead to potential miscommunications. This course involves analysis of contemporary and leading-edge OC theories and processes. Students address preparation and minimization of destructive system and process complexities, and maximization of constructive system and processes. Prerequisites: HRD 602 and 603 (Proseminars I and II in Human Resource Development). | |
Industrial and Organizational Psychology

(College of Business Administration)

MAJOR DEGREES

Industrial and Organizational Psychology ........................................ Ph.D.

David J. Woehr (Liaison), Director

Committee:

Fowler, Oscar S., Management
Ladd, Robert T., Management
James, Lawrence R., Management
Rentsch, Joan R., Management
Rush, Michael C., Management
Schumann, David W., Marketing, Logistics and Transportation
Woehr, David J., Management

The doctoral program is designed to prepare students for personnel, managerial, and organizational research; for university teaching; and for consulting relationships with industry. The program emphasizes a scientist/practitioner model in applying and conducting research based on accepted theory, organizational behavior, psychology, management, and statistics. The degree program is administered by a committee and the program director is appointed by the Dean of Graduate Studies on recommendations from the Management Department head and the program director.

It is intended that students entering the I/O program will represent widely different undergraduate and graduate backgrounds including psychology, business administration, engineering, science, and liberal arts. The first-year program provides the opportunity to take courses that will assist the students in attaining a reasonable level of sophistication in areas of deficiency.

ADMISSION REQUIREMENTS

Applicants for admission should request information and application forms from both the Office of Graduate Admissions (218 Student Services Building) and the Director, Industrial and Organizational Psychology Program, (408 Stokely Management Center, The University of Tennessee, Knoxville, Tennessee 37996-0545).

Two separate applications must be completed: one Graduate Application for Admission (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 Graduate Admissions by February 1.

The master’s degree in Industrial and Organizational Psychology is generally not required of individuals pursuing a doctoral degree.

General Requirements

At least one year of college mathematics and one course in statistics are required. Ordinarily, an undergraduate grade-point average of 3.7 or above is required with no evidence of special weakness in mathematics and physical sciences.

Test scores on each section of the general portion (verbal and quantitative) of the Graduate Record Examination (GRE) are required. Customarily, those students admitted to the program have performed at or above the 69-79th percentile on the general test. (This corresponds to a raw score of approximately 600 on each of the tests.)

THE DOCTORAL PROGRAM

The Ph.D. degree with a major in Industrial and Organizational Psychology can be completed with a minimum of 90 semester hours in the major. Students must be in residence full-time for one year; must maintain an overall 3.0 grade-point average with no more than one grade below B in the I/O Psychology, General Psychology, and Research core; must complete an applied research project prior to beginning dissertation work; must pass a comprehensive examination; and must pass a final oral examination on their dissertation research.

Course Requirements: Hours

I/O Psychology Core 567, 568, and 569 9
Research Core 537 and 538 or equivalents 12
Statistical Principles (Statistics 537 and 538 or equivalents) 579, 679 or equivalent 12
Multivariate Statistics (Statistics 579, 679 or equivalent) 569 12
General Psychology Core 579, 589 and 599 9
One course in each of the following areas: biological bases of behavior, cognitive bases of behavior, history and systems of psychology, I/O Psychology Seminars 600 level IOPSY courses, from a program committee approved list. 9
Approved Electives Courses supporting the student’s course of study. 9

Supervised practicum, internship, or field training (690) 15
Ethics (635 or equivalent) 3
Dissertation (600) 24
TOTAL 90

GRADUATE COURSES

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 complete. May not be used toward degree requirements. May be repeated. S/NC only.

525 Research in Industrial/Organizational Psychology (1-3) Available only to students admitted to program or by prearrangement with program director. May be repeated. Maximum 6 hrs. S/NC or letter grade.

567-68 Proseminar in Industrial/Organizational Psychology (3.3) Basic thought, concepts, and issues required for advanced graduate study in industrial and organizational psychology. Must be taken during first year of study in program. Consent of instructor required for non-program students.

569 Applied Measurement for Industrial/Organizational Psychology (3) Basic techniques for collection and evaluation of individual and organizational data using both classical and modern psychometric techniques. Relevant statistical models; reliability analysis, and exploratory and confirmatory factor analyses.

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

605 Advanced Research Methods in Psychology (4) Critical analysis of new and evolving techniques for psychological research; new statistical and psychometric methods.

610 Individuals in Organizations Seminar (3) Bridging principles and processes which link individual attributes with macro organization concerns: culture, climate, and group decision-making.

611 Seminar in Organizational Leadership (3) Current theories, concepts, and issues associated with psychology of organizational leadership. Prereq: 567-68 or consent of instructor.

612 Seminar in Work Motivation (3) Current theories, concepts, and issues associated with psychology of work motivation. Prereq: 567-68 or consent of instructor.

613 Seminar in Performance Appraisal (3) Current issues, problems, and research in performance appraisal and criterion development; applications in compensation. Prereq: 567-68 or consent of instructor.

614 Seminar in Employee Selection (3) Current issues, concerns, and methods used in employee selection. Prereq: 567-68 or consent of instructor.

615 Seminar in Organizational Training and Development (3) Current issues, problems, and research in training and development. Prereq: 567-68 or consent of instructor.

625 Topics in Organizational Psychology (3) Topics vary. May be repeated. Maximum 9 hrs.

626 Topics in Industrial Psychology (3) Topics vary. May be repeated. Maximum 9 hrs.

627 Structural Equation Models in Organizational Research (3) Issues related to analysis of organizational data using structural equation and related techniques.

628 Personality Assessment (3) Review of key domains of social cognition: measurement systems which use individual difference and social-cognitive biases as basis for measuring personality.

635 Ethical and Professional Issues in Industrial/Organizational Psychology (3) Issues involved with ethical practice in research, academic, organizational, and consulting situations.

690 Supervised Practicum, Internship or Field Training in Industrial/Organizational Psychology (1-15) One credit hour per 30 hours of practice. S/NC or letter grade.
Industrial Engineering
(College of Engineering)

MAJOR DEGREES

Industrial Engineering .......... M.S., M.S.-MBA

Badiru, A.B., Ph.D. ................ North Carolina State

Professors

Badiru, A.B. (Head), Ph.D. .... Central Florida, P.E.

Ding, F., Ph.D. ............... North Carolina State

Garrison, G.W. (UTSI), Ph.D. .. North Carolina State

Associate Professors

Badiru, A.B., Ph.D. .......... Florida Tech., P.E.

Ford, R.E., Ph.D. ........ Tennessee, CPEng.

Liggett, H.R., Ph.D. .......... Texas Tech., P.E.

Aikens III, C.H., Ph.D. .... Virginia Tech., P.E.

Coleman, G.D. (UTSI), Ph.D. .... Tennessee

Ph.D. ....................... Tennessee State

Kim, D., Ph.D. ................... Florida Tech.

Kong, D., Ph.D. ............... Penn State

Assistant Professors

Hailey, M.L. (UTSI), Ph.D. .... Texas Tech., P.E.

Jackson, D.F., Ph.D. .......... Tennessee, P.E.

Liggett, H.R., Ph.D. .......... North Carolina State

Sawmney, R.S., Ph.D. ........ Tennessee

Research Faculty and Staff

Halstead, P.D., B.S. .............. State University of New York

Cook, E.M. ........................ University of New York

The Department of Industrial Engineering offers a graduate program leading to the Master of Science degree with a major in Industrial Engineering, concentrations in traditional industrial engineering, engineering management, human factors engineering, manufacturing systems engineering, and product development and manufacturing. The Ph.D. with a major in Engineering Science is available through the Department of Mechanical, Aerospace, and Biomedical Engineering with a concentration in industrial engineering.

ADMISSION REQUIREMENTS

Applicants must first submit a formal Graduate Application for Admission. In addition to the minimum requirements of the Graduate Council, the Department of Industrial Engineering requires the following:

1. Three rating forms or letters of reference; and
2. GRE scores; and
3. Essay (2 double-spaced pages—contact department for current topic). The graduate committee in the department sets any prerequisite courses or other measures that apply to the particular situation of the applicant. The department and the Office of Graduate Admissions must be notified of any change in the entering date after admission has been granted.

THE MASTER'S PROGRAM

Students who enroll in the Master of Science degree may select a concentration in industrial engineering, engineering management, product development and manufacturing, or manufacturing systems engineering.

The College of Business Administration and the College of Engineering offer an integrated program leading to the conferral of the Master of Business Administration degree with a major in Business Administration (concentration in operations management) and the Master of Science degree with a major in Industrial Engineering (concentration in manufacturing systems engineering or product development and manufacturing). The Industrial Engineering program is also open to students with undergraduate engineering majors other than industrial engineering.

Admission Requirements

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

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

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

Curriculum

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

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

Curriculum for Dual M.S.-MBA Degree

<table>
<thead>
<tr>
<th>August—First Year</th>
<th>Fall—First Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>BA 511 MBA Core I</td>
<td>BA 512 MBA Core II</td>
</tr>
<tr>
<td>3</td>
<td>15</td>
</tr>
</tbody>
</table>
**IE 504** Product Development Process 1
**Spring**

**BA 513** MBA Core III 9
**IE 506** Product Selection and Evaluation 2
**IE 508** Integrated Product, Process, and Manufacturing System Design 3

**Summer**

**BA 514** Integrated Business Simulation 3
**IE 509** Project Management 1

**Fall—Second Year**

**IE 503** IE Methods Review 1
**IE 515** Advanced Production and Inventory Systems 3
**IE 516** Statistical Methods in Industrial Engineering 3
**IE 524** Advanced Integrated Manufacturing 3
**IE 511** Business Planning and Commercialization 3
**IE 527** Multidisciplinary Project 1

**Spring**

**IE General Electives (select with advisor)** 3
**IE 509** Multidisciplinary Project 1
**IE 522** Optimization Methods in Industrial Engineering 3
**IE 518** Advanced Engineering Economic Analysis 3
**IE 527** Lean Production Systems (MBA Hub Course) 3

**Summer (first session)**

**IE 594** Culminating Integrated Project Report 3

**TOTAL** 66-69

**Note:** Any 400-level course required in the Industrial Engineering program at UT may not be used for graduate credit in the M.S. degree program.

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### CERTIFICATE IN MAINTENANCE AND RELIABILITY ENGINEERING

The College of Engineering offers a certificate program in maintenance and reliability engineering. The program is designed primarily for part-time students in that several of the courses are available through distance education.

- **Spring**: IE 503 Industrial Engineering Methods Review (3)
- **Fall**: IE 483 Reliability Engineering (3), and IE 484 Quality Engineering (3), which are cross-listed among all participating departments in the College of Engineering, plus two elective courses selected from a list of courses provided by the participating departments. Currently, the available elective courses are Industrial Engineering 516 and 591, Mechanical Engineering 534 and 599, Nuclear Engineering 579 and 585, and the selection of elective courses is determined through an advising conference with each individual student, and is based on the student's personal interests, academic background, and work experience. Applicants must meet the minimum criteria established by the Graduate Council.

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### Industrial Engineering

#### GRADUATE COURSES

**Note:** Any 400-level course required in the Bachelor of Science in Industrial Engineering program at UT may not be used for graduate credit in the M.S. degree program.

**401 Integrated Manufacturing Systems (3)**

**402 Production System Planning and Control (3)**

**403 Production Facilities Design and Material Handling (3)**
- Design of production facilities: plant layout, analysis and planning for overall moving, packaging and storage of materials. Office layout and service areas. Design of facilities for such diverse groups as hospitals, banking, industry. Prereq: 306.

**405 Engineering Economic Analysis (3)**
- Engineering economy and application in engineering practice. Time-value of money and discounted cash flow techniques. Decisions among engineering alternatives, design options, equipment selection, break-even points, and similar situations. Cost estimating and consideration of taxes and inflation. Analyzing uncertainty in economic estimates using nonprobabilistic techniques. Prereq: Junior standing or consent of instructor.

**421 Information Systems Analysis and Design (3)**
- Systems engineering approach to analysis, design, development, and implementation of systems of information. Informational requirements of industrial engineering. Utilization of relevant software packages. Prereq: Senior standing or consent of instructor, 2 hrs and 1 lab.

**422 Senior Industrial Engineering Problems Analysis (3)**
- Application of industrial engineering to field assignments in local organizations, problem definitions, analysis and presentation. Prereq: Expected term of graduation or consent of instructor.

**423 Industrial Safety (3)**

**440 Process Improvement Through Planned Experimentation (3)**
- Fundamentals of continuous improvement, advanced statistical process control techniques, and strategies for short production runs. Use of experimental design techniques to improve processes: single and multiple-factor designs, blocking and confounding, and fractional designs. Full factorial designs compared to fractional designs to balance experimental efficiency with loss of information. Lab component utilizes statistical and simulation software to provide hands-on experience. Prereq: 300 Engineering Data Analysis and Process Improvement.

**483 Introduction to Reliability Engineering (3)**
- (Same as Nuclear Engineering 483, Chemical Engineering 483, and Mechanical Engineering 483.)

**484 Introduction to Maintenance Engineering (3)**
- (Same as Nuclear Engineering 484, Chemical Engineering 484, Materials Science and Engineering 484, and Mechanical Engineering 484.)

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

**501 Design Project (1-3)**
- Enrollment limited to industrial engineering students in non-thesis program. May be repeated. Maximum 6 hrs. S/N 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/N only.

**503 Industrial Engineering Methods Review (3)**
- Survey of industrial engineering tools and techniques applied to analysis, design, and improvement of manu-
508 Integrated Product, Process and Manufacturing System Design (3) Different manufacturing systems: line balancing, set-up time reduction, cost and performance of mass and lean production systems. Lean production concepts and principles. Planning and execution of projects, including: business and organization design, culture, empowerment, organizational behavior, and diversity. Study of management theories and systems which promote or inhibit productivity and international competition. Study of management theories and systems which promote or inhibit productivity and international competition.

509 Multidisciplinary Project (1) Venue for multidisciplinary student teams to coordinate design and manufacturing tasks of product to be developed. Project management (budget and schedule), assignment of tasks for team members, and concurrent design and manufacturing. Design concepts and product features reviewed by potential customers/investors. Prereg: Consent of instructor. May not be repeated. Maximum 6 hrs. S/NC only.

510 Process Development and Market Feasibility (3) Manufacturing process technologies available to cost-effectively produce specific new products that have been identified and designed. Product cost estimating, capital cost requirements and justification, capacity analysis, layout and design of facilities, identification of potential suppliers, and finalization of business plan. Prereg: 511 and 524.

511 Business Planning and Commercialization (3) Complex issues of product development and business planning required to deliver new product from concept to market. Market issues that emerge during product development cycle, beginning with concept to product development to commercialization to eventual product introduction or dismissal. Management practices for successful product development and product management. Prereg: Consent of instructor.

515 Advanced Human Factors Engineering and Ergonomics (3) Application of human factor and ergonomic concepts to design and improve products and systems. Human as biomechanical system; human information processing; minimization of human error; anthropometry; anatomy and physiology; physical and mental workload; effects of environmental factors: temperature, lighting, weightlessness, and vibration on humans; manual material handling; and electromyography; psychophysical measurements and laboratory distribution; design of displays and controls; hand tool design; and cumulative trauma injuries. Prereg: Probability and Statistics for Scientists and Engineers, or equivalent.

516 Statistical Methods in Industrial Engineering (3) Application of probabilistic methods to selected topics. Application at enterprise level to achieve strategic competitive goals. Prereg: 515 or consent of instructor.


518 Advanced Engineering Economic Analysis (3) Application of engineering economic analysis in complex decision situations and product changes. Uncertainty evaluation using nonprobabilistic techniques; capital financing and project allocation; evaluations involving equipment replacement, investor-owned utilities, and public works projects; probabilistic risk analysis including computer simulation and decision trees; multi-attribute decision analysis; and other advanced topics. Prereg: 515 and Probability and Statistics for Scientists and Engineers, or equivalent.

519 Human Factors Engineering and Ergonomics (3) Application of human factor and ergonomic concepts to design and improve products and systems. As Management Science 531.)

521 Advanced Human Factors Engineering Methodology (3) Advanced methodologies used in human factors engineering. Observational methods; function task analysis; computerized human factor design methods; human reliability and error prediction; evaluation of human-machine interface; modeling techniques; questionnaire and survey design; experimental design, and other selected topics. Prereg: 519 or consent of instructor.

522 Optimization Methods in Industrial Engineering (3) Classical optimization applied to constrained and unconstrained, non-linear, multi-variable functions; search techniques; decision making under uncertainty; game theory; and dynamic programming. Prereg: Operations Research or Engineering Management 537.

523 Mathematical Programming (3) (Same as Management Science 531.)

524 Advanced Integrated Manufacturing Systems (3) Different types of manufacturing systems. Integrated application of numerical control and automation concepts and methods to layout and design of computerized manufacturing. Process planning for discrete products, measurement and reverse engineering principles and other selected topics. Prereg: 401 and 508, or consent of instructor.

525 Systems Modeling and Simulation (3) Modeling of discrete systems using current simulation software and Monte-Carlo simulation. Problem definition, input distribution, output analysis, model validation and verification, variance reduction techniques, animation of models, and design of simulation experiments. Case studies in various domains for simulating manufacturing, transportation, and power systems. Prereg: Consent of instructor. May be repeated with consent of instructor.

526 Advanced Applications of Systems Modeling and Simulation (3) Modeling of discrete, continuous, and combined systems using current simulation software. Development simulation models to enhance accessibility of simulation models for experimentation. Development of distributed simulation models to represent and test production and supply chain systems. Prereg: Systems Simulation or 525. (Same as Management Science 526.)

527 Lean Production Systems (3) Characteristics and performance of mass and lean production systems. Lean production concept and principles. Planning and managing lean production systems: line balancing, set-up time reduction, cost management, maintenance support and other selected topics. Application at enterprise level to achieve strategic competitive goals. Prereg: 515 or consent of instructor.

591-92-93 Special Topics in Industrial Engineering (1-3, 1-3, 1-3) Individual or group research projects. Prereg: Consent of instructor. May be repeated.

594 Culminating Integrated Project Report (3) (Same as Mechanical Engineering 594).

601 Operations Research Models in Engineering Economy (3) Mathematical programming techniques applied to capital budgeting; advanced topics in multiple attribute decision analysis; Bayesian analysis of sequential decision making; artificial intelligence in complex decision analyses. Prereg: 518, 523.

602 Nonlinear Optimization (3) (Same as Management Science 651.)


691-92-93 Advanced Topics in Industrial Engineering (3-3-3) Forum to study individually or in groups. Prereg: Graduate standing and consent of instructor. May be repeated with consent of instructor.

Engineering Management

GRADUATE COURSES

501 Capstone Project (3-6) Application-oriented project to show competence in major academic area. Prereg: Enrollment in engineering management. May be repeated. Maximum 6 hrs. 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.

532 Productivity and Quality Engineering (3) Productivity and quality measures defined and used to analyze current competitive position of important sectors of American industry with respect to national and international competition. Study of management theories and systems which promote or inhibit productivity or quality improvements.

533 Theory and Practice of Management (3) Principles of engineering management, including: business and organization design, culture, leadership, marketing, and competition in global economy, motivation, and performance management; empowerment, organizational behavior, and diversity. Study of management theories and systems which promote or inhibit productivity or quality improvements.

534 Financial Management for Engineering Managers (3) Financial and managerial accounting in engineering management with emphasis on financial statement analysis, cash flow analysis, investment analysis, and financial decision making. Study of management theories and systems which promote or inhibit productivity or quality improvements.
justifying technology; assimilating and managing change; changing management roles; and impacts of new technologies. Prereq: 539 and Industrial Engineering 518.

536 Project Management (3) Development and management of management and technology projects. Project proposal preparation; resource and cost estimating; and project planning, organizing, and controlling. Network diagrams and other techniques. Role of project manager: team building, conflict resolution, and contract negotiations. Discussion of typical problems and alternative solutions. Case studies and student projects. Prereq: 539 or consent of instructor.

537 Analytical Methods for Engineering Managers (3) Survey of management analysis and control systems through IE techniques. Qualitative and quantitative systems; methods analysis, work measurement, incentive systems, wage and salary development, production and inventory control, facility layout, linear programming, and applied operations research techniques. Not for credit for students with undergraduate degrees in industrial engineering.

538 New Venture Formation (3) Factors other than mechanical or chemical which enter into successful establishment of manufacturing or service enterprise. Organizational and financial planning and evaluation. Cost and location studies and market analysis to determine commercial feasibility of new ventures. Prereq: 539.

539 Strategic Management in Technical Organizations (3) Strategic planning process and strategic management in practice; corporate vision and mission; product, market, organizational, and financial strategies; external factors; commercialization of new technologies; and competition and beyond. Prereq: 537 or consent of instructor.


543 Legal and Ethical Aspects of Engineering Management (3) Legal issues imposed by government and ethical considerations in engineering practice. Selected readings, lecture, discussion, and student presentations. Current topics from government and industry.

Information Sciences
(College of Communication and Information)

MAJOR
Information Sciences (M.S.)

Degree

Information Sciences

Elizabeth Aversa, Director

Professor:
Aversa, Elizabeth, Ph.D. .......... Drexel

Tenopir, Carol, Ph.D. .......... Illinois

Associate Professors:
Bilal, Dana, Ph.D. .......... Florida State

Pemberton, J. Michael, Ph.D. .......... Tennessee

Pollard, Richard, Ph.D. .......... Brunel (UK)

Raber, Douglas, Ph.D. .......... Indiana

Robinson, William C., Ph.D. .......... Illinois

Wang, Peiling, Ph.D. .......... Maryland

Watson, Jinx, Ed.D. .......... Vanderbilt

Whitney, Gretchen, Ph.D. .......... Michigan

Assistant Professors:
Albright, Kendra, Ph.D. .......... Tennessee

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 plan for the future of the School of Information Sciences states that "The School of Information Sciences will be recognized nationally and internationally as an interdiscipli-\nary program of excellence in the information sciences. Graduates of the School's programs will be knowledgeable, skilled, and ethical users of information and information technology in their educational, professional, and personal endeavors. They will be well prepared for further study and inquiry, for leadership in the information professions, and for enlightened participation in a global information society. The School's graduates will recognize their responsibilities to contribute new knowledge and to engage in lifelong learning in the field."

The vision for the future of the School will be realized through:
- Excellent teaching
- Innovative research
- Distinguished service.

To achieve distinction in teaching, research, and service, the School is committed to:
- A forward-looking curriculum that embraces diversity in intellectual approaches to knowledge, skills, and values, a highly competent and visible faculty, a highly competent and effective staff, an academically and diverse student body,
- Extensive partnerships within higher education and professional communities in both private and not-for-profit sectors, service to the State of Tennessee and to the region,
- The exemplary use of state-of-the-art information technologies in both academics and administration, exceptional support, and collaborative and inclusive governance.

ADMISSION REQUIREMENTS

Applicants to the Information Sciences program must have a minimum undergraduate grade-point average of 3.0 or a satisfac-\ntory graduate degree grade-point average for admission as a potential candidate for the MS degree.

The verbal, quantitative, and analytical aptitude portions of the Graduate Record Examination (GRE) are required of all applicants unless a graduate degree has been completed prior to application for admission. Applicants should take the GRE at least one semester in advance of application for admission and are expected to score 1500 points or better.

A personal data sheet and three recommendations (obtained from the School of Information Sciences) should be returned to the admissions office of the school. Foreign applicants are required to take the Test of English as a Foreign Language.

THE MASTER'S DEGREE

The program leading to the Master of Science involves a total of 42 semester hours of graduate courses in information studies required of all students. Either a thesis or a non-thesis option is available, with 6 hours required for thesis credit. At least 36 hours must be taken in the School of Information Sciences, allowing up to 6 hours outside the school with a maximum of 6 from outside the University.

Required Courses

Five courses are required of all students: 490, 520, 530, 560 and 580. (Students seeking licensure see track requirements below.) These courses address the evolving information environment; organization and representation of information; information access and retrieval; developing and managing collections; and principles and concepts of the information sciences. Three courses, 490, 520 and 530, are prerequisite to all courses for students enrolled in the M.S. degree program.

Individualized Curriculum Approach

Students, in consultation with their advisor, may wish to pursue a curricular focus to develop a personalized program of study. Graduates of the school have prepared themselves for a variety of careers, including positions as: corporate information specialist, public librarian, records manager/archivist, page designer, indexer/abstractor, online information retrieval specialist, medical or law librarian, reference librarian, youth services specialist, and many others. Students are encouraged to take advantage of the individualized curricular approach.

Whatever individualized curriculum is chosen, all students who complete the program receive an M.S. degree accredited by the American Library Association (ALA).

For those pursuing Tennessee Department of Education licensure as a school library information specialist, stipulated requirements apply. See following section.

Tennessee State Department of Education School Library Information Specialist Requirements

The Tennessee State Department of Education requires School Library Information
Specialists to hold the master’s degree. The School of Information Sciences offers four tracks for School Library Information specialist endorsement.

Initial Endorsement for Non-Licensed Teachers with a Master’s Degree in Library or Information Sciences:

For those students who do not hold the master’s degree, the requirements for initial endorsement include the 5 required courses plus 551, 567, 571, 572, 585, and 595. In addition, students must complete two corequisite courses from the College of Education (5 credit hours) which do not count toward the master’s degree requirements.

Students pursuing the initial endorsement must follow the non-thesis option. Upon completion of the requirements, students will earn a master’s degree in Information Sciences and a Tennessee State Department of Education license as a School Library Information Specialist.

Initial Endorsement for Non-Licensed Teachers with a Master’s Degree in Library or Information Sciences:

For those students who hold an ALA-accredited master’s degree and have approval of the faculty advisor, the requirements are a maximum of 24 hours within the School’s program, including the required 595. In addition, students must complete two corequisite courses from the College of Education (5 credit hours) beyond the required 24 hours. Upon completion of the requirements, students will earn a Tennessee State Department of Education license as a School Library Information Specialist.

Additional Endorsement for Licensed Teachers with a Master’s Degree:

The requirements include the 5 required courses plus 551, 567, 571, 572, 585 and 596 (which must be taken twice). Upon completion of the requirements, students will earn a Tennessee State Department of Education additional endorsement as a School Library Information Specialist.

Additional Endorsement for Licensed Teachers without a Master’s Degree:

The requirements include the 5 required courses plus 551, 567, 571, 572, 585 and 596 (which must be taken twice) plus 3 electives (upon approval of the faculty advisor). Upon completion of the requirements, students will earn a master’s degree in Information Sciences and a Tennessee State Department of Education additional endorsement as a School Library Information Specialist.

Additional Program Requirements Thesis Option:

Students electing the thesis option will write a master’s thesis under close supervision of a thesis committee. Six hours of Thesis (IS 500) must be taken within the 42 hours required for graduation. (Students may register for the required hours of 500, but only 6 hours will count toward graduation.) Students must be registered for IS 500 in the semester they complete and defend their thesis. The oral defense of the thesis (oral comprehensive examination) substitutes for the written examination that is taken by non-thesis students. The writing of the master’s thesis serves as the culminating experience.

Non-Thesis Option:

Upon completion of the program, all students who elect the non-thesis option must take and pass a written comprehensive examination. A culminating experience is also required which must be completed in one of the student’s last two terms with a grade of B or better (except as noted) selected from the following and approved by the student’s advisor: 590 Problems in Information Sciences, 591 Supervised Readings in Information Sciences, 592 Seminar in Information Sciences, 593 Independent Study, 594 Graduate Research Participation (S/NC only), 595 Student Teaching in School Library Information Center (S/NC only), 596 Student Teaching and Observation in School Library Information Center (S/NC only), 599 Practicum (S/NC only).

FINANCIAL ASSISTANCE OPPORTUNITIES

Employment with the University of Tennessee Libraries may provide a work-study opportunity for selected students who wish to obtain experience in academic librarianship while pursuing the degree. Such students usually work at least 20 hours each week and thus may extend the period required for the degree. Similar opportunities exist with some other libraries and information agencies in the Knoxville area.

Work opportunities in a scientific-technical environment are available through subcontracts with Oak Ridge National Laboratory and the Department of Energy.

A limited number of graduate teaching assistantships are available through the school. Assistantships of this type carry a waiver of tuition and fees as well as a stipend and require that recipients work 10 hours per week in the school.

For application forms and information about financial aid and other information about the M.S. in Information Sciences, write to Admissions, School of Information Sciences, University of Tennessee, 451 Communications Building, Knoxville, Tennessee 37996-0341.

GRADUATE COURSES

430 History of the Book (3) History of writing and methods applicable to information professional work, general classification, authority control, bibliographic agencies.

450 Writing About Science, Technology and Medicine (3) (Same as Journalism 450.)

485 Introduction to Electronic Communications and Information Resources on the Internet (3) Exploration of worldwide information and communication resources: email, newsgroups, and wide-world web. Discussion of information issues: copyright, censorship, privacy and access.

486 Advanced Electronic Communications and Information Resources on the Internet (3) Exploration of advanced information and communications issues, resources and tools: forms, scripting and search engines. Prereq: 485 or consent of instructor.

490 Information Environment (3) Generation, production, manipulation, and distribution of information. Roles of information in society, information seeking and user behavior, information industry, economics of information products and services, technological and organizational change, information professions, and issues.

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

502 Registration and 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.

520 Organization and Representation of Information (3) Principles of describing, and indexing intellectual works; current approaches: citation systems, descriptive cataloging, non-subject indexing, classification and categorization; authority control of index terms; standards.

521 Cataloging and Classification (3) Basic library-oriented cataloging and classification techniques, tools, and supporting operations. Descriptive cataloging, choice and form of non-subject entries, subject heading work, general classification, authority control, bibliographic utilities, online library catalogs.

522 Organization and Representation of Multimedia Information Resources (3) Principles and practices of description and access to information resources in nonprint media and/or nontextual formats: visual, auditory, and electronic (including Internet).

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, evaluation of retrieval system performance. Search techniques for various types of databases including multi-media, full-text, numeric, bibliographic.

531 Sources and Services for the Social Sciences (3) Information sources in political science, sociology, psychology, geography, history, anthropology, business, and education.

532 Sources and Services for Science and Engineering (3) Information sources in engineering, physical and life sciences.

533 Sources and Services for the Humanities (3) Information sources in philosophy, religion, fine arts, performing arts, literature and language. Organization and management of regional collections.

534 Government Information Sources and Services (3) Selection, acquisition, and utilization of government information in various formats of legislation, judicial and executive branches of federal, state, local, and international government and intergovernmental agencies.

535 Advanced Information Retrieval (3) Bibliographic, non-bibliographic, full-text databases, e.g., non-bibliographic formula and structure databases, contents-page/full-text databases, patents; document delivery alternatives: evaluation, and testing.

537 Information Industry (3) Issues and trends concerning information industry: products and services. Standards, enabling technologies, choice of distribution media, entrepreneurial opportunities. Legal, ethical, and quality concerns.

538 Economics of Information (3) Costing and pricing of information; value of information and value added services; cost-benefit analysis and tradeoffs; policy issues related to economic aspects of information exchange and transfer.

539 Information Policy (3) Role of government in creation and exchange of information; review of key national and international 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) Supervisory 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 Academic Libraries (3) Mission, status, and history of academic libraries and academic librarianship in community colleges, colleges and universities; trends in technology, information technology, and government’s impact on public, technical, and administrative services.

553 Corporate Information Services (3) Development and present status, scope and objectives. Information resources external to organization.

554 Public Library Management and Services (3) Developmental roles; political environment, governance, organization, fiscal management, services, marketing, and performance evaluations.

555 Scientific and Technical Communications (3) Evolution of scientific and technical communication, current trends; 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 all users of information systems. Includes practical experience.

560 Development and Management of Collections (3) Selecting and preserving variety of items (tangible and intangible) to meet needs of particular users; community analysis; policies and procedures; evaluation; purchasing.

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 Business Intelligence for Information Professionals (3) Principles and practices of gathering and synthesizing business intelligence: competitive intelligence, environmental scanning, and issues management; information evaluation and synthesis; role of strategic information in modern organizations.

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 resources; construction of local technologies as developed and applicable.

569 Advanced Production of Audiovisual Software (3) Same as Education in the Sciences, Mathematics, Philosophy and objectives of public and school library services for children and young adults. Read- ing, listening, and viewing guidance for individuals and groups. Program planning, implementation, and evaluation. Prereq: 571 or 572.

574 Adult Materials and Services (3) Popular informational and recreational materials and services to meet adult interests in variety of formats. Development of specialized collections.

580 Foundations of Information Sciences and Technologies (3) Definitions of information, information sciences, and information technology; theories of information, information representation, retrieval, and transfer; standards and technologies for information processing and distribution; research fronts; bibliometrics and infometrics; relationships with other disciplines.

581 Seminar in Radio and Television (3) Same as Electronic Media 580.

582 Library Automation (3) Computer-based applications, role of systems for libraries including MARC, bibliographic utilities, retrospective conversion, circulation systems, online catalogs, computer-based reference systems, and electronic document delivery systems. Prereq: Consent of instructor. May be repeated. Maximum 6 hours. S/NC only.

583 Information Systems (3) Systems concept, defining systems, analysis and design of information systems. Selecting and using information systems to support various activities. User involvement in the development process.

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, relational models, database administration and evaluation. Design and implementation of application using database management system.

585 Information Technologies (3) Evolution, trends, capabilities, and limitations of technologies applied to information capture, storage, preservation, access, and distribution.

586 Information Retrieval Systems (3) Historical perspective on information retrieval research; statistical and probabilistic retrieval techniques; cognitive modeling; expert intermediary systems; associations, relations and hypermedia.

588 Human-Computer Interaction (3) Survey of human-computer interaction and introduction to human and technological factors of importance to design of usable information systems. Basic phenomena of human perception, cognition, memory, and problem solving, and relationships to user-centered design. Methods and techniques for interaction design and evaluation.


590 Problems in Information Sciences (3-6) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

591 Supervised Readings in Information Sciences (3) Prereq: Consent of instructor. May be repeated. 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.

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/NC only.

595 Student Teaching in School Library Information Center (3) Planned professional semester: full day school library work and classroom observation activities. S/NC only.

596 Field-Based Experience in School Library Information Centers (2) Prescribed activities to gain competencies in a school library information center setting. Must be taken twice. May be repeated. Maximum 8 hrs. S/NC only.

599 Practicum (3-6) Prereq: Completion of core and pertinent advanced courses relevant to student’s practice and current degree level. 3.0 cumulative GPA. Written consent of advisor and approval of practicum coordinator. May be repeated. Maximum 6 hours. S/NC only.

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.

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**Instructional Technology and Educational Studies**

(Consortium of Colleges of Education, Health, and Human Sciences)

**MAJOR DEGREES**

**Doctor of Education**

Instructional Technology and Educational Studies: M.S., Ed.S., Ed.D.

Michael Waugh, Head

Professors:

Counts, Edward L., Ed.D. ............... Texas A&M

Dessart, Donald J., Ph.D. ............... Maryland

French, Russell, Ph.D. ................. Ohio State

Hipple, Theodore W., Ph.D. .......... Illinois

Ray, John R., Ed.D. ................. Tennessee

Thayer-Bacon, Barbara, Ph.D. ....... Indiana

Waugh, Michael, Ed.D. .......... Georgia

Emeriti Faculty:

Myer, M. E., Ed.D. ............... Ohio State

Roeske, Edward L., Ph.D. .......... Florida

Wright, Handel K., Ph.D. ........ Toronto

**Assistant Professor:**

Counts, Edward L., Ph.D. ............... Texas A&M

Dessart, Donald J., Ph.D. ............... Maryland

French, Russell, Ph.D. ................. Ohio State

Hipple, Theodore W., Ph.D. .......... Illinois

Ray, John R., Ed.D. ................. Tennessee

Thayer-Bacon, Barbara, Ph.D. ....... Indiana

Waugh, Michael, Ed.D. .......... Georgia

**Associate Professors:**

Connelly, Mary Jane, Ed.D. ........... VPI

Grant, A. D., Ph.D. ................. Wisconsin

O’Bannon, Blanche, Ed.D. .......... Memphis

**Curriculum**

Instructional Technology

Instructional Technology and Educational Studies

Curriculum

Instructional Technology

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**Educational Specialist**

Instructional Technology and Educational Studies

Curriculum

Instructional Technology

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**Doctor of Education**

Instructional Technology and Educational Studies

Curriculum
### THE MASTER’S PROGRAMS

#### Instructional Technology and Educational Studies • Cultural Studies of Educational Foundations Concentration

<table>
<thead>
<tr>
<th>Program Component</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>Concentration:</td>
<td>15</td>
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<tr>
<td>CSED 590 (2 cr)</td>
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<td>CSED 591</td>
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<td>CSED 592</td>
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<td>Choose one or two from the following courses:</td>
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<td>CSED 511, 539, 544, 545, 549, 555 (Multicultural Education)</td>
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<td>Specialization (6-12 cr):</td>
<td>9</td>
</tr>
<tr>
<td>Philosophy of Ed: CSED 526, 539, 544, 547, 548, 608, 609</td>
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<tr>
<td>Cultural Studies: CSED 548, 595, 609, 660, 695</td>
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<td>Sociology of Ed: CSED 545, 549, 648, 652</td>
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<tr>
<td>History of Ed: CSED 511, 539, 546, 609, 625</td>
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<td>Research (6-9 cr):</td>
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<td>CSED 560, 561, 526, 625 (2 course sequence)</td>
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<td>Thesis Hours (6-9 hours):</td>
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#### Instructional Technology and Educational Studies • Curriculum Concentration (Thesis/Non-Thesis)

<table>
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<th>Program Component</th>
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<tr>
<td>Core:</td>
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<td>TPTE 517</td>
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<td>One course from Educational Foundations (advisor approval)</td>
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<tr>
<td>One course from Curriculum (advisor approval)</td>
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<td>Concentration:</td>
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<td>TECH 521</td>
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<td>TECH 570</td>
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<td>TECH 573</td>
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<td>TECH 575</td>
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<td>CREV 520 (thesis)</td>
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| Thesis | 30 |

#### Instructional Technology and Educational Studies • Instructional Technology Concentration (Thesis/Non-Thesis)

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<th>Program Component</th>
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<td>Core:</td>
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<td>CREV 676, TECH 575, CREV 623 OR COUN 520, CREV 535 OR 675</td>
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<td>CREV 588, 671</td>
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<td>CREV 671</td>
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<td>CREV 623</td>
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<td>Seminar:</td>
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<td>CRED 604</td>
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*NOTE: These courses are required for students who do not have a Masters in IT.

### THE ED.D. PROGRAMS

#### Instructional Technology and Educational Studies • Curriculum, Research, and Evaluation Concentration

<table>
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<th>Program Component</th>
<th>Credit Hours</th>
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<td>Core:</td>
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<tr>
<td>TPTE 517</td>
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<tr>
<td>One course from Curriculum (advisor approval)</td>
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<td>One course from Educational Foundations (advisor approval)</td>
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<td>Concentration:</td>
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<td>*TECH 521</td>
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<td>*TECH 570</td>
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<td>*TECH 573</td>
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<td>ITES 503A</td>
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<td>ITES 503B (may not be taken concurrently with 503A)</td>
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*NOTE: These are courses required for students who do not have a Masters in IT.

#### Instructional Technology and Educational Studies • Instructional Technology Concentration

<table>
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<th>Program Component</th>
<th>Credit (Units)</th>
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<tr>
<td>Core:</td>
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<tr>
<td>Students entering the Ed.D. program with a concentration in IT must hold a master's degree in IT or closely related field OR complete pre-requisite courses listed below OR show evidence of comparable course work or</td>
<td></td>
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</tbody>
</table>
work experience.
TECH 521
TECH 570
TECH 573
TECH 575

Core: 5

TECH 678
CREV 604 (2 cr)

Concentration: 18
(Selected in consultation with advisor)

Specialization: 9
(Selected in consultation with advisor from approved CEHHS list)

Research: 9
(Selected in consultation with advisor from approved CEHHS list)

Dissertation Hours: 24

TOTAL:* 65

*NOTE: This total represents minimums and some students may be required to complete additional coursework to overcome background deficiencies.

THE PH.D. CONCENTRATIONS

- Education • Cultural Studies of Educational Foundations Concentration

Program Component Credit (Hrs)

Core: 11

Cult Std 607
Ed Adm Pol Std 605
Ed Psych 609
EDUC 601 (2cr)

Concentration: 16
(from the following and approved substitutions)
CSED 590 (4 cr)
CSED 591
CSED 592
CSED 595 (Multicultural Education)
CSED 609

Specialization: 9
(from one of the following areas)
Philosophy of Ed: CSED 526, 539, 544, 547, 548, 608
Cultural Studies: CSED 560, 561, 592, 549, 609, 660, 695
Sociology of Ed: CSED 545, 549, 648, 652
History of Ed: CSED 511, 539, 546, 609, 625

Research: 15
(from the following and approved alternatives)
CSED 560, 561, 625, 531

Cognate: 6
(Selected in consultation with advisor)

Dissertation Hours: 24

TOTAL*: 81

*NOTE: These totals are minimums and some students may be required to complete additional coursework to overcome background deficiencies.

- Education • Instructional Technology Concentration

Program Component Credit (Hrs)

Program Pre-Requisites: 12

Core: 11

EDUC 601 (2 cr)
Other College Core Requirements

Concentration: 12

Required:
CREV 676
TECH 575 or TECH 521
CREV 623 or 520
CREV 535 or 675

Electives: 6
CREV 558, 560, 588, 671 674

Specialization: 9
(Selected in consultation with advisor)
Research: 15
(from the following and approved substitutions)
CREV 561
CREV 671
CREV 623
CSED 560
Educational Psychology 520
Educational Psychology 563
CREV 520

Cognate: 6
(Selected in consultation with advisor)

Dissertation Hours: 24

TOTAL*: 83

*NOTE: This total represents minimums and some students may be required to complete additional coursework to overcome background deficiencies.

- Education • Curriculum, Research, and Evaluation Concentration

Program Component Credit (Units)

Program Pre-Requisites: 12

Core: 11

EDUC 601 (2 cr)
Other College Core Requirements

Concentration: 12

Required:
CREV 676
TECH 575 or TECH 521
CREV 623 or 520
CREV 535 or 675

Electives: 6
CREV 558, 560, 588, 671 674

Specialization: 9
(Selected in consultation with advisor)
Research: 15
(from the following and approved substitutions)
CREV 561
CREV 671
CREV 623
CSED 560
Educational Psychology 520
Educational Psychology 563
CREV 520

Cognate: 6
(Selected in consultation with advisor)

Dissertation Hours: 24

TOTAL*: 80

*NOTE: This total represents minimums and some students may be required to complete additional coursework to overcome background deficiencies.

Cultural Studies in Education

GRADUATE COURSES


526 Philosophy of Education (3) Description, interpretation, and critique of philosophical and critical arguments, and their impact on education.

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

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

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

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

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

548 Transforming Critical Thinking: Constructive Thinking and Educational Implications (3) Critique and transformation of critical thinking to more holistic, relational, and aesthetic models of multicultural and gender-sensitive constructive thinking; confronting power and addressing educational implications.

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

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, biography, oral and life history. Critical reading and evaluation of qualitative research studies.

561 Qualitative Research in Education Settings (3) Implementing and writing qualitative studies in educational settings. Qualitative data collection, analysis, and report writing. Prereq: 560 or equivalent.

590 Cultural Studies Seminar (1) Two-semester sequence (fall and spring); ongoing discussion about cultural studies; popular culture, interdisciplinary work, social justice issues. Presentations, videos, readings. May be repeated. Maximum 4 hrs. S/NC only.

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

592 Justice, Schools, and Sports (3) Social justice issues: education and sport practices. Social justice, moral commitments to others in educational and sport settings, and equal opportunity to acquire social goods and benefits. Prereq: Admission to doctoral program with concentration in cultural studies in education.

607 Advanced Seminar in the Social Foundations of Education (3) Interdisciplinary team-taught seminar. Readings selected by faculty and participants from classic studies and current periodical literature in anthropology, sociology, history, and philosophy of
Curriculum Educational Research and Evaluation

GRADUATE COURSES

520 Techniques of Research in Education (3) Study and application.

532 Instructional Research: Analysis and Application (3) Analysis of research on instruction. Translation and application of research findings into instructional performance.

534 Program Evaluation in Education (3) Issues and practices in planning and conducting program and curriculum evaluation in variety of settings. Fundamentals of design, measurement, philosophy, ethics, and underlying values; proper role and use of evaluation in educational organizations. Prereq: Consent of instructor. (Same as Educational Administration and Policy Studies 534.)


552 School Law for Educators (3) Case and statutory material for public school educators; problems concerning law and public education.

557 The Junior High and Middle School Curriculum (3) Curriculum and instructional design for junior high and middle school. Characteristics of students, curriculum designs, instructional patterns, and organization and structure of junior high and middle school.

558 Curriculum Planning and Development (3) Foundations and principles of curriculum planning and development. Historical analysis of curriculum theory, principles of planning and development, and classroom applications for improved learning.

560 Student Assessment (3) Processes for assessing and reporting student progress; interpretation and use of available assessment data. Methods of assessment, related research and measurement; portfolios, performance tasks, exhibitions.

561 Educational Statistics (3) Applications of descriptive and inferential statistics to educational and instructional problems. Use of electronic calculators in educational research. Prereq: One year of college mathematics, an elementary course in statistics, or consent of instructor.

580 Techniques for Research in Curriculum and Instruction (3) Fundamentals of research methodology applicable to curriculum, instruction, and other areas of educational inquiry. Critical reading of research and development of skills needed for proposal development.

588 Instructional Theory and Design (3) Relationship of curriculum to instruction; examination of instructional and related learning theories; instructional models and teaching styles.

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

623 Using Research for Curriculum Improvement (3) Research methodology; application to descriptive/survey curriculum materials. Critical reading of research, methodological development in descriptive and survey areas.

630 Seminar in Assessment and Evaluation (3) Trends and issues in student/client assessment, personnel evaluation, and program evaluation; and examination of current state, national and international assessment and evaluation projects. Prereq: Consent of instructor.

631 Application of Assessment/Evaluation (3) Systems designs, instruments, procedures, reporting formats used in personnel and program evaluation and student assessment; analysis, synthesis and interpretation of data sets. Prereq: 630.

671 Advanced Educational Statistics (3) Applications of parametric and non-parametric statistical inference to educational and instructional problems. Use of microcomputers in educational research. Prereq: 561.

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

674 Designing and Implementing Personnel Assessments (3) Models and methods for assessing performance of educators and other professionals. Critique of systems currently in use and design of evaluation system.

675 Curriculum Evaluation: Theory and Application (3) Evaluation trends and issues. Theoretical frameworks to design evaluation studies for various educational programs.


Instructional Technology

GRADUATE COURSES

521 Computer Applications in Education (3) Use and integration of technology in educational settings to support teaching and learning. Prereq: Basic computer operations or consent of instructor.

556 Administering Instructional Media Programs (3) Leadership roles and responsibilities of professional media administrator in variety of organizational settings.

569 Media and Technology Production Techniques (3) Workshop strategy: basic photography, audio production, multi and single camera TV production, basic digital video editing, and other media/technology techniques important for improving communication in variety of presentation styles, instructional settings. (Same as Information Sciences 569.)

570 Instructional Systems Design (3) Application of theory and research of instructional systems design to solve instructional problems in educational settings.

571 Desktop Publishing for Educators (3) Use of computer-based desktop publishing and graphics software and related hardware in designing and producing instructional and informational products. Prereq: 521, 570, or consent of instructor.

573 Introduction to Multimedia in Instruction (3) Selected computer-based multimedia production tools and use to produce instructional materials based on specific learner characteristics and objectives. Prereq: 521 or consent of instructor.

575 The Internet: Implications for Teaching and Learning (3) Investigation of Internet, its origin and historical development. Hands-on use of Internet. Relevant issues regarding legal and ethical issues, evaluation, responsible use, proprietary rights.

576 Advanced Interactive Multimedia for Instruction (3) Design and production of educational and interactive Web sites using advanced software. Development of effective interactive methods for enhancing teaching and learning supported by principles of planning, designing, creating, testing, and evaluating. Prereq: 521, 570, 573, 575.

578 Web Design (3) Design and development of instructional web sites using basic design principles and visual web editor software. Prereq: 575.

669 Instructional Media Research (3) Identification, location, and collection of developmental and experimental research on instructional media. Application of research.

678 Seminar in Instructional Technology (1) Readings and discussions based on current literature, research, theories and practices in instructional technology. Prereq: Consent of instructor. May be repeated. Maximum 3 hrs.


680 Designing Problem-Based Learning Environments (3) Development and integration of problem-based learning pedagogy into curriculum. Examination of literature to understand theoretical perspective for design of this type of learning environment. Prereq: 521, 570, 573, 575, or consent of instructor.
694 Supervised Reading (1-3) May be repeated. S/NC or letter grade.
695 Special Topics (1-3) May be repeated. S/NC or letter grade.

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, Asian Studies, Cinema Studies, Comparative Literature, Environmental Studies, Latin American Studies, Legal Studies, Judaic Studies, Linguistics, Medieval Studies, Urban Studies and Women's Studies. Certain courses within these programs are available for graduate credit as listed below. See the Undergraduate Catalog for program descriptions and directors.

African and African-American Studies

GRADUATE COURSES
443 Topics in Black Literature (3) (Same as English 443.)
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.)
461 Art of Southern and Eastern Africa (3) (Same as Art History 461.)
462 Art and Archaeology of Ancient Africa (3) (Same as Art History 462.)
463 Arts of the African Diaspora (3) (Same as Art History 463.)
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
423 Geography of American Popular Culture (3) (Same as Geography 423.)
451 Criminal Justice (3) (Same as Sociology 451.)
455 Society and Law (3) (Same as Sociology 455.)
461 Art of Southern and Eastern Africa (3) (Same as Art History 461.)
463 Arts of the African Diaspora (3) (Same as Art History 463.)
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.

Asian Studies

GRADUATE COURSES
471 Selected Topics in Asian Studies (3) Content varies. May be repeated. Maximum 9 hrs.
510 Special Topics (3) May be repeated. Maximum 6 hrs.

Cinema Studies

GRADUATE COURSES
400 Special Topics (3) May be repeated. Maximum 6 hrs.
420 French Cinema (3) (Same as French 420.)
421 Topics in Italian Literature and Cinema (3) (Same as Italian 421.)
433 History of Film and Modern Art (3) (Same as Art Media/Photography 433.)
434 Hispanic Culture Through Film (3) (Same as Spanish 434.)
465 Latin American Film and Culture (3) (Same as Spanish 465 and Latin American Studies 465.)
469 Sexuality and Cinema (4) (Same as Women’s Studies 489.)
489 Special Topics in Film (3) (Same as English 489.)
510 Special Topics (3) May be repeated. Maximum 6 hrs.

Comparative Literature

GRADUATE COURSES
401-02 Special Topics in Comparative Literature (3,3) Content varies. May be repeated. Maximum 9 hrs.
452 Modern Drama, 1880-1945 (3) (Same as English 452.)
454 Twentieth-Century International Novel (3) (Same as English 454.)
510 Special Topics (3) May be repeated. Maximum 6 hrs.

Judaic Studies

GRADUATE COURSES
405 Modern Jewish Thought (3) (Same as Religious Studies 405.)
425 Early Christian and Byzantine Art, to 1350 (3) (Same as Art History 425.)
431 Medieval Art of the West, 800-1400 (3) (Same as Art History 431.)

Latin American Studies

GRADUATE COURSES
400 Mass Communications Law and Ethics (3) (Same as Communication 400.)
420 United States Constitutional Law: Sources of Power and Restraint (3) (Same as Political Science 430.)
430 United States Constitutional Law: Civil Rights and Liberties (3) (Same as Political Science 431.)
435 Criminal Law and Procedure (3) (Same as Political Science 435.)
442 Administrative Law (3) (Same as Political Science 442.)
451 Criminal Justice (3) (Same as Sociology 451.)
455 Society and Law (3) (Same as Sociology 455.)
470 International Law (3) (Same as Political Science 470.)
490 Language and Law (3) (Same as English 490 and Linguistics 490.)
496 The Rhetoric of Legal Discourse (3) (Same as English 496.)

Legal Studies

GRADUATE COURSES
465 Latin American Film and Culture (3) (Same as Spanish 465 and Cinema Studies 465.)
479 Disenchanted Texts in Hispanic Literature (3) (Same as Spanish 479.)
510 Special Topics (3) May be repeated. Maximum 6 hrs.

Linguistics

Graduate Certificate in Linguistics

The Linguistics Program offers a graduate certificate, designed to meet the needs of individuals wishing to apply linguistics in various professional fields. It draws upon the strengths of faculty members in applied linguistics, sociolinguistics, and theoretical linguistics. The requirements focus upon the central aspects of the discipline of Linguistics and aim to develop students’ basic knowledge and skills in the central aspects of the discipline.

Upon successful completion of this program, students should have an understanding of the basic theoretical concepts and approaches of the discipline and have gained experience in the use of analytic and research techniques. It is also designed to meet the specific needs of those students who are preparing to teach foreign language at the high school/junior college level and/or to obtain advanced level proficiency in linguistics and cultural knowledge.

Prospective candidates for the certificate may take up to 6 hours of certificate classes before making application for admission to the Certificate Program. Once admitted to the program they must maintain a GPA of at least 3.0. Application to the Certificate Program must be made to the Chair of the Interdisciplinary Linguistics Program by submitting a letter of application and copies of undergraduate transcripts (and graduate transcripts, if applicable). A minimum of fifteen credit hours is required; all courses must be selected in consultation with a program advisor, who must approve all courses for individual
students prior to their being taken, except that, as noted above, up to six credit hours may be accepted from candidates upon admission. Students will satisfy the requirements of the Certificate Program by selecting fifteen hours from the following lists, provided that those courses are selected in consultation with a program advisor, who approves their selection. A certificate cannot be earned without program approval by the advisor.

Certificate Requirements
1. At least one of the following courses: French 512, German 512, Spanish 512, Linguistics 423, 425.
2. Additional courses from the following list for a total of fifteen credit hours: Audiology and Speech Pathology 506, 579, 601, 652, English 508, 509, 680, French 421, 422, 510, German 510, 541, 631, 632, Linguistics 400, 411, 426, 429, 435, 471, 472, 474, 475, 476, 477, 485, 490, Spanish 531, Psychology 400, 543, 617, Statistics 531. Other courses may, where appropriate, be substituted for the courses listed above with the permission of the Chair of the Linguistics Program.
3. A non-credit capstone project, normally the preparation of a paper for presentation at a professional conference or for publication in a journal, planned and completed in consultation with a program advisor.

GRADUATE COURSES
400 Topics in Linguistics (3) Content varies. May be repeated. Maximum 6 hrs.
411 Linguistic Anthropology (3) (Same as Anthropology 411.)
423 The Development of Diachronic and Synchronic Linguistics (3) Development of Western linguistic thought from Hebrews and Greeks through modern times. Readings from Boas, Sapir, Bloomfield, and others. Prereq: 9 hrs of courses required for Linguistics major (300-level or above) or consent of instructor.
425 Introduction to Descriptive Linguistics (3) (Same as French 425, German 425, and Spanish 425.)
426 Methods of Historical Linguistics (3) (Same as German 426, French 426, and Spanish 426.)
429 Romance Linguistics (3) (Same as French 429 and Spanish 429.)
431 Topics in Hispanic Linguistics (3) (Same as Spanish 430.)
435 Structure of the German Language (3) (Same as German 435.)
436 History of the German Language (3) (Same as German 436.)
471 Sociolinguistics (3) (Same as English 471 and Sociology 471.)
472 American English (3) (Same as English 472.)
474 Teaching English as a Second or Foreign Language I (3) (Same as English 474.)
475 Teaching English as a Second or Foreign Language II (3) (Same as English 475.)
476 Second Language Acquisition (3) (Same as English 476.)
477 Pedagogical Grammar for ESL Teachers (3) (Same as English 477.)
485 Special Topics in Language (3) (Same as English 485.)
490 Language and Law (3) (Same as English 490 and Legal Studies 490.)
510 Special Topics (3) May be repeated. Maximum 6 hrs.

Medieval Studies

Graduate Certificate in Medieval Studies
The Medieval Studies program offers a graduate certificate enabling students with an interest in medieval topics to acquire a broad foundation in the interdisciplinary approaches to medieval research and to begin putting these approaches into practice. For students earning MAs or PhDs in traditional disciplines, the program will augment their training and may make them more attractive candidates for academic positions.
Prospective candidates for the certificate may take up to 6 hours of certificate classes before making application for admission to the Certificate Program. Once admitted to the program they must maintain a GPA of at least 3.0. Application to the Certificate Program must be made to the Chair of the Medieval Studies Program by submitting a letter of application and copies of undergraduate transcripts (and graduate transcripts, if applicable). A minimum of fifteen credit hours is required; all courses must be selected in consultation with a program advisor, who must approve all courses for individual students prior to their being taken, except that, as noted above, up to six credit hours may be accepted from candidates upon admission. Students will satisfy the requirements of the Certificate Program by selecting fifteen hours from the following lists, provided that those courses are selected in consultation with a program advisor, who approves their selection. A certificate cannot be earned without program approval by the advisor.

Certificate Requirements
1. Medieval Studies 510.
2. Twelve additional hours chosen from at least two disciplines. A minimum of six hours must be taken in one discipline. Students may choose from the following courses: Art History 425, 431, 441, 451, 571, English 401, 402, 508, 513, 514, 610, 611, 620, 621, French 410, 429, 540, German 541, History 531, Italian 401, 402, Spanish 531, 532, Philosophy 520, 620, Political Science 475. Topics and special topics courses, where appropriate, may be substituted for any of the above courses with the permission of the Chair of the Medieval Studies Program.
3. Demonstration of competency in reading medieval Latin, either by earning an “A” or “B” in Classics 435, or by passing the University of Toronto’s MA Medieval Latin exam, given on campus in Fall and Spring semesters. Where appropriate, students may substitute competency in reading medieval Greek, Hebrew, or Arabic. The chair of Medieval Studies, in conjunction with the Medieval Studies committee, will establish standards for determining competency in these languages as need arises.
4. A non-credit capstone project, usually a paper. The paper should be interdisciplinary in its approach to its topic and may be an outgrowth of a seminar paper in another course. This capstone paper must be presented to an audience of Medieval Studies committee members and other interested faculty and graduate students before the certificate is granted.

GRADUATE COURSES
510 Special Topics (3) May be repeated. Maximum 6 hrs.

Urban Studies

GRADUATE COURSES
401 The City in the U.S. (3) (Same as Planning 401.)
441 Urban Geography of the United States (3) (Same as Geography 441.)
464 Urban Ecology (3) (Same as Sociology 464.)

Women’s Studies

Graduate Certificate in Women’s Studies
The Women’s Studies program offers a graduate certificate, enabling students to develop critical thinking about the economic, social, and legal factors influencing women’s roles in contemporary and historical societies, and to evaluate those roles in the widest possible perspectives. Students may examine representations of women in the arts and the media, evaluate how science and medicine view women as objects of study, and study how women work as practitioners and researchers in these fields.

The program is designed to provide a supplementary perspective for students already enrolled in graduate programs, to provide an entry into graduate study for those who are exploring a number of disciplinary approaches, to provide enrichment for members of the community who have a BA or an advanced degree, and to develop skills for professionals in various fields.
Prospective candidates for the certificate may take up to 6 hours of certificate classes before making application for admission to the Certificate Program. Once admitted to the program they must maintain a GPA of at least 3.0. Application to the Certificate Program must be made to the Chair of the Women’s Studies Program by submitting a letter of application and copies of undergraduate transcripts (and graduate transcripts, if applicable). A minimum of fifteen credit hours is required; all courses must be selected in consultation with a program advisor, who must approve all courses for individual students prior to their being taken, except that, as noted above, up to six credit hours may be accepted from candidates upon admission. Students will satisfy the requirements of the Certificate Program by selecting fifteen hours from the following lists, provided that those courses are selected in consultation with a program advisor, who approves their selection. A certificate cannot be earned without program approval by the advisor.

Certificate Requirements
1. Women’s Studies 510.
2. Twelve additional hours, drawn from at least two different disciplines. For students already enrolled in graduate programs, to make them more attractive candidates for academic positions and special topics courses, where appropriate, may be substituted for any of the above courses with the permission of the Chair of the Women’s Studies Program.

Certificate Requirements
that program or the department in which the MA program is housed. Students are encouraged to select from courses at the 500 level and above. Students may choose from the following list: Anthropology 517, English 584, Health 420, 520, Public Health 585, Law 449, 862, 958, Women’s Studies 400, 410, 422, 425, 434, 466, 469, 476, 483, 510, 593.

3. A capstone experience such as presenting research results to a professional group, submitting a work for publication, presenting research results to a professional group, and/or an examination to a group approved by the individual advisor and the chair of Women’s Studies.

GRADUATE COURSES

400 Topics in Women’s Studies (3) Content varies. May be repeated.

410 Gender Role Development: Implications for Education and Counseling (3) (Same as Educational Psychology and Counseling 410.)

422 Women Writers in Britain (3) (Same as English 422.)

425 Women’s Health (3) (Same as Health 425.)

434 Psychology of Gender (3) (Same as Psychology 434.)

466 Rhetoric of the Woman’s Rights Movement to 1939 (3) (Same as Speech Communication 466.)

469 Sexuality and Cinema (4) Exploration of issues surrounding sexuality, gender and cinema from points of view of feminist film criticism. (Same as Cinema Studies 469.)

476 Rhetoric of the Contemporary Feminist Movement (3) (Same as Speech Communication 476.)

483 African-American Women in American Society (3) (Same as African and African-American Studies 483.)

510 Special Topics (3) May be repeated. Maximum 6 hrs.

593 Independent Study (1-6) Prereq: Consent of Chair of Women’s Studies.

Electronic Media

GRADUATE COURSES

440 Corporate Video (3) Special requirements of business, industrial, educational, and medical uses of video. Management, budgeting, planning, producing, and evaluating projects. Prereq: 430 or consent of instructor.


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

470 Cable, Broadband, and Interactive Digital Media (3) History and structure of cable television and other broadband delivery systems: DBS, Internet, Development of digital broadcasting, interactive television, and other broadband media systems and digital technology. Regulatory, policy, programming, and management issues arising from new media and digital technologies. Prereq: 275 Introduction to Radio and Television or consent of instructor.


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

550 International Electronic Media (3) History and structure of broadcasting systems in other countries. Development of international broadcasting, rise of new international and global media systems (satellites, internet). Role and impact of international broadcast organizations, policy, and technology. Use of electronic media for intercultural and development communications. Prereq: Consent of instructor.

560 Electronic Media and Telecommunications Law and Policy (3) Law, regulation, and policy in broadcasting and telecommunications (cable, telephone, Internet). Philosophy of regulatory policy formation role of FCC and ITU, and discrete treatments of electronic media. Issues and problems facing media managers, industry, and society as result of electronic media law and regulations. Prereq: Consent of instructor or admission to program.

570 Broadcast and Internet Research (3) Practical and professional application of research methods. Applied audience and market research. Overview of techniques, research design, data collection and analysis, and application to management decision making.

Use of internet for data collection. Prereq: Communications 512 or 612, or consent of instructor.

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


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

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 through world political, cultural, and economic factors. Print and broadcast systems in terms of relevant social, political, economic, and cultural factors. Relation of communication practices to international affairs and understanding.

412 Opinion Writing (3) Analysis of editorial positions, practices, and pages. Writing of editorials and columns for newspapers, magazines and company publications: study and use of rhetorical devices and logic. Prereq: Writing for Mass Communication or consent of instructor. (Same as Public Relations 412.)

414 Magazine Article Writing (3) Techniques of writing in-depth articles of mass circulation and specialized magazines. Organizing and presenting material, problems in specialized areas: business, science, agriculture, humanities. Prereq: Writing for Mass Communication or consent of instructor.

416 Issues in Journalism (3) Topics vary. Prereq: of instructor. May be repeated. Maximum 6 hrs.

420 Print Media Management (3) Current business practices in print media, especially newspapers. Problems in management and production and outlook for new technologies. Prereq: 6 hrs mathematics and/or accounting and senior standing.


433 Advanced Editing (3) Sensitivity to language and editing skills. Headline writing, layout, and production. Prereq: Editing.

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.)

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. Exemplary 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 in quest to understand why some science writing succeeds. Prereq: Consent of instructor.


465 Women and Mass Media (3) Media effects on women. Media coverage and portrayal of women. Historical and current status of women in mass communication industries.

490 Advanced Photojournalism (3) Advanced principles and methods of black-and-white photography. Introduction to color photography. News and feature photographs and photo essays. Prereq: Photojournalism or consent of instructor.

520 Political Communications (3) Relationships among mass media, public relations and government and their roles in democratic society. Governmental public relations, political campaigns, executive, legislative and judicial branches of government, special interest groups and public access to government. Governmental relationships among mass media, public relations and government finance, science; technical, general publications.

Law

MAJOR

DEGREES

Law

J.D., J.D.-MBA, J.D.-M.P.A.

Thomas C. Galligan, Jr., Dean

Professors:

Ansley, Frances Lee, LL.M. Harvard
Best, Reba, M.L.S. Florida
Blaze, Douglas A., J.D. Georgetown
Cohen, Neil P., LL.M. Harvard
Cook, Joseph G., LL.M. Yale
Davies, Thomas Y., J.D. Northwestern
Galligan, Jr., Thomas C., LL.M. Columbia
Hardin, Patrick, J.D. Chicago
Hess, Amy M., J.D. Virginia
King, Christopher D., J.D. Pennsylvania
Lloyd, Robert M., J.D. Michigan
Phillips, Jerry J., J.D. Yale
Picquet, Cheryn, M.S.L.S. Tennessee
Plank, Thomas E., J.D. Maryland
Reynolds, Glenn H., J.D. Yale
Rivkin, Dean H., J.D. Vanderbilt
Sobieski, John L., Jr., J.D. Michigan
Stark, Barbara, J.D. New York University
Stein, Gregory M., J.D. Columbia
Stephens, O.H., J.D. Tennessee
Wirtz, Richard S., J.D. Stanford
Zwier, Paul J., II, LL.M. Temple

Associate Professors:

Aarons, Dwight, J.D. UCLA
Anderson, Gary L., LL.M. Harvard
Baran, Joanne, J.D. Michigan
Beintema, William J., J.D. Miami
Black, Jerry P., Jr., J.D. Vanderbilt
Cornett, Judy M., J.D. Tennessee
Heminway, Joan M., J.D. New York
Jacobs, Becky L., J.D. Georgia
Kennedy, Deseree A., LL.M. Temple
Kuney, George W., J.D. California (Hastings)
Leatherman, Don A., LL.M. New York
Marlote, Susanna, J.D., Washington (St. Louis)
Medill, Colleen E., J.D. Kansas
Parker, Carol M., J.D. Illinois
Pierce, Carl A., J.D. Yale
Pulitz, Hunt A., J.D. California (Boalt Hall)
White, Penny J., LL.M. Georgetown
Williams, Paulette J., J.D. New York University

Assistant Professors:

Coehran, Cathleen R., M.S. Tennessee
Collins, Carol Morgan, M.S. Tennessee
Mask, Shelley, J.D. Loyola
Price, Loretta, M.S.L.S. Tennessee

Emeriti Faculty:

Gray, Grayfred B., J.D. Vanderbilt
Le Clercq, Frederic S., LL.B. Duke
Sewell, Toxey H., LL.M. George Washington

The College of Law offers the Doctor of Jurisprudence degree program; a dual degree program with the College of Business Administration leading to the J.D. and the Master of Business Administration degree; and a dual degree program with the Department of Political Science, College of Arts and Sciences, leading to the J.D. and Master of Public Administration. In addition graduate students may be eligible to take a limited number of law courses to count toward a graduate degree.

Current information regarding admission, financial aid, course requirements, academic policies, extracurricular activities, and student services is available from the Admissions Office, The University of Tennessee, College of Law, 1505 W. Cumberland Avenue, Knoxville, Tennessee 37996-1810 and at the College’s web page www.law.utk.edu. Completed application should be received before February 1 of the year of requested admission.

DEGREE OF DOCTOR OF JURISPRUDENCE

The degree of Doctor of Jurisprudence will be conferred upon candidates who complete, with the required average, six semesters of resident law study and who have 89 semester hours of credit, including all required courses. The required average is 2.0 and that average must be maintained on the work of all six semesters and also for the combined work of the grading periods in which the last 28 credit hours taken in residence were earned. Averages are computed on weighted grades. Grades are on an alphabetical scale from A+ to F. No credit toward the J.D. degree is awarded for grades of D- or lower. Eligible law students may receive up to six (6) semester hours of credit toward the J.D. degree for acceptable performance (a grade of B or higher) in upper-level courses that materially contribute to the study of law and which are taken in other departments at The University of Tennessee. Course selection and registration are subject to guidelines approved by the law faculty which include the requirement that any such course be acceptable for credit toward a graduate degree in the department offering the course. Refer to the Law Catalog and Student Handbook for current degree requirements.

Concentration in Business Transactions

Students interested in a concentration in business transactions must complete all of the following law courses:

818 Fundamental Concepts of Income Taxation
826 Introduction to Business Transactions*
827 Business Associations
972 Income Taxation of Business Organizations
940 Land Finance Law
840 Commercial Law
842 Contract Drafting Seminar
833 Representing Enterprises or
978 Transactional Tax Planning

Students electing a concentration in business transactions may not take any of the above courses on an S/NC basis except 826.

*This course is not required for students who have an undergraduate major in accounting, finance, or business administration, who hold the MBA degree, or who are enrolled in the dual J.D.-MBA program. Waivers may also be granted to students who have acquired the requisite business knowledge through other coursework or through practical experience.

Concentration in Advocacy and Dispute Resolution

Students interested in a concentration in advocacy and dispute resolution must complete all of the following courses:

813 Evidence
815 Introduction to Advocacy and Professional Responsibility
920 Trial Practice
921 Pretrial Litigation
922 Advanced Trial Advocacy
928 Case Development and Resolution

Large Animal Clinical Sciences

See College of Veterinary Medicine and Comparative and Experimental Medicine
Students electing a concentration in advocacy and dispute resolution may not take any of the above courses on an S/NC basis.

**DUAL J.D.-MBA DEGREE PROGRAM**

The College of Business Administration and the College of Law offer a coordinated dual program leading to the conferral of both the Doctor of Jurisprudence and the Master of Business Administration.

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 degree programs of the College of Law and the College of Business Administration, and the intellectual benefits inherent in the concurrent study of both business and business-related law. The program is designed to accommodate the interests of students who (a) contemplate a career in public service and want to acquire the skills and perspective of the lawyer and the business-oriented manager, (b) contemplate a career in business management and want to acquire the skills and perspective of a lawyer, or (c) contemplate a career as a lawyer specializing in business-related law and want to acquire the skills and perspective of the business-oriented manager.

**Admission Requirements**

Applicants for the J.D.-MBA program must make separate application to, and be competitively and independently accepted by, the College of Law for the J.D., the Office of Graduate Admissions and College of Business Administration for the MBA degree, and by the Dual Program Committee. Students who have been accepted by both colleges may apply for approval to pursue the dual program anytime prior to, or after, matriculation in either or both colleges. Such approval will be granted, provided that dual program studies are started prior to entry into the last 28 semester hours of J.D. coursework and prior to the third semester of the MBA program. Students interested in entering the dual degree program should submit a letter of application to the Dual Program Committee. Upon receipt of the application, the Dual Program Committee will determine eligibility and assign students to advisors who will be responsible for course approval and supervision of the student’s progress through the dual program.

**Curriculum**

A dual program candidate must satisfy the graduation requirements of each college. Students withdrawing from the dual program before completion of both degrees will not receive credit toward graduation from either college for courses in the other college, except as specified 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 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). 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.

**Awards for Grades**

For grade recording purposes in the College of Law and the Department of Political Science, grades awarded in courses in the other unit will be converted to either Satisfactory or No Credit and will not be computed in determining a student’s GPA or class standing. The College of Law will award a grade of Satisfactory for an approved M.P.A course in which the student earns a grade of B or higher and a grade of No Credit for any lower grade. The Political Science Department will award a grade of Satisfactory for an approved law course in which the student earns a grade of C+ or higher and a grade of No Credit for any lower grade. The official academic records 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 Department of Political Science, be awarded credit in courses (500 or 600 level) 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). 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.

**Awards for Grades**

For grade recording purposes in the College of Law and the Department of Political Science, grades awarded in courses in the other unit will be converted to either Satisfactory or No Credit and will not be computed in determining a student’s GPA or class standing. The College of Law will award a grade of Satisfactory for an approved M.P.A course in which the student earns a grade of B or higher and a grade of No Credit for any lower grade. The Political Science Department will award a grade of Satisfactory for an approved law course in which the student earns a grade of C+ or higher and a grade of No Credit for any lower grade. The official academic records 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 Department of Political Science, be awarded credit in courses (500 or 600 level) 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). 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.

**Awards for Grades**

For grade recording purposes in the College of Law and the Department of Political Science, grades awarded in courses in the other unit will be converted to either Satisfactory or No Credit and will not be computed in determining a student’s GPA or class standing. The College of Law will award a grade of Satisfactory for an approved M.P.A course in which the student earns a grade of B or higher and a grade of No Credit for any lower grade. The Political Science Department will award a grade of Satisfactory for an approved law course in which the student earns a grade of C+ or higher and a grade of No Credit for any lower grade. The official academic records 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 Department of Political Science, be awarded credit in courses (500 or 600 level) 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). 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.

**Awards for Grades**

For grade recording purposes in the College of Law and the Department of Political Science, grades awarded in courses in the other unit will be converted to either Satisfactory or No Credit and will not be computed in determining a student’s GPA or class standing. The College of Law will award a grade of Satisfactory for an approved M.P.A course in which the student earns a grade of B or higher and a grade of No Credit for any lower grade. The Political Science Department will award a grade of Satisfactory for an approved law course in which the student earns a grade of C+ or higher and a grade of No Credit for any lower grade. The official academic records maintained by the Registrar of the University shall show the actual grade assigned by the instructor without conversion.
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 calculated until graduation, at which time both the graduate and the law cumulatives will be shown on the permanent record.

**PROFESSIONAL COURSES**

801 Civil Procedure I (3) Binding effect of judgments, nonjudicial methods of dispute resolution, and evidentiary rules; pleading; discovery; pretrial conferences; settlement; written and oral arguments; oral argument; judicial ethics; legal research. Prereq: 807.

803 Contracts I (3) Basic agreement process and legal protections afforded contracts: offer and acceptance, consideration, and other defenses for enforcing promises; the Statute of Frauds, unconscionability and other defenses of contractual invalidity, impracticability of performance, frustration of purpose; remedies; third party beneficiaries; assignment and delegation. Considerable coverage of Article 2 of the Uniform Commercial Code.

804 Contracts II (3) Continuation of Contracts I. Issues arising after contract formation: interpretation, duty of good faith, slowdowns, impracticability of performance, frustration of purpose; remedies; third party beneficiaries; assignment and delegation. Considerable coverage of relevant portions of Article 2 of the Uniform Commercial Code with respect to remedies, anticipatory repudiation, impracticability and good faith.

805 Legal Process I (3) Lawyer-like use of cases and statutes in prediction and persuasion. Analysis and synthesis of common law decisions; statutory interpretation; fundamentals of expository legal writing and legal research.

806 Legal Process II (3) Continuation of Legal Process I. Formal legal writing, appellate procedure, and oral advocacy.

807 Torts I (3) Intentional torts, defenses and privileges related to intentional torts; negligence: standard of care, professional malpractice, and liability of owners and occupiers of land; defenses based on plaintiff's conduct; contributory and comparative negligence; assumption of risk, failure to take precautions, and avoidable consequences; causation, proximate cause; duty rules, special questions of joint and several or several liability.

808 Torts II (3) Vicarious liability and related concepts; strict liability for dangerous animals and abnormally dangerous activities; products liability; nuisance, defamation and invasion of privacy; economic torts: misrepresentation and interference with contract and prospective opportunities; immunities: those of government, governmental employees, charities and family members, and damages.

809 Criminal Law (3) Substantive aspects of criminal law; general principles applicable to all criminal conduct; specific analysis of particular crimes; defenses to crimes.

810 Property (4) Introductory course treating issues of ownership, possession, and title in the 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; servitudes; and selected aspects of nuisance law, eminent domain and zoning.

812 Constitutional Law (4) Fundamental principles of American constitutional law: federalism, separation of powers, equal protection of law, and constitutional protection of other fundamental individual rights.

813 Evidence (4) Rules regulating introduction and exclusion of oral, written and demonstrative evidence at trials and other proceedings, including relevance, competence, 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 815.

815 Introduction to Advocacy and Professional Responsibility (3) Theory and morality of advocacy in adversarial, ethical, and professional standards applicable to lawyers and especially lawyers as advocates.

818 Fundamental Concepts of Income Taxation (3) Introduction to basic statutory analysis, fundamental principles of federal taxation, income tax considerations, identification of significant income tax concerns that arise in practice. Federal concept of gross income, pattern of exclusions, exemptions and deductions from gross income used to arrive at tax base; special treatment of capital gains and losses; and rate structure.


821 Administrative Law (3) Administrative agency decision-making processes and judicial review of administrative decisions: procedural standards for informal and formal administrative adjudication and rule-making (attention paid to National Administrative Act); constitutional due process standards in administrative settings; and availability, scope and timing of judicial review of agency actions.

822 Legislation (3) Interpretation and drafting of statutes, legislative process, and legislative power: comparison of judicial views on legislative process with both realities of legislative process and applicable constitutional principles.


827 Business Associations (4) Legal problems associated with formation, operation, and dissolution of unincorporated and incorporated business firms; legal rights of officers and agents, partners and limited partners, members, managers, and governors of limited liability companies, and corporate shareholders, directors, and officers; and other matters. Business practices and the relationships between courts and firm’s business.

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. Legal valuation of corporate securities.

830 Securities Regulation (3) Basic structure of federal securities law. Legal problems associated with raising of capital by new and growing enterprises; securities transactions by promoters, officers, directors and other insiders; regulation of public-held companies; litigation under Rule 10b-5 and other antifraud provisions; and provision of legal and other professional services in connection with securities transactions. Recommended prereq or coreg: 827.

833 Representing Enterprises (3-5) Capstone course for concentration in business transactions. Simulated business transactions and completion of major planning drafting project. Transactions vary: formation of new enterprise, merger, buying a business, sale of development of real estate project, various financing transactions and corporate reorganization. Prereq: Completion 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 (Art. 3 of U.C.C.); sales of goods, including coverage of portions of Art. 2 of U.C.C. not covered in Contracts.

842 Contract Drafting Seminar (2) Practical fundamentals of drafting contracts of different types.

843 Debtor-Creditor Law (3) Basic elements of federal bankruptcy law; claims, property of estate, automatic stay, debtor's avoidance powers, assumption and rejection of contracts, priority of distributions, and distinction between liquidation and rehabilitation. Enforcement judgments outside of bankruptcy.

847 Advanced Constitutional Law (2-3) Advanced study of issues in American constitutional law. Specified course offerings vary. Subjects include: constitutional structure of American governmental institutions, American governmental powers; relation between legislative and executive branches, relationship among states and between states and federal government, and constitutional amendment process; state constitutional law, Tennessee constitution and differences between state and federal constitutional law; Bill of Rights and 14th Amendment to Constitution; constitutional rights protected by Bill of Rights and 14th Amendment. Prereq: 812. May be repeated under different topic.

848 Civil Rights Actions (3) Litigation to vindicate constitutional rights in private actions against the government, and its related civil rights protections under the Fourteenth Amendment. Prereq: 847. May be repeated under different topic.

849 Discrimination and the Law (3) Comparison of race, sex, and other forms of discrimination with respect to education, employment, housing, political participation and areas not specifically covered by the Civil Rights Act; historical landmarks and current issues in discrimination law.

850 Supreme Court (3) History of Supreme Court and of procedures by which Court arrives at decisions; influence of justices' ideology and role of Court in political system.

854 Investigatory Criminal Procedure (3) Police practices and constitutional rights of persons charged with crimes: arrest; search and seizure; identification; interrogation; and rights against self-incrimination; electronic eavesdropping; and right to counsel.

855 Adjudicatory Criminal Procedure (3) Pre and post-trial procedures in criminal case: bail; preliminary hearing; grand jury; prosecutorial discretion; discovery and pretrial conference; plea bargaining; jury trial; and double jeopardy. Federal Rules of Criminal Procedure.

859 Criminal Law Seminar (2) Advanced problems in criminal law and administration of justice. Prereq: 809.

862 Family Law (3) Survey of laws affecting formal and informal family relationships: premarital disputes; ante-nuptial contracts; creation of common law and formal marriage; legal effects of marriage; support obligations within family; legal separation, annulment, divorce, alimony, and property settlements; child custody and child support; abortion; illegitimacy.

863 Children and the Law (3) Legal relationships between children, families and state; juvenile justice; foster care; adoption; educational issues: special education; child abuse and neglect; health care and income maintenance; advocacy for children and families.

866 Environmental Law and Policy (3) Study, through methods of public policy analysis, of responses of U.S. federal and state environmental regulatory systems; environmental litigation; Clean Air Act; Clean Water Act; National Environmental Policy Act; and selected regulatory issues.

867 Environmental Law Seminar (2) Selected topics in environmental law.

873 American Legal History (3) Selected topics in American legal history.

877 Jurisprudence (3) Critical or comparative examination of legal theories, concepts, and problems: legal
positivism; natural law theory; legal realism; idealism; historical jurisprudence; utilitarianism; Kantianism; sociological jurisprudence; policy science; and critical studies.

679 Law and Economics (3) The relationship between legal and economic theories and the application of basic economic concepts to legal problems; economics in legal decisionmaking; scholarly support for and criticism of legal-economic analysis of law. Designed for students with no undergraduate background in economics or mathematics.

881 Law and Literature (3) Reading literary works, development of philosophy and reading technique applicable to both law and life.

886 Public International Law (2) Law creating processes and doctrines, principles and rules of law that regulate mutual behavior of states and other entities in international system.

887 International Business Transactions (2-3) Doing business with foreign persons and in foreign countries; acquisition and use of property within foreign country; regulation of international business transactions by international organizations and foreign governments; analysis of international conventions and laws of foreign countries affecting business and comparison of those conventions and laws with United States law.

895 Labor Relations Law (3) Policy, economic and social influences in development of federal labor relations laws; employees rights of self-organization; union and employer unfair labor practices; strikes, lockouts, boycotts and collective bargaining processes; enforcement of collective agreements; individual rights of employees; federal preemption and state regulation.

896 Employment Law (3) Legal regulation of employment relationships: legal, social and economic influences in employee-employer relationship; employment discrimination; legally prescribed minimum standards of employment safety and health. Limited enrollment. Prerequisite: 920.

898 Arbitration Seminar (2) Arbitration agreements; judicial and legislative developments of law in arbitration; enforcement of arbitration agreements; role of lawyers and arbitrators. Limited enrollment. Prerequisite: 895.

899 Labor Relations Seminar (2) Selected labor relations law problems. Prerequisite: 895.

905 Advocacy Clinic (6) Supervised fieldwork requiring students to assume substantial responsibility for representing clients with various civil and criminal legal problems. Exploration and development of fundamental legal and advocacy strategies; study of pre-adjudicatory practice: interviewing and counseling clients, negotiating with other attorneys, planning for transactions and dispute resolutions, initiating and defending claims, conducting factual investigations, and presenting evidence. Prerequisite: 920 and third-year standing. May not receive credit for both 905 and 946 or both 905 and 947.

908 Mediation Clinic (3) Mediation process, theory, strategy, tactics and skills through readings, simulations, and service as mediators in general sessions court and other settings; mediation ethics, relationship of mediation to other dispute-resolution methods, roles of attorneys in mediation, and writing of mediation agreements.

915 Conflict of Laws (3) Jurisdiction, foreign judgments, and conflict of laws.

916 Federal Courts (3) Jurisdiction of federal courts; doctrine of separation of powers; conflicts between federal and state courts.

918 Remedies (3) Judicial remedies; damages, restitution, and equitable relief; availability, limitations and measurement of various remedies; comparison of contract, tort and property-related remedies.

920 Trial Practice (3) Litigation through simulation, trial procedure, roles of attorney and witness, professional responsibility; fact investigation and witness preparation; discovery and presentation of evidence; selection and instruction of jurors; opening and closing arguments. Written work: pleadings, motions, interrogatories or memoranda. Coreq: 813 for students electing concentration in advocacy. Prereq: 813 for all other students and either 920 or 930, and consent of instructor. May not receive credit for both 815 and 905.

921 Pro-Trial Litigation (3) Civil pre-trial process. Drafting of actual pre-trial documents in civil cases; complaint, motions for preliminary injunction, class certification papers, case summary; preparation for and summary judgment, and various discovery papers.

922 Advanced Trial Advocacy (3) Study and development of trial skills: trial preparation, advanced direct and cross-examination, expert witnesses, jury selection, jury instructions, technology in courtroom, and motion practice. Prerequisite: 920.

927 Interviewing, Counseling and Negotiation (3) Development of conceptual and practical frameworks for understanding interviewing, counseling and negotiating. Historical and contemporary developments of different methods, strategies and perspectives from recent literature involving lawyering skills. Simulations and videotape critique and analysis of documents, legal ethics and techniques of dispute resolution. Not open to students who have taken 904 or 906.

928 Case Development and Resolution (4) Theory and development of skills for case development and management; interview techniques, and fact investigation. Ways of resolving disputes without litigation. Not open to students who have taken 927.

935 Gratuitous Transfers (3) Gifts; will substitutes; nature, creation, termination and modification of trusts; intestate succession; estate administration; probate and contest of wills; statutory protections against disinheritance; and introduction to powers of appointment, living trusts, professional trustee, and attorney and planning for disability and death.

937 Estate Planning Seminar (2) Estate planning problems; relationship to estate planning of law and practice of fiduciary administration, insurance, property, wills, trusts, and probate procedures. Prerequisite: 920. May not receive credit for both 937 and 938.


941 Land Acquisition and Development Seminar (2) Simulated representation of various parties: sellers, buyers, construction lenders, permanent lenders, architects, contractors, subcontractors and consultants; valuation and financial feasibility of real estate project; negotiation and drafting of documents essential in large commercial development. Prerequisite: 940.

943 Land Use Law (3) Private land use controls: nuisance, easements, real covenants, equitable servitudes, and the acquisition, use and control of property; zoning, subdivision controls, eminent domain, and regulatory takings.

946 Business Law Clinic (6) Supervised fieldwork requiring students to assume substantial responsibility for representing clients with various business and transactional matters. Exploration and development of fundamental professional skills involved in practicing business and transactional law. Limited enrollment. Prerequisite: 943. May not receive credit for both 946 and 905.
tracts; insurable interest requirement; conditions, warranties and representations; coverage and exclusions; duties of agents; excess liability; subrogation; and bad faith actions against insurers. Liability insurance defense problems: duty to defend, notice and cooperation issues, and conflicts of interest.

983 Products Liability (3) Scope of doctrine and theories of recovery; potential plaintiffs and defendants; statutory and contractual limitations on recovery; damages; causation; and defenses.

985 Workers’ Compensation (3) Workers’ Compensation system for compensating victims of work-related accidents and diseases: requirements for covered employee-employer relationship; accidental injuries or occupational diseases arising out of and in course of employment; causation; nature of medical, disability, and death benefits; exclusiveness of compensation remedy against employer and co-employees; and rights and liabilities of non-employers; administrative and procedural aspects of Workers’ Compensation practice; and various law reform measures.

990 Issues in the Law (3) Selected topics. May be repeated.

991 Issues in the Law Seminar (2) Selected topics. May be repeated.

993 Directed Research (1-2) Independent research and writing under direct supervision of faculty member. Proposals must be approved by supervising faculty member or the Dean’s designee. Maximum of once each semester during last two years of study. Prereq: Second-year standing.

994 Independent Study (1-4) Independent study of selected topics. Prereq: Second-year standing. May be repeated. S/NC only. (Will not count toward total number of elective upper division courses taken separately and has unique admissions committee. Deficiencies will be corrected during the first year.

Required courses are Life Sciences 510; Botany 521, 522; Biochemistry and Cellular and Molecular Biology 511, 512; Plant Sciences and Landscape Systems 471 or Ecology and Evolutionary Biology 560; Microbiology 410. The master's degree requires a minimum of 30 semester hours of study approved by the student's committee, a thesis, and an oral examination. The minimum requirements for the doctoral degree include at least 8 hours above the 600 level, 24 semester hours of course 600, 12 courses approved by the student's committee, a comprehensive examination, a doctoral dissertation, and a defense of dissertation.

500 Thesis (1-15) P/NP 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.

503 Graduate Research Participation (3-12) Special advanced research project not related to dissertation research. Topics chosen with consent of instructor. May be repeated. 3 hours minimum.

505 Research Rotation (2) Laboratory rotations with faculty member on clearly defined projects. Written proposal and oral report. May be repeated. Maximum 6 hrs.

506 Computational Biology and Genome Informatics (3) Computational basis of nucleotide protein sequence alignment; pairwise sequence comparison, multiple sequence alignments; gene and species trees. Genome annotation and feature finding. Computational protein structure analysis; threading homology models, ab initio methods. Prereq: Computer Science 140 Data Structures or consent of instructor.

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.

Life Sciences (College of Arts and Sciences)

MAJOR

DEGREES

Life Sciences ......................... M.S., Ph.D.

Ottó J. Schwarz, Chair

The program leading to the M.S. and Ph.D. degrees in Life Sciences is interdisciplinary and intercollegiate and is designed to augment offerings of individual departments in two concentrations: genome science and technology and computational biology and computational biology. Students interested in these areas should contact either the Life Sciences chairperson or the director of the area of interest. Each concentration is administered separately and has unique admission requirements.

CONCENTRATIONS

Genome Science and Technology

Jeffrey Becker, Director

The University of Tennessee-Oak Ridge National Laboratory Graduate School of Genome Science and Technology (GST) is a unique and multidisciplinary program for full time graduate study leading to the M.S. or Ph.D. degree. The program focuses on developments in the biological and computational sciences relating to genome sequences, and is designed to take advantage of collaboration of The University of Tennessee and the Oak Ridge National Laboratory. Students are trained in emerging areas of genome science, with emphasis on mammalian genomics, structural biology, proteomics, computational biology and bioinformatic, and bioanalytical technologies. Scientists from both campuses participate in teaching. Research projects pursued for either the M.S. or Ph.D. degrees are mentored jointly by a faculty member from each campus. A year-long introductory course in Genome Science and Technology focuses on inquiry conducted on a genome-wide scale. Laboratory rotations during the first year offer students hands-on experience in a variety of focus areas.

Applicants are expected to have a background in the biological, physical, or computational sciences. Requirements for admission are one year of general biology or the equivalent; two years of chemistry, including one year of general chemistry and one year of introductory organic chemistry with laboratory; one year of calculus; one year of physics; at least eight semester hours in cognate sciences related to the program; a combined GRE score of 1800 for the verbal, quantitative, and analytical sections is highly desirable; three letters of recommendation; and a minimum grade point average of 3.0 out of 4.0. Coursework in genetics, cell biology and computer sciences is advantageous. Superior students, deficient in one or more of the above requirements, may be admitted at the discretion of the program admissions committee. Deficiencies will be made up as a part of the courses taken by the individual student.

Requirements for the Ph.D. degree are satisfactory completion of the genome science and technology core courses, (Life Sciences 505, 515-16, 520-21, 540-41; Biochemistry and Cellular and Molecular Biology 511 and 512); three semesters of GST laboratory, satisfactory completion of formal advanced courses in the areas of the student's interest, passing both written and oral comprehensive examinations, a disserta-
515-16 Introduction to Genome Science and Technology I, II (1,1) 515—Introduction to research in genome science and technology concentration. 516—Science and ethics of practice of science. S/NC only.

520-21 Genome Science and Technology I, II (4,4) 520—Overview of genomics, advanced genetics principles, computational biology and bioinformatics. 521—Computational biology and informatics, analytical technologies and special techniques.

540-41 Colloquium (1,1) Invited speakers. Topics announced in advance. Required every semester in residence after first year. May be repeated. Maximum 6 hrs.

550 Mammalian Genetics and Genomics (3) Genetic variation, inheritance, phenotypic traits, molecular genetics and genomics, mutation in laboratory rodents and other mammals. Prereq: 520-21.

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

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

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

595-96 Special Topics in Genome Science and Technology (1-3) Tutorials or lectures on variety of special topics to be chosen by instructor. May be repeated. Maximum 4 hrs.

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

610 Advanced Topics in Life Sciences (1-3) Topics vary. May be repeated. Maximum 6 hrs.

615-16 Introduction to Genome Science and Technology I, II (1,1) Topics in instruction, organizational structure configurations, organizational effectiveness and design of complex organizations.

613 Seminar in Strategic Management III (3) Analysis of concepts and research in strategic management.

614 Seminar in Strategic Management IV (3) Analysis of concepts and research in strategic management.

615 Seminar in Strategic Management V (3) Analysis of concepts and research in strategic management.

593 Directed Independent Study (1-3) Topic of mutual interest. Available only by prearrangement with supervising faculty member. May be repeated. Maximum 6 hrs. S/NC or letter grade.

595 Selected Topics in Current Management Issues (3) In-depth consideration of current issues. Managerial impact of emerging topics. Prereq: Consent of instructor.

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

610 Seminar in Advanced Organization Theory (3) Analysis of functioning of complex organizations. Classical and open systems models, organization growth and change, organizational effectiveness and design of complex organizations.

611 Seminar in Strategic Management I (3) Analysis of concepts and research in strategic management.

612 Seminar in Strategic Management II (3) Analysis of concepts and research in strategic management.

613 Seminar in Strategic Management III (3) Review and analysis of important books and monographs in strategic management. Understanding evolution of thought and emergence of distinct paradigms.

Logistics

See Marketing, Logistics and Transportation

Management

(College of Business Administration)

MAJOR DEGREES

Business Administration ………….. MBA, Ph.D.

Oscar Fowler, Head

Professors:

Gilbert, Kenneth C., Ph.D. ……….. Tennessee
James, Lawrence R. (Pilot Chair of Excellence), Ph.D. ………….. Utah
Judge, William Q. , Ph.D. ………….. North Carolina
Ladd, Robert T., Ph.D. ………….. Georgia
Miller, Alex (W. B. Stokely Professor), Ph.D. ………….. Washington
Neel, C. Warren, Ph.D. ………….. Alabama
Noon, Charles E., Ph.D. ………….. Michigan
Rentsch, J. R., Ph.D. ………….. Maryland
Rush, Michael C., Ph.D. ………….. Akron
Srinivasan, M. M. (The Ball Corporation Distinguished Professor of Business), Ph.D. ………….. Northwestern
Stahl, Michael J. (Distinguished Professor of Management), Ph.D. ………….. Rensselaer
Wehr, D. J., Ph.D. ………….. Georgia Tech

Associate Professors:

Bowers, Melissa R., Ph.D. ………….. Clemson

Edirisinghe, Chanaka P., Ph.D. ………….. British Columbia
Elenkov, Detelina S., Ph.D. ………….. MIT
Fowler, Oscar S., Ph.D. ………….. Georgia
Haley, Usha C. V., Ph.D. ………….. New York

Assistant Professor:

Smith, Anne D., Ph.D. ………….. North Carolina

BUSINESS ADMINISTRATION CONCENTRATIONS

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

MBA Concentration:

Operations Management.

Minimum course requirements: 540, 541, and one course from the following: Management Science 526, 551, Statistics 566, Industrial Engineering 522, 526, or any applicable course approved by designated faculty.

Ph.D. Concentration:

Management.

Minimum course requirements are: For operations management—541 and 542; two semesters of 640 (may be repeated for credit); one additional semester of approved doctoral seminar work. For strategic management—610, 611, 612, 613.

MINOR IN ENVIRONMENTAL POLICY

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

GRADUATE COURSES

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

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.

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 Human Resource Management (3) Personnel functions and human resources management. Community relations, recruiting, selection, training, performance evaluation, wage and salary administration, legal framework as it affects personnel.

531 Management of Technology-Based Organizations (3) Role of technology and innovation in formulation and implementation of strategy. Management of research and development function and coordination with other functions. Management of scientists and engineers.

540 Logistics and Operations Management (3) Analysis of methods and models for understanding supply chain flows and processes. Introduction to management strategies and techniques applicable to design of systems in logistics and operations processes. Prereq: Business Administration 511, 512, and 513 or consent of instructor. (Same as Logistics and Transportation 510.)

541 Operations Management (3) Techniques applicable to design of systems in operations planning and control in manufacturing and service industries. Modeling real-world systems through problem definition, supporting data structure design, model design, solution, implementation, and maintenance.

551 Management of New Ventures (3) Integration of various functional disciplines and their application to general management of ventures formed both within larger corporations and independently. Preparation of a venture plan, case analysis.

571 International Management (3) Analysis of environment of international business firms and impact of internal and external factors on managerial decisions.

581 Environmental Management (3) Managerial frameworks for addressing environmental issues. Most pressing environmental challenges; options compatible with sustained business performances. Cases, field projects, research papers.

593 Directed Independent Study (1-3) Topic of mutual interest. Available only by prearrangement with supervising faculty member. May be repeated. Maximum 6 hrs. S/NC or letter grade.

595 Selected Topics in Current Management Issues (3) In-depth consideration of current issues. Managerial impact of emerging topics. Prereq: Consent of instructor.

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

610 Seminar in Advanced Organization Theory (3) Analysis of functioning of complex organizations. Classical and open systems models, organization growth and change, organizational effectiveness and design of complex organizations.

611 Seminar in Strategic Management I (3) Analysis of concepts and research in strategic management.

612 Seminar in Strategic Management II (3) Analysis of concepts and research in strategic management.

613 Seminar in Strategic Management III (3) Review and analysis of important books and monographs in strategic management. Understanding evolution of thought and emergence of distinct paradigms.

Management Science

(College of Business Administration)

MAJORS DEGREES

Management Science ………….. M.S., Ph.D.

Kenneth C. Gilbert, Chairperson

Committee:

Bowers, Melissa R., Management
Bozdogan, Hamparsum, Statistics
Edirisinghe, Chanaka P., Management
Fowler, Oscar S., Management
Gilbert, Kenneth C., Management
Leitmaker, Mary G., Statistics
Noon, Charles E., Management
Ralston, Bruce A., Geography
Srinivasan, Mandym 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 theoretical and applied aspects of quantitative techniques and their application to managerial decision making. In addition to the development of sufficient mathematical maturity for creative use of quantitative skills, the program requires concentrated study in a supporting area.

Supporting areas are available in other departments of the College of Business Administration as well as in computer science, public administration, geography, health, and other areas, subject to approval by the Management Science Committee.

Admission Requirements
The Master's program requires three applicant recommendation forms and the GRE or GMAT. Applications are encouraged from all majors, but a mathematics background equivalent to the completion of at least two years of college calculus and proficiency in a computer language is required. The program is designed to be completed in four semesters by full-time students. However, students may start the program in any semester and may pursue an M.S. degree program in Management Science on a part-time basis.

Course Requirements Hours
Core Requirements 16
Management Science 531, 532, 533, 534, and 691 or 692
Statistics 563
Applied specialization area (approved by advisor) 9
Technical elective: 6
Statistics (500 level or above as approved by advisor)
Mathematics (400 level or above as approved by advisor)
Industrial Engineering (400 level or above as approved by advisor)
Other elective (as approved by advisor)
Electives selected from mathematics, statistics, computer science, business, management science, industrial engineering, or other approved area
Total 40

A thesis option is available to qualified students. The Management Science Committee will work closely with the student in tailoring a program to his/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. The candidate may choose from the business functional areas (accounting, finance, marketing, management, and transportation and logistics) or other disciplines, (e.g., computer science, forestry, ecology, and public administration);
3. to develop in the student, through coursework in mathematics, statistics and computer science, a high degree of mathematical maturity to enhance a potential career in management, research, or teaching.

Admission Requirements
The doctoral program requires three applicant recommendation forms and the GRE or GMAT, in addition to the Graduate Council's requirements.

Coursework
A minimum of 48 semester hours of coursework taken for graduate credit (exclusive of thesis or dissertation) is required. Some of this may be the coursework from a master's program although a master's is not a prerequisite for the doctorate. The candidate must complete a minimum of 24 semester hours at The University of Tennessee, at least 6 of which must be at the 600 level. Both of these requirements are also exclusive of thesis or dissertation credits.

Entering students who have completed graduate studies in applicable fields will be granted course credits for work which is equivalent to required courses in the program. The program includes approximately 16 to 20 semester hours of coursework in the applied area.

Qualifying Examinations
The student must demonstrate mastery of probability theory and statistical inference, Statistics 563, 564, by passing a written qualifying examination. Mastery of 12 to 14 semester hours in mathematics coursework must be demonstrated by passing a written qualifying examination. Topics normally include numerical analysis, either Mathematics 471, 472, 453, and 571, or 571-572, and real analysis, Mathematics 445-446. Other options may be approved. In exceptional circumstances, the faculty will consider waiving the mathematics and/or statistics qualifying examinations.

These requirements generally are completed by the end of the first year of the program.

There is no foreign language requirement.

Comprehensive Examination
Prior to admission to candidacy for the degree, and normally after completion of the second year of the program, the student must pass a written comprehensive examination covering the theory of deterministic and stochastic management science models. Topics included in this examination are determined on an individual basis. Students will be expected to demonstrate an integrative ability that goes beyond simple mastery of course content.

Research and Dissertation
The student must complete 24 semester hours of Management Science 600: Doctoral Research and Dissertation, through which he/she is expected to make a significant contribution to the science. A final oral examination is conducted over the dissertation and such other segments of the program that the faculty committee deems appropriate. This effort, which is beyond the minimum 48 hours of coursework, normally is completed in the third year of the program.

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

PREREQUISITES FOR MANAGEMENT SCIENCE COURSES

The Management Science Program is interdisciplinary and students in other degree programs are encouraged to enroll in management science courses. Course prerequisites are designed to indicate the level at which courses are taught. Interested students whose prior coursework does not match the prerequisites are encouraged to seek the instructor's guidance and consent to enroll.

GRADUATE COURSES

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

502 Registration for Use of Facilities (1-15) Required for students 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.

526 Advanced Applications of Systems Modeling and Simulation (3) (Same as Industrial Engineering 526.)

531 Mathematical Programming (3) Linear programming solution procedures, duality, sensitivity, and parametric analysis, linear-convex, piecewise-linear, separable and integer programming, transportation linear programs. Prerequisite: Fundamentals of matrix algebra. (Same as Industrial Engineering 523.)

532 Stochastic Models in Management Science (3) Discrete-time Markov chains, Poisson processes, continuous-time Markov chains, renewal theory, and queueing theory. Prerequisite: Statistics 563 and Mathematical Analysis or consent of instructor.

533 Computational Mathematical Programming (3) Computational aspects of mathematical programming models, in particular for large systems. Prerequisite: 531 and proficiency in computer language.

534 Management Science Methods in Business (3) Application of methods from 531, 532, and 533 to real world problems in business/industry.

551 Leveraging Information Through Descriptive and Prescriptive Modeling (3) Concepts and tools
Marketing, Logistics, and Transportation

MAJOR DEGREES

Business Administration .......... MBA, Ph.D.

Robert B. Woodruff, Head

Professors:
Barnaby, D. J., Ph.D. ....... Purdue
Cadotte, E. R., Ph.D. ....... Ohio State
Davis, F. W., Jr., Ph.D. ...... Michigan State
Dicer, G. N., DBA ............ Indiana
Mentzer, J. T. (Harry J. Bruce Chair of Excellence), Ph.D. .... Michigan State
Schumann, D. W. (Taylor Professor), Ph.D. .... Missouri
Woodruff, R. B. (Liaison) (Proffitt's Professor), DBA ............ Indiana

Associate Professors:
Dabholkar, P. A., Ph.D. ........ Georgia State
Fogg, J. H., DBA .......... Indiana
Gardial, S. F., Ph.D. ........ Houston
Kahn, K. B., Ph.D. ............ Virginia Tech
Holcomb, M. C., Ph.D. ....... Tennessee
Moon, M. A., Ph.D. ........... North Carolina
Reizenstein, R. C., Ph.D. .... Cornell
Rentz, J. O., Ph.D. .......... Georgia
Rinehart, L. M., Ph.D. ....... Tennessee

Assistant Professors:
Flint, D. J., Ph.D. ......... Tennessee
Myers, M. B., Ph.D. .......... Michigan State
Ruzicka, M. E., Ph.D. ....... Arizona State

Sahin, Funda, Ph.D. ........... Texas A&M

Instructor:
Collins, Mark E., MBA Middle Tennessee State

BUSINESS ADMINISTRATION CONCENTRATIONS

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

MBA Concentration: Logistics and Transportation

Minimum course requirements for logistics and transportation—Logistics and Transportation 510, 546, and 547. For marketing—Marketing 520 and 530.

Ph.D. Concentration: Logistics and Transportation, Marketing.

Minimum course requirements for logistics and transportation—611, 612, 613, 614, and 615. For marketing—611, 612, 613, 614, 615, and 616.

Logistics and Transportation GRADUATE COURSES

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.

510 Logistics and Operations Management (3) (Same as Management 540.)

546 Logistics and Supply Chain Strategy (3) Development of strategy for logistics systems and supply chain processes. Executive-level integration of logistics strategy with marketing, production, finance, and other decision areas. Prereq: 510 and Business Administration 511, 512, 513, and 514.


593 Independent Study (3-6) Directed research and study. Prereq: Consent of instructor. May be repeated. S/NC only.

599 Special Topics Seminar (3 Topics vary: market forecasting, market segmentation, services marketing, marketing channels, and related issues. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

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

611 Theoretical Foundations (3) Theoretical foundations and frameworks common to business research. Historical and philosophy of science perspectives. (Same as Logistics and Transportation 611.)

612 Research Methods I (3) Research process: philosophical foundations, problem formulation, grounded theory, qualitative methods and analysis, measurement, sources of error, experimental design and analysis, and survey design and analysis. (Same as Logistics and Transportation 612.)

613 Supply Chain Management Thought (3) Survey of concepts and research methods of interorganizational systems. Supply chains will be studied from multiple perspectives including the following: institutional design and structure, transaction cost economics, operations and logistics cost economics, exchange behaviors and strategies, supply chain dynamics, and evaluation of supply chain performance.

614 Evolution of Logistics Thought (3) Survey of concepts, frameworks, theory, research issues, and empirical research in content areas related to logistics and supply chain management. Conceptual foundations, issue controversies, and future directions.

615 Logistics and Transportation Models (3) Analysis of contemporary models and methodologies in logistics and transportation research, topical coverage at discretion of instructor.

693 Independent Study (1-6) Directed research on subject of mutual interest to student and faculty. May be repeated. Prereq: Consent of instructor.

Marketing

Graduate Courses

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.

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.

520 Marketing and Customer Value (3) Frameworks, techniques, and processes required for customer relationship management and demand planning in organizations. Twin problems of analyzing markets and customer preferences and translating these analyses into actionable marketing strategies. Prereq: Business Administration 511, 512, and 513 or consent of instructor.

530 MBA Marketing Concentration (6) Product management, interdisciplinarity, nature of product development and product management. Strategic issues during product life cycle, from idea conception to product development to commercialization to eventual product dismissal. Integrated communications, strategies, and tactics associated with communicating value to customers. One-to-one marketing approaches, role of personal selling in communication mix, and advertising and promotions management. Global marketing management: Cross-national forces that enable firms to design and maintain competitive marketing and supply chain networks across multiple geographic locations. Prereq: 520 and Business Administration 511, 512, 513, and 514.

593 Independent Study (3) Directed research and study. Prereq: MBA Core and consent of instructor. May be repeated. Maximum 6 hrs.

599 Special Topics Seminar (3 Topics vary: market forecasting, market segmentation, services marketing, marketing channels, and related issues. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

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

611 Theoretical Foundations (3) Theoretical foundations and frameworks common to business research. Historical and philosophy of science perspectives. (Same as Logistics and Transportation 611.)

612 Research Methods I (3) Research process: philosophical foundations, problem formulation, grounded theory, qualitative methods and analysis, measurement, sources of error, experimental design and analysis, and survey design and analysis. (Same as Logistics and Transportation 612.)

613 Research Methods II (3) Examination of qualitative research theoretical foundations and methodologies. Application of qualitative research methods to theoretical research. Topics include formulating research questions, designing qualitative research studies, sampling, data generation techniques, data analysis techniques, evaluating qualitative research, and writing qualitative research reports.

614 Contemporary Marketing Thought (3) Representative topics comprising content of marketing knowledge: macro-marketing, markets, channels, and communication behavior; marketing mix tools; and ethical issues in marketing. Examination of research for contributions to advancing knowledge and opportunities for new research.
Materials Science and Engineering

(College of Engineering)

MAJORS DEGREES
Materials Science and Engineering ...... M.S., Ph.D.
Polymer Engineering ..................... M.S., Ph.D.

Raymond A. Buchanan, Interim Head

Professors:
Bhat, Gajanan S., Ph.D. .......... Georgia Tech
Benson, Roberto S., Ph.D. .......... Florida State
Bresee, Randall R., Ph.D. .......... Florida State
Buchanan, Raymond A. (Liaison), PE, Ph.D. ........................................ Vanderbilt
Collier, Billie J., Ph.D. .......... Tennessee
Dahotre, Narendra B. (UT/ORNL Joint Faculty), Ph.D. .......... Michigan State
Egami, Takeshi (UT/ORNL Distinguished Scientist), Ph.D. .......... Pennsylvania
George, Easo (UT/ORNL Joint Faculty), Ph.D. .......... Michigan State
Hansen, Marion G., Ph.D. .......... Washington
Liaw, Peter K. (Rachell Chair of Excellence), Ph.D. .......... Northwestern
Lowndes, Douglas H., Ph.D. .......... Colorado
Lundin, Carl D., Ph.D. .......... Rensselaer
McHargue, Carl J. (Director, Center for Materials Processing), Ph.D. .......... Kentucky
Pedraza, Anthony J., Ph.D. .......... La Plata (Argentina)
Pharr, George M. (UT/ORNL Joint Faculty), PE, Ph.D. .......... Stanford
Phillips, Paul J., Ph.D. .......... Liverpool (UK)
Simpson, Michael L. (UT/ORNL Joint Faculty), Ph.D. .......... Tennessee
Spruiell, Joseph E., Ph.D. .......... Tennessee
Wadsworth, Larry C., Ph.D. .......... North Carolina State

Associate Professor:
Meek, Thomas T., Ph.D. .......... . Ohio State

Assistant Professors:
Choo, Hahn (UT/ORNL Joint Faculty), Ph.D. .......... Illinois IT

Ph.D. .............. Chinese Academy of Sciences
Kit, Kevin, Ph.D. ................. Delaware
Rack, Philip D., Ph.D. .......... Florida
Rawn, Claudia J. (UT/ORNL Joint Faculty), Ph.D. .......... Arizona

Emeriti Faculty:
Brooks, Charlie R., Ph.D. .......... Tennessee
Fellers, J. F., Ph.D. .......... Akron
Oliver, Ben F., Ph.D. .......... Pennsylvania

Graduate programs are offered leading to the degrees of Master of Science and Doctor of Philosophy in Materials Science and Engineering or Polymer Engineering. Both the Materials Science and Engineering and Polymer Engineering programs are flexible and interdisciplinary in nature. Students may be admitted from a wide range of disciplines; these include physics, chemistry, chemical engineering, mechanical engineering, electrical engineering, materials engineering, and engineering science programs.

Areas of concentration within the Materials Science and Engineering degree program include metallurgy, polymers, and materials. Specializations include, but are not limited to: ceramics; composites; electronic materials; physical metallurgy; materials processing; welding metallurgy and materials joining; corrosion science and engineering; biomedical materials; and mechanical and physical behaviors of materials.

Areas of concentration within the Polymer Engineering degree program include rheology and polymer processing; polymer morphology; mechanical, physical and chemical behavior of polymers; and composite materials.

THE MASTER’S PROGRAM

Thesis Option
A total of 30 semester hours is required for the M.S. degree in either Materials Science and Engineering or Polymer Engineering. Additional requirements include:
1. A major consisting of 12 semester hours of graduate courses in materials science and engineering or polymer engineering. The materials science and engineering major must include MSE 511, 512, 540, and 541 for the materials concentration; and MSE 511, 512, 540, and 541 for the polymers concentration; and MSE 511, 512, and two graduate specialization courses approved by the student’s faculty committee for the materials concentration. The polymer engineering major must include MSE 540, 541, 543, 546, 549, and 550 unless similar material has been covered in prior coursework.
2. Additional courses up to 12 hours total in related areas.
4. Satisfactory performance on a comprehensive oral examination administered by the faculty committee.

Non-Thesis Option
Any candidate may apply for a non-thesis option. Upon acceptance, a supervisory committee of three will be appointed. At least two members of the committee will be from the faculty in the major area, either materials science and engineering or polymer engineering. The requirements for completion of the non-thesis option are as follows:
1. Completion of a total of 30 hours of graduate coursework. At least 18 of those hours must be in the department, and up to 12 hours may be in related areas. Three hours of MSE 503 or 504, Seminar, graded Satisfactory/No Credit, may be counted toward degree requirements. The materials science and engineering major and the polymer engineering major must include the same courses required for the thesis option. The candidate’s degree program must be approved by the faculty committee.
2. Satisfactory completion of a culminating experience such as MSE 580 (Critical Review).
3. Satisfactory performance on a comprehensive examination administered by the faculty committee.

THE DOCTORAL PROGRAM
After one year in residence and with the approval of the faculty, a student may proceed directly to the doctoral program without completion of a master’s degree. Departmental requirements for completion of the doctoral degree are:
1. a. For students proceeding directly to the Ph.D. from the baccalaureate degree: 48 graduate course credit hours with at least six hours of 600-level courses. Six hours of MSE 503 or 504, Seminar, graded Satisfactory/No Credit, may be counted toward degree requirements. At least 30 credit hours must be courses taught in the department. The materials science and engineering major and the polymer engineering major must include the courses required for the master’s program.
   b. For students having a master’s degree, the Ph.D. from the baccalaureate degree: 48 graduate course credit hours with at least six hours of 600-level courses. Three hours of MSE 503 or 504, Seminar, graded Satisfactory/No Credit, may be counted toward degree requirements. At least 12 credit hours must be courses in the department.
2. Students must complete at least 24 hours of dissertation credits.
3. Satisfactory performance on a comprehensive oral examination, usually given in two parts, and covering such topics as materials science and engineering, metallurgical or polymer engineering operations and processes, thermodynamics, technology, mathematics, physics, chemistry, and other related fields.
4. Active participation in graduate seminars conducted by the department. Resident students must register for the appropriate 503 or 504 every semester offered.

GRADUATE COURSES

405 Structural Characterization of Materials (4) X-ray diffraction and fluorescence; scanning and transmission electron microscopy; microanalytical techniques.
421 Mechanical Behavior of Materials II (3) Description of stress and strain; linear elastic constitutive equations, isotropic and anisotropic moduli in various materials; yield criteria; brittle fracture; crazing; plastic strain concepts; constitutive equations, forming operations and limit criteria. Prereq: Mechanical Behavior of Materials, Mechanics of Materials I, sophomore mathematics.

429 Introduction to Ceramic Matrix Composites (3) Characteristics of composites: ceramic matrix composites; magnetomechanics and materials design; overview of fabrication techniques; microstructural characterization; physical and mechanical property evaluation; current and potential applications. Prereq: Intro- duction to Materials Science and Engineering: Mechanics of Materials or equivalent and consent of instructor.

443 Polymer Processing (3) Rheological measurements; flow through tubes and slits, end effects and extrude swell; selected application, screw extrusion, injection molding; synthetic fibers, spinning methods, structure development, properties.

444 Plastics Fabrication and Design (3) Lectures, laboratories and field trips; unit operations of plastics fabrication; plastics classification; design and selection criteria; processing techniques; characterization laboratory.


472 Fundamental Principles of Composite Materials (3) Establishment of physical principles basic to design, manufacture and application of fiber reinforced composites, metals and ceramics. Prereq: 302 or equivalent.

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. Recommended for engineering science and mechanics majors.

484 Introduction to Maintenance Engineering (3) (Same as Nuclear Engineering 484, Chemical Engineering 484, Industrial Engineering 484, and Mechanical Engineering 484.)

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

502 Registration for Use of Facilities (1-15) 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. S/N/C only.

503 Graduate Seminar in Materials Science and Engineering (1) Prereq: Admission to graduate program. May be repeated. S/N/C only.

504 Graduate Seminar in Polymer Engineering (1) Prereq: Admission to graduate program. May be repeated. S/N/C only.

505 Engineering Analysis (3) (Same as Chemical Engineering 505.)

507 Application of Linear Algebra in Engineering Systems (3) (Same as Chemical Engineering 507. Electrical and Computer Engineering 507, and Mechanical Engineering 507.)

511 Fundamentals of Materials Science and Engineering I (3) Chemical bonding, structures, defects, scattering, diffusion, phase diagrams, microstructures, and phase transformations.

512 Fundamentals of Materials Science and Engineering II (3) Physical properties: electrical and thermal conduction, elementary quantum physics, band theory, dielectric materials, magnetic and optical properties. Mechanical behavior: stress and strain at a point, elastic constitutive equations, phenomenological bulk behavior, and deformation mechanisms.


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 ordering, and solid solution alloying; polycrystalline behavior in terms of single crystal deformation mechanisms; texture formation. Prereq: 301, 320 or consent of instructor.

524 Metallurgical Thermodynamics (3) Applications of chemical thermodynamics to metallurgical problems: refining, oxidation, surface treatments, alloy systems. Prereq: 570 or equivalent.

525-26 Welding Metallurgy (3,3) Welding processes; solidification of welds; phase transformations; heat flow; residual stresses; theories of hot cracking, cold cracking and porosity formation; application to process selection. Prereq: 524 or equivalent.

526 Ceramic Matrix Composites: Material and Me- chanics (3) (Same as Engineering Science 526.)

531 Advanced Corrosion (3) Analyses of corrosion processes in terms of polarization measurements and Pourbaix diagram. Influence of environmental and mechanical factors contributing to pitting, crevice, fretting, wear, fatigue and stress corrosion. Prereq: 470 or consent of instructor.


540 Basic Polymer Chemistry (3) Synthesis, reactions, degradation, and modification of polymers. Molecular character- ization; solution methods and spectroscopy. Prereq: Semester of organic chemistry and thermodynamics or equivalent.

541 Polymer Rheology (3) Deformation and flow of polymeric materials. Development of empirical models, linear viscoelasticity and finite strain constitutive equations; material functions, temperature depen- dence and rheometry with applications to synthesis and processing. Elementary kinetic theory of elastic dumbbell suspensions. Prereq: Chemical Engineer- ing 240 Fluid Flow and Heat Transfer or equivalent. (Same as Chemical Engineering 541.)

542 Further Topics in Polymer Processing (3) De- scription and analysis of selected polymer processing operations. Prereq: 541.


544 Polymer Solution Thermodynamics and Char- acterization (3) Theories of solutions, statistical thermodynamics. Characterization, treatment of chro- matograms, viscosities, osmotic pressures. Prereq: Undergraduate physical chemistry.

546 Mechanical Properties of Solid Polymers (3) Types of mechanical behavior; Hookean and rubber elasticity; plastic deformation; fracture; linear viscoelasticity, dynamic mechanical behavior and test- ing; loss tangent; experimental methods. Introduction to mechanical properties of polymeric composites.

549-50 Laboratory Methods in Polymer Engineering (1,2) Basic experimental techniques and instrumenta- tion associated with characterization, x-ray and light scattering, calorimetry, rheometry, mechanical prop- erties of solid polymers, polymer processing opera- tions. Coreq: 540 or consent of instructor. 549-S/NC only.

552 Fiber Science (3) Physical properties, mechani- cal properties and microstructure of polymeric fibers, relation to end-use properties. Prereq: Organic Chem- istry and Thermal Physics or equivalent.

553 Nonwovens Science and Technology I (3) Non- woven fabric technology; different web forming process- es and relationships to end-use properties of fibrous products. Prereq: 553 or equivalent.

555 Laboratory Methods in Nonwovens Process- ing and Characterization (3) Laboratory experience in nonwovens fabrication processes and character- ization techniques. Effect of processing conditions on structure development and properties of different types of webs. Prereq: 552 and 553.

560 Principles of Ceramic Processing (3) Treat- ment of ceramic processing; raw materials prepara- tion and characterization; powder consolidation; dry- ing, firing, sintering techniques, mechanisms and ki- netics. Prereq: 360 or equivalent.

570 Optical Microscopy (4) Basic compound and polarizing microscopy for imaging. Optical property measurements, and structure elucidation. Other meth- ods of optical microscopy. Prereq: Fundamentals of Physics: Wave Motion, Optics and Modern Physics or equivalent. 3 hrs and 2 labs.

572 X-Ray Diffraction (3) Symmetry of crystals, space group theory, reciprocal lattice and application to defi- nition of structures; powder and single crystal x-ray techniques; introduction to crystal structure determi- nation; characterization of orientation; application to inorganic, metallic and polymer structures.


576 Special Topics in Materials Science and Engi- neering (3) Topics of current significance and inter- est. Prereq: Consent of instructor. May be repeated.


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

621-22 Theoretical Metallurgy (3,3) Topics in solid state physics as applied to metallurgy; introduction to quantum theory, specific heats, electron theory of solids, electrical and thermal conductivity, magnetic properties, theories of alloy formation. Prereq: Consent of instructor.

623 Solidification and Crystal Growth (3) Theories of solidification, solid and liquid flow effects, magnetore- dynamics of incompressible fluids, growth stability theory, thermodynamic applications, rapid solidification theory, metastability. Prereq: Consent of instructor.

625 Materials Lifetime Science and Engineering I (4) Fundamentals of aqueous and high-temperature corrosion and fatigue; methods of materials lifetime modeling. Prereq: 531 and 532, or consent of instructor.
626 Materials Lifetime Science and Engineering II
(3) Interactions between corrosion and fatigue at ambient and high temperatures; lifetime modeling of materials simultaneously subjected to corrosion and fatigue. Prereq: 625.

627 Case Studies in Materials Lifetime Science and Engineering (3) Studies of, and participation in, industrial analyses of lifetimes of structural materials subjected to aqueous corrosion/fatigue and high-temperature oxidation/fatigue, performed as part of the student’s industrial and national-laboratory internship programs. Prereq: 531 and 532, or consent of instructor.

628 Graduate Seminar in Materials Lifetime Science and Engineering (1) Seminars by students, faculty, and visiting scholars on materials lifetime science and engineering; processes, mechanisms, and materials lifetime modeling. Prereq: 531 and 532, or consent of instructor. S/NC only.

630 Thin Film Materials Processing (3) Students learn materials issues and thin film processing techniques used to manufacture semiconductor devices. Topics include basic vacuum technology, plasma physics, sputtering, evaporation (resistive, electron beam, laser ablation), chemical vapor deposition, and etching. The mechanisms of each process are explained, and relevant material chemistries are discussed. Thin film growth models are also explained and processing variables are related to material properties. Prereq: Permission 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 polymeric glasses; crystallization of polymers; nucleation, growth and morphology; secondary nucleation theory; solidification of copolymers; crystalization under stress. Prereq: 543.

644 Optoelectronic Processes in Polymeric Materials (3) This course introduces fundamental molecular orbitals and the theory of electronic and optical processes in polymeric materials. Application to polymer processing devices, and 3) applications of optical and electronic properties to polymer characterization. The focus is to understand electron related processes and opto-electronic characterizations of polymeric materials and devices. The fundamentals of laser spectroscopy are also explained in determining structure property relationships in polymer research. Prereq: 543 or equivalent, and permission of instructor.

672 Introduction to Transmission EM and Electron Diffraction (3) Fundamentals of electron scattering, reciprocal space, the Ewald Sphere construction. Basic electron optics, operation of the transmission electron microscope (includes sample preparation and sample preparation). Kinetichal theory of imaging of perfect and imperfect crystals in the TEM. Problems with the kinematic theory, introduction to the dynamical theory of TEM imaging. The effect of inelastic scattering in the TEM. Fundamentals of analytical electron microscopy, The Transmission Scanning Electron Microscope (STEM) and its relation to the TEM. Prereq: Either 405, 511, or 572; and permission of instructor.

673 Introduction to Scanned Probe Microscopies (3) A survey of techniques for surface imaging and characterization. Young’s Topogapher, field emission, and the beginning of scanning tunneling microscopy (STM). Scanning microscopy (STM). Image resolution and interpretation in the STM, analytical STM imaging. The theory and control of feedback loops in SPM. The generalized Scanning Probe Microscope (SPM) and the Atomic Force Microscope (AFM). Theory of operation of AFM, limits to resolution, and image interpretation (includes laboratory session). Important variants of the SPM including scanning capacitance, scanning near field optical, and scanning thermal microscopy. Technical trilogy of nanoscale structures. Prereq: Permission of the instructor.

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.

Mathematics

(College of Arts and Sciences)

MAJOR

DEGREES

Mathematics ................................. M.M., M.S., Ph.D.

John B. Conway, Head

Professors:
Alexiades, V., Ph.D. ......................... Delaware
Anderson, D. F., Ph.D. ...................... Chicago
Conway, J. B., Ph.D. ......................... Louisiana State
Daverman, Robert J., Ph.D. .............. Wisconsin
Dobb, D. E., Ph.D. ......................... Cornell
Dyadk, J., Ph.D. ............................. Warsaw
Gavrilets, Sergey, Ph.D. .................. Moscow State
Gross, L. J., Ph.D. ......................... Cornell
Hinton, D. B., Ph.D. ....................... Tennessee
Jordan, G. Samuel, Ph.D. ............... Wisconsin
Karakashian, O., Ph.D. .................... Harvard
Kupersmidt, B. A. (UTSI), Ph.D. ........ MIT
Lenhart, S., Ph.D. ......................... Kentucky
Muly, S., Ph.D. ............................... Purdue
Plaut, Conrad, Ph.D. ..................... Maryland
Rajput, B. S., Ph.D. ....................... Illinois
Reddy, K. C. (UTSI), Ph.D. ............. Indian IT
Richter, Stefan, Ph.D. ..................... Michigan
Rosinski, J., Ph.D. ......................... Wroclaw
Schaefer, P. W., Ph.D. ................... Maryland
Simon, H., Ph.D. ......................... Cal Tech
Soni, R. P., Ph.D. ......................... Oregon State
Stephenson, K. R., Ph.D. ............... Wisconsin
Sundberg, C., Ph.D. ....................... Wisconsin
Thistlethwaite, M. B., Ph.D. .......... Manchester
Wade, W. R., Ph.D. ...................... California (Riverside)
Wagner, C. G., Ph.D. ..................... Duke

Associate Professors:
Collins, Charles R., Ph.D. .......... Minnesota
Feng, Xiaobing, Ph.D. ................. Purdue
Freire, A., Ph.D. ......................... Princeton
Guan, Bo, Ph.D. ......................... Massachusetts
Kimble, K. R. (UTSI), Ph.D. ........... Ohio State
Kub, Y., Ph.D. ............................. Cincinnati
Schulze, Timothy, Ph.D. .............. Northwestern
Xiong, Jie, Ph.D. ....................... North Carolina

Assistant Professors:
Chen, Xia, Ph.D. ......................... Case Western
Davis, Reid, Ph.D. ....................... Tennessee
Denzler, Jochen, Ph.D. ............... ETH Zurich
Dwyer, Jerry, Ph.D. ..................... Ireland
Gleason, Jim A. ........................ Nevada
Ph. D. ....................... California (Santa Barbara)
Kachi, Yasuyuki, Ph.D. .............. Tokyo

Matthews, Gretchen, Ph.D. ........ Louisiana State
Todorova, Grozdena, Ph.D. .......... Moscow State
Tzermias, Pavlos, Ph.D. .............. California

Emeriti Faculty:
Bradley, John S. ......................... Iowa
Carruth, J. H., Ph.D. .................... Louisiana State
Clark, C. E., Ph.D. ...................... Louisiana State
Frandsen, Henry, Ph.D. .............. Illinois
Husch, L. S., Ph.D. .................... Florida State
Serbin, Steve, Ph.D. .................... Cornell
Soni, K., Ph.D. ......................... Oregon State

The Mathematics Department has three graduate degrees: (1) the Master of Mathematics degree, intended primarily for teachers, (2) the Master of Science degree, designed to prepare students for industrial employment and for teaching, and (3) the Doctor of Philosophy degree, designed to prepare students for industrial employment and for college and university teaching and research. Contact the department office for additional information.

A student offering mathematics as a minor for the master’s degree is required to obtain at least 6 hours of resident graduate credit in courses numbered above 400 and approved by both the major department and the Department of Mathematics.

For additional information, please visit the graduate web site on the Department of Mathematics’ homepage at www.math.utk.edu.

THE MASTER OF MATHEMATICS PROGRAM

Before admission to the Master of Mathematics program, the applicant must have either (a) certification for teaching secondary mathematics in at least one state, or (b) three years of elementary school, secondary school, or community college teaching experience. Applicants must have successfully completed one year of calculus (141-142 or equivalent) and a course in matrix algebra (251 or equivalent).

The following requirements must be met:
1. Complete 30 hours of coursework of which 21 must be at the 500 level. The coursework must include 504, 505, 506, 507, and 6 hours in 509. At most, 6 hours may be taken outside the Department of Mathematics (selected in consultation with the advisor).
2. Pass a final examination upon completion of all coursework.

In exceptional circumstances, part of admission requirement (b) might be satisfied concurrently with coursework. Normally Master of Mathematics degree students will start the program by taking 504 during the summer.

THE MASTER OF SCIENCE PROGRAM

The department offers two options for the Master of Science degree. The first option requires a thesis for which 6 hours must be earned along with 24 additional hours of work in acceptable courses numbered above 400. Of the additional hours, 6 may be in an area outside the department and 15 must be in courses in mathematics numbered above 500.

After one semester of graduate study, a student whose advisory committee gives its
approval may choose the non-thesis option, for which 30 hours in courses numbered above 400 are required. Of these, 21 hours (at least 15 of which must be in mathematics) must be in courses numbered above 500. Of the 30 hours, 9 in courses approved by the advisory committee may be taken in fields other than mathematics. For this option it is 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 thesis or the non-thesis option, the student must complete the following:

1. Prerequisite courses:
   d. Matrix Algebra II 453.
   e. One hour of Seminar in Applied Mathematics 519 or Seminar in Mathematical Ecology 589.

2. One course from each of the following five areas:
   e. Statistics—Statistics 525, Stochastic Modeling 527, Statistical Methods 571 (Statistics), Biometry 560 (Ecology and Evolutionary Biology).

THE DOCTORAL PROGRAM

For the Ph.D. program in Mathematics, the student must meet the following four requirements in addition to those of the Graduate Council:

1. Satisfy either the standard program or the interdisciplinary mathematical ecology concentration. A student intending to work in mathematical ecology may complete either but is encouraged to complete the interdisciplinary mathematical ecology concentration. A student may elect to switch from one to the other provided the constraints of the latter option have not been violated. A student's status after electing such transfer is determined by the complete history of the student's earlier mathematics examinations from the standard program and the interdisciplinary mathematical ecology concentration. Descriptions of both programs are given below.

2. Demonstrate proficiency in one foreign language, normally French, German or Russian. This requirement must be met prior to the examination in the area of specialization. A student's doctoral committee may require the student to pass a second language examination.

3. Pass an examination in the field of specialization. After the requirements in 1. and 2. are completed, this examination will be given by a committee appointed by the department head. A student may take this speciality examination only twice.

4. Pass a one-year, 600-level sequence in mathematics outside the student's area of specialization. The sequences selected to fulfill this requirement must be approved by the department head and the student's doctoral committee. (Such approval may occur after completion of the sequence.)

Requirements 1-4 must be completed no later than the start of a student's seventh year (as a mathematics graduate student at UT).

Standard Program

Demonstrate knowledge in five subjects selected from the groups listed below by passing written examinations in three subjects and by earning grades of B+ or better each semester in the courses associated with two additional subjects.* The three subjects selected for written examinations must be from Groups I, II, III. At least two groups must be represented in the three written examinations. At least three groups must be represented in the five subjects.


A student's five subjects may not include both Real Analysis and Applied Linear Analysis or both Mathematical Principles of Fluid Mechanics and Mathematical Principles of Continuum Mechanics. A student may not count examinations in both Ordinary Differential Equations and Partial Differential Equations, but both may be included in a student's five subjects. With prior approval of the graduate committee, a student may utilize as a Group IV course a year-long graduate-level sequence from outside the Department of Mathematics. At most one such utilization may be made.

A student may take as many written examinations as desired at any time the examinations are given, subject to the following conditions:

a. The examinations to be taken must be approved in advance by the student's advisory committee.

b. At any one time a student may take at most only the number of examinations necessary to complete the requirements.

c. A student may take a collection of written examinations a maximum of 3 times, but no one failing 4 examinations, counting possible repetitions, will be permitted to take another examination. An exception is that a student who does not have a master's degree in mathematics and who has been enrolled in a UT graduate program in mathematics no longer than one year may take written examinations at one time during that year without having that sitting for the examinations or any incurred failure(s) count toward the limits imposed above.

d. At least two examinations must be taken and at least one must be passed before the start of a student's fourth year. Three examinations must be passed before the start of a student's fifth year.

*In lieu of earning a grade of B+ or better each semester in a sequence from Group I, II, or III, a student may demonstrate proficiency in that subject by passing the associated written examination. For this purpose, only one examination is permitted for each of up to two subjects, and this use of a written examination must be declared before the 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 outside the department, this concentration is subject to the constraints and privileges specified in the standard program, including the restrictions on related subjects, the conditions a. through d. placed on the taking of written examinations, and the option to pass a written examination in lieu of earning a grade of B+ or better each semester in a sequence from Group I, II, or III.

GRADUATE COURSES

400 History of Mathematics (3) Development of major ideas in mathematics from ancient to modern times and influence of ideas in science, technology, philosophy, art, and other areas. Writing emphasis course: at least one in-class essay examination and 3000 words of writing outside classroom. Prereq: Matrix Algebra I and Introduction to Abstract Mathematics.

401 Mathematics and Microcomputers (3) Primarily for students seeking certification as mathematics teachers at secondary level. Use of microcomputers to study concepts and problems in mathematics. Does not satisfy the major requirements for a B.S. or M.S. in mathematics. Prereq: Calculus I.

404 Applied Vector Calculus (3) Topics from 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 equations and models of biological systems. May not be counted toward graduate degree. Prereq: Calculus II or Biocalculus.


421 Combinatorics (3) Introduction to problems of construction and enumeration for discrete structures: sequences, partitions, graphs, finite fields and geometries, or experimental designs. Prereq: Probability and Statistics or consent of instructor.

423 Probability I (3) Axiomatic probability, multivariate distributions: t, F and X2; independence of sample processes. Prereq: 423. Other topics as selected by 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: I, F and χ2; independence of sample mean and variance; basic limit theorems; point and interval estimation, Bayesian estimates; statistical hypothesis, Neyman-Pearson theorem; likelihood ratio and other parametric and non-parametric tests; sufficient statistics. Prereq: Probability I or consent of instructor.


443 Complex Variables I (3) Theory of functions of complex variable: residue theory and contour integrals. Prereq: Calculus III. Recommended prereq: 300- or 400-level mathematics course.

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.

453 Matrix Algebra II (3) Matrix theory including Jordan canonical form. Prereq: Matrix Algebra I.

455-56 Abstract Algebra II (3,3) Algebraic structures: groups, rings, fields, vector spaces and linear transformations. Prereq: Matrix Algebra I and Introduction to Abstract Mathematics, or consent of instructor.

601 Mathematical Methods I (3) Continuation of Applied Vector Calculus; and hyperbolic geometry: stressing proof technique and critical reasoning. Models of Non-Euclidean geometries. Prereq: Introduction to Abstract Mathematics, or consent of instructor.

461 Topology (3) Topology of line and plane, separation properties, compactness, connectedness, continuous functions, homeomorphisms, and topological invariants. Prereq: Calculus III and Introduction to Abstract Mathematics, or consent of instructor.

471 Numerical Analysis (3) Computation, instabilities, and rounding. Interpolation and approximation by polynomials and splines; and numerical quadrature and solution of initial and boundary value problems of ordinary differential equations, stiff systems. Prereq: Numerical Algorithms I or consent of instructor. (Same as Computer Science 447.)


475 Industrial Mathematics (3) Modeling, analysis, and computation applied to scientific/technical/industrial problems. Prereq: Differential Equations I and either Computer Literacy for Mathematics or Numerical Algorithms, or consent of instructor.

490 Readings in Mathematics (1-3) Open to superior students with consent of independent study faculty advisor. Prereq: Consent of faculty mentor to supervise independent work. May be repeated. Maximum 9 hrs.

499 Seminar in Mathematics (1-3) Topics vary. Requires definition of out-of-class presentations by students. Credit hours announced for each seminar. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

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

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

504 Discrete Mathematics for Teachers (3) Mathematical logic and methods of argument, sets, functions, relations, combinatorics. Normally first graduate course 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.

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.

506 Algebra for Teachers (3) Algebraic structures: integral domains and fields and their applications to algebra of integers and polynomials. 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.

507 Probability and Statistics for Teachers (3) Probability models. Discrete random variables. Binomial, hypergeometric, and multinomial distributions. Normal distributions. Sampling theory. 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 various branches of mathematics. Prereq: Calculus III and Introduction to Abstract Mathematics, or consent of instructor.

511-12 Methods in Applied Mathematics (3,3) Fundamentals and techniques associated with discrete and continuous models of physical, engineering and biological systems: difference equations, networks and graphs, optimization, time series analysis, qualitative and quantitative properties of differential and delay-differential equations, and other topics. Coreq: 510. Prereq or coreq: 445 or 447, and 453.


515-16 Analytical Applied Mathematics (3,3) Analysis of advanced techniques in modern context for engineers, including numerical analysis and scaling, perturbation theory, variational approaches, transform theory, wave phenomena and conservation laws, stability and bifurcation, distributions, integral equations. Prereq: 446 or 448, 453, and either 511-12 or both 431 and 435.

517-18 Mathematical Methods in Physics (3,3) (Same as Physics 571-72.)

519 Seminar in Applied Mathematics (1-3) May be repeated. Maximum 12 hrs.

521-22 Enumerative Combinatorics (3,3) Sieve method, inclusion-exclusion, generating functions, and permanents. Introduction to generating functions applied to enumeration problems and discrete structures. Incidence algebras and combinatorics of partially ordered sets.


525-26 Statistics (3,3) Pertinent facts from probability theory; formulation of statistical models; sufficiency, Fisher-Neyman factorization theorem, exponential families, Bayesian models; methods of estimation and optimality theory; uniform minimum variance unbiased estimates, asymptotic efficiency and optimality; the confidence procedures and hypothesis testing; optimal tests and confidence intervals, the Neyman-Pearson lemma; uniformly most powerful tests; general linear models, estimation and tests in linear models; non-parametric models, rank methods for comparison, linear regression and independence. Robust tests; topics from decision theory. Prereq: 445-46. Recommended prereq: 425.

527 Stochastic Modeling (3) Models in probability applied to real world situations; queueing theory; branching processes; Monte Carlo simulation. Prereq: 445-46 or consent of instructor.


534 Calculus of Variations (3) Necessary conditions for extrema, Euler’s equation, broken extremals, Weierstrass-Erdman corner conditions, sufficient conditions for extrema-Legendre’s and Jacobi’s conditions, conjugate points. Multiple integrals. Prereq: 431.

535-36 Partial Differential Equations (3,3) First order equations, classification of equations and properties of elliptic, hyperbolic, and parabolic equations in several variables. Prereq: 445-46 and 231 or consent of instructor.

537-38 Mathematical Principles of Continuum Mechanics (6) Conservation principles, equations of equilibrium and motion for fluids and elastic solids, constitutive relations and stress, convery properties, bifurcation phenomena, existence theory. Prereq: 431, 435, 446 or 448, or consent of instructor.
543 Seminar in Differential Equations (1-3) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.
549 Seminar in Analysis (1-3) May be repeated. Maximum 12 hrs.
551-52 Modern Algebra (3,3) Groups, rings, modules and linear algebra, fields and Galois theory. Must be taken in sequence. Prereq: 455-56 or consent of instructor.
553 Linear Programming (3) Theory and applications. Prereq: Consent of instructor or 453 and programming ability.
555-56 Number Theory (3,3) Introduction to algebraic number theory. Prereq: 445-56 or consent of instructor.
559 Seminar in Algebra (1-3) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.
567-68 Differential Geometry (3,3) Classical differential geometry in two and higher dimensions: curves and surfaces in Euclidean space. Gauss map, curvature, Gauss-Bonnet theorem, hyperbolic geometry, Manifolds and Riemannian metrics; connections, geodesics, Jacobi curvature. Differential forms and moving frames. Prereq: 445-46 or consent of instructor.
569 Seminar in Topology (1-3) May be repeated. Maximum 12 hrs.
571-72 Numerical Mathematics (3,3) Numerical approximation of solutions of differential equations including conservation laws and hyperbolic, parabolic, and elliptic problems. Derivation, physical meaning, and implementation of schemes. Prereq: 435 or 512 or 515, Fortran or C, or consent of instructor.
579 Seminar in Numerical Mathematics (1-3) May be repeated. Maximum 12 hrs.
581-82 Mathematical Ecology (3,3) Deterministic and stochastic models of populations, communities, and ecosystems. Prereq: 431, 453 or consent of instructor. (Same as Ecology and Evolutionary Biology 581-582.)
583 Mathematical Evolutionary Theory (3) Populations genetics and evolutionary ecology. Prereq: 431, 453 or consent of instructor. (Same as Ecology and Evolutionary Biology 583.)
585 Optimal Control Theory (3) Deterministic optimal control. Examples involving calculus of variations, optimal trajectories, and engineering control problems. Introduction to stochastic control. Prereq: 431, 445-46 or consent of instructor.
589 Seminar in Mathematical Ecology (1-3) May be repeated. Maximum 12 hrs.
593 Independent Study (1-15) See College of Arts and Sciences.
598 Graduate Reading in Mathematics (1-3) Independent study with faculty guidance. Prereq: Graduate standing and consent of instructor. May be repeated. Maximum 6 hrs.
600 Doctoral Research and Dissertation (3-15) P/NP only.
619 Seminar in Applied Mathematics (1-3) May be repeated. Maximum 12 hrs.
623-24 Advanced Probability (3,3) Selected topics in modern theory of probability and stochastic processes: Ito’s calculus and stochastic differential equations, integration prediction theory, ergodic theory, probability on algebraic structures, limit theorems, geometry and probability in Banach spaces, probability methods in analysis. Prereq: 523-24 or consent of instructor. May be repeated with consent of department. Maximum 12 hrs.
629 Seminar in Combinatorics (1-3) May be repeated with consent of department. Maximum 12 hrs.
631-32 Advanced Ordinary Differential Equations (3,3) Theory of ordinary differential equations from advanced viewpoint. Topics from current literature. Subject matter varies according to interests and prepa-
rations of students. Prereq: 531-32 or consent of instructor. May be repeated with consent of department. Maximum 12 hrs.
635-36 Advanced Partial Differential Equations (3,3) Selected topics in classical and modern theoretical partial differential equations. Prereq: 541-42 or 547-48 or consent of instructor. May be repeated with consent of department. Maximum 12 hrs.
643-44 Harmonic Analysis (3,3) Fourier series and Fourier transforms on Euclidean spaces or topologi-
groups: convergence, summability, uniqueness, inversion, duality, Plancherel transform, integral transforms, Hardy-Littlewood maximal function, interpolation of operators, or Fefferman-Stein duality. Prereq: 541-42 and 543. May be repeated with consent of department. Maximum 12 hrs.
649 Seminar in Analysis (1-3) May be repeated with consent of department. Maximum 12 hrs.
651-52 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, coho-
mology and homotopy theories: duality theorems and Hurewicz isomorphism theorem. Prereq: 561-62 and 1 yr of abstract algebra, 455-56 or 551-52. May be repeated with consent of department. Maximum 12 hrs.
667-68 Advanced Differential Geometry (3,3) Se-
lected topics from Riemannian geometry and analysis on manifolds: Lie groups, metric geometry, spectrum of Laplacian, Hodge Theory, variational problems, curvature and topology of manifolds. Prereq: 567-68 or consent of instructor. May be repeated with consent of department. Maximum 12 hrs.
669 Seminar in Topology (3) May be repeated with consent of department. Maximum 12 hrs.
673 Advanced Topics in Numerical Partial Diff-
679 Seminar in Numerical Mathematics (1-3) May be repeated with consent of department. Maximum 12 hrs.
681-82 Advanced Mathematical Ecology (3,3) Se-
lected topics in theoretical and applied mathematical biology: population, community, ecosystem ecology and applied topics such as demography, ecotoxicology, epidemiology, environment, and resource management. Prereq: 581-82. May be repeated. (Same as Ecology and Evolutionary Biology 881-882.)
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. A dual M.S.-MBA degree program with a concentration in product development and manufacturing is also available with a major in Mechanical Engineering or in Engineering Science.

In Mechanical Engineering, program concentrations include dynamics, control, and robotics; energy conversion and utilization; gas dynamics; heat transfer and fluid mechanics; machine design; power generation; product development and manufacturing (MS only); propulsion; space engineering; stress analysis; and thermodynamics.

In Aerospace Engineering, program concentrations include aerodynamics and performance; energy conversion and utilization; flight and aerospace mechanics; gas dynamics; heat transfer and fluid mechanics; propulsion; space engineering; structures and stress analysis; and thermodynamics.

In Engineering Science, program concentrations include applied artificial intelligence, biomedical engineering, computational mechanics, fluid mechanics, mechanics of composite materials, solid mechanics, industrial engineering (Ph.D. only), product development and manufacturing (MS only), optics, optoelectronics engineering (UTOI only). In each of these concentrations, interdisciplinary programs are arranged to meet individual needs or interests. The flexibility and interdisciplinary aspect of the program concentrations are intended to be of particular interest to prospective students currently employed in research, development, or design activities and whose interests in continuing education (either full-time or part-time) lie at one of the interfaces between science and engineering or can best be met by interdisciplinary study in engineering. The program's course offerings and research activities are also intended to meet the needs of students who seek preparation for employment in engineering areas requiring specialization in mechanics or in related interdisciplinary studies such as bio-mechanics.

The Engineering Science program is available to qualified graduates of recognized undergraduate curricula in mechanical or aerospace engineering and to qualified graduates of other curricula who satisfy the necessary prerequisites. A program application is required in addition to the Graduate Application for Admission. 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 Application for Admission. 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 Council. In Engineering Science, the student's major professor may be selected from a department other than the Department of Mechanical, Aerospace, and Biomedical Engineering; however, at least one member of the student's graduate advisory committee must be on the faculty of the Department of Mechanical, Aerospace, and Biomedical Engineering.

THE MASTER'S PROGRAM

In Mechanical Engineering, Aerospace Engineering, and Engineering Science, two M.S. options are offered. Option I requires a thesis and is the normal program for graduate students. Option II does not require a thesis and provides graduate students, including co-op and other off-campus students, the opportunity to focus their programs in special areas through extended coursework.

Credit requirements for these two options in Mechanical Engineering and Aerospace Engineering are:

<table>
<thead>
<tr>
<th>Course Areas</th>
<th>Hours Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thesis credit</td>
<td>6 n/a</td>
</tr>
<tr>
<td>Coursework</td>
<td>24 30</td>
</tr>
</tbody>
</table>

Courses in program (500-level or above) (min.)
- Mathematics (400-level or above) 6
- 590 Selected Engineering Problems (max.) n/a 6

Total 30 30

For all program options, other 500 level engineering courses that are approved by the student's master's committee and the graduate programs committee may be substituted for the mathematics courses. All program options require participation in the departmental graduate seminars program, and passing a final examination on all work submitted for the degree. The final examinations in Option II will cover all coursework. The thesis option, Option I, requires submission and defense of a written thesis that demonstrates the ability to conduct and report an independent investigation.

DUAL M.S.-MBA PROGRAM

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

The Engineering Science program is intended to provide other engineering majors an opportunity to participate in this program with a flexible coursework plan based on their undergraduate degrees. The establishment of the dual program addresses the critical need for personnel trained in both engineering and management who can integrate an increasingly complex body of knowledge for rapid introduction of new products to the marketplace. The
objective of the dual degree program is to prepare graduates to take a leading management role in companies that must react quickly to a dynamic market where forces of competition require rapid changes in design and manufacturing and a short product development cycle.

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

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

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

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

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

Curriculum for Dual M.S.-MBA Degree – Major in Mechanical Engineering

<table>
<thead>
<tr>
<th>August - First Year</th>
<th>Fall - First Year</th>
<th>Spring</th>
<th>Fall - Second Year</th>
<th>Summer (first session)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BA 511 MBA Core I</td>
<td>BA 512 MBA Core II</td>
<td>ME 504 Product Development Process</td>
<td>ME 509 Multidisciplinary Project</td>
<td>ME 594 Culminating Integrated Project</td>
</tr>
<tr>
<td>3</td>
<td>15</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

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

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

THE DOCTORAL PROGRAM
All students must complete a minimum of 72 semester hours beyond the Bachelor's degree, exclusive of credit for the master's thesis. These shall include a minimum of 24 semester hours in Doctoral Research and Dissertation and a minimum of 48 semester hours in other courses.

In Engineering Science, 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 course(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.

Additional requirements for all students include:
1. Registration and participation in the graduate seminar in the major 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.
CERTIFICATE IN COMPUTATIONAL FLUID DYNAMICS

The College of Engineering offers a certificate program in computational fluid dynamics (CFD). The program is designed primarily for the part-time student interested in gaining dexterity in this subject by taking a course sequence through distance education. All course work is permanently archived at the COE Computational Fluid Dynamics Laboratory web site, hence available on demand on a totally flexible schedule.

The 12-hour certificate is earned by completing the three courses, ES 551, ES 552 and ES 581 (CFD Laboratory), which are extensively cross-listed among departments in the College of Engineering. The certificate is completed with one elective 3 hour course from an approved list. Those currently approved are CHE 507 and ECE 599 (Computer Fire Modeling). A wider selection of courses will be added when they become available.

The sole academic prerequisite for the certificate program is a bachelor’s degree in engineering. Applicants must meet the minimum admission requirements of the UT Graduate School and become admitted thereto.

CERTIFICATE IN MAINTENANCE AND RELIABILITY ENGINEERING

The College of Engineering offers a certificate program in maintenance and reliability engineering. The program is designed primarily for part-time students in that several of the courses are available through distance education.

The 12-credit certificate is earned by completing 483 and 484, which are cross-listed among all participating departments in the College of Engineering, plus two elective courses selected from a list of courses provided by the participating departments. Currently, the available elective courses are Industrial Engineering 516 and 591, Mechanical Engineering 534 and 599, and Nuclear Engineering 579 and 585. The selection of elective courses is determined through an advising conference with each individual student, and is based on the student’s personal interests, academic background, and work experience. Applicants must meet the minimum criteria established by the Graduate Council.

GRADUATE CREDIT FOR UNDERGRADUATE COURSES

Students majoring in Mechanical Engineering or Aerospace Engineering may not normally take one 400-level engineering course to meet their advanced degree requirements. Undergraduate courses that are required for the student’s major in Mechanical Engineering may not be taken for graduate credit by graduate students in Mechanical Engineering.

Undergraduate courses that are required for the bachelor’s degree in Aerospace Engineering may not be taken for graduate credit by graduate students in Aerospace Engineering. For students majoring in Engineering Science, 400-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, Aerospace, and Biomedical Engineering may take senior (400-level) courses in the department for graduate credit. Such students should consult with their advisors regarding prerequisites for undergraduate courses.

Aerospace Engineering

NOTE: Not all the courses listed below are available at both the UT and the UTSA campuses.

GRADUATE COURSES


429 Aerospace System Design (4) Synthesis and design of complete aerospace system. Participation in team design effort: formal presentations and design report. Prereq: 422, 425, 426.


494-95 Selected Topics in Aerospace Engineering (1-4, 4-1) Problems and topics related to development and practice in aerospace engineering. Prereq: Consent of instructor.

500 Thesis (1-15) P/NP 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.

511 Inviscid Flow (3) Kinematics and dynamics of inviscid fluids; potential flow about body, conformal mapping. Prereq: 422 or 541, Mathematics 425 or equivalent.

512 Viscous Flow (3) Derivation of fundamental equations of incompressible and compressible flow; boundary conditions for inviscid heat-conducting flow; exact solutions for Newtonian viscous flow (Navier-Stokes) equations for special cases; similarity solutions. Thermal boundary layers, stability of laminar flows, transition to turbulence, 2-D turbulent boundary layer equations. Incompressible-turbulent mean flow, and compressible boundary layer flow. Prereq: Consent of Instructor.

513 Experimental Methods in Fluid Mechanics (3) Experimental techniques with laboratory experiments; representative experiments: hot wire anemometry and turbulence measurements; flow visualization, wind tunnel tests, water table experiments, supersonic flow experiments, boundary layer measurements, laser- optical measurements. Prereq: 423 Viscid Flow or 541.

515-16 Air Vehicle Aerodynamics and Performance (3,3) Application of aerodynamics principles to air vehicles to provide estimates of performance, stability, and control characteristics for subsonic to hypersonic speeds. Relations among thrust, drag, lift and attitude; momentum theory; slender body theory; similarity rules; method of characteristics. Prereq: 422 for 512; 521 for 512.

521-22 Aerodynamics of Compressible Fluids (3,3) One-dimensional internal and external flow; waves; small perturbation theory; shock waves; numerical techniques, stability characteristics, and trajectory optimization. Prereq: 422; 515 for 516.

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 air breathing and rocket engines; space environment and space vehicle test facilities. Prereq: 521, 541 and Mechanical Engineering 522.

529 Rarefied Gasdynamics (3) Binary elastic collisions; kinetic theory; flow regimes; Boltzmann and model equations, transfer equation, gas-surface interactions; slip boundary conditions, free molecule, slip and transition flow; Monte Carlo simulation; experimental techniques; introduction to hypersonic real gas flows. Prereq: 522, Mechanical Engineering 522.

531 Magnetohydrodynamics (3) Electromagnetic field theory; chemical kinetics; thermodynamic and thermophysical properties of gas plasmas; governing equations and applications. Prereq: 422 and Mathematics 471.

532 Introduction to Turbulence (3) Macroscopic effects, analogies, statistical treatment, correlation functions, energy spectra and diffusion; application of turbulent jets and pipe flow. Prereq: 511-12.

533 Dynamics (3) (Same as Mechanical Engineering 533 and Engineering Science 533.)

534 Atmospheric Entry (3) Reentry trajectories; lift and drag during reentry; vehicle motion and stability during reentry; aerodynamic heating and heat protection systems. Prereq: 522. Recommended prereq: 512.

535 Mechanical Vibrations (3) (Same as Mechanical Engineering 534 and Engineering Science 534.)

539 Continuum Mechanics (3) (Same as Engineering Science 539 and Mechanical Engineering 539.)

541 Fluid Mechanics I (3) (Same as Mechanical Engineering 541 and Engineering Science 541.)

542 Fluid Mechanics II (3) (Same as Mechanical Engineering 542 and Engineering Science 542.)

544 Transonic Flow (3) Nature of flow at transonic speeds; hypersonic flow; shock wave properties; shock wave measurements; rarefied and shock wave phenomena; solution techniques. Prereq: 522.


552-53 Advanced Strength of Materials (3,3) (Same as Mechanical Engineering 535-36 and Engineering Science 521-22.)

554 Aerospace Vehicle Stability and Control (3) Static and dynamic longitudinal directional and lateral stability and control. Coupled modes. Motion with free and fixed flight control surfaces. Automatic control systems. Prereq: 423, 551.

556 Vertical or Short Take Off and Landing Aircraft (3) Performance, stability, control of rotary wing, tilt wing, vectored lift and jet vertical riser type aircraft. Vertical and transition flight modes. High lift airfoils. Automatic controls. Simulation facility types and flight testing. Prereq: 555.

Graduate Courses


430 Biomedical Engineering Laboratory (3) Experimental work courses in experimental biophysical sciences. Prereq: 551, Mathematics 471.

571 Finite Elements for Engineering Applications (3) Same as Engineering Science 551 and Mechanical Engineering 562.

573 Computational Solid Mechanics (3) Same as Engineering Science 553 and Mechanical Engineering 563.

574 Space Engineering: Satellite Technology (3) Satellites and rockets (orbit, launch vehicles and launching), spacecraft structure, power systems, attitude control system, telemetry/ tracking/command, and communications. Prereq: spacecraft testing, reliability, and application of satellites (communication, weather, Earth observation, and future applications). Prereq: 425, Mathematics 471, 404.

590 Selected Engineering Problems (2-6) Enrollment limited to students in problems, projects. Prereq: Consent of advisor. May be repeated. Maximum 6 hrs. S/NC only.

595 Seminar (1) All phases of aerospace engineering, reports on current research at UT and UTSA. May be repeated. Maximum 6 hrs. S/NC only.

599 Special Topics in Aerospace Engineering (1-3) May be repeated. Maximum 6 hrs.

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

631 Magnetohydrodynamics I (3) Electromagnetic field equations, motions of single charged particle, statistical description of plasma, Boltzmann equation, conduction and diffusion in ionized gases, continuum magnetohydrodynamic equations. Prereq or coreq: 512. Prereq: Mathematics 561 or equivalent.

632 Magnetohydrodynamics II (3) Alfvén and shock waves, exact solution for magnetohydrodynamic channel flow, one-dimensional passive and active control problems for engineering applications of magnetohydrodynamics, propulsion and power generation. Prereq: 631 and Mathematics 562.


645 Theory of Turbulence (3) Same as Engineering Science 645.

661-62 Advanced Topics in Computational Fluid Dynamics (3,3) Same as Engineering Science 651- 52 and Mechanical Engineering 651-52.

663-64 Advanced Topics in Computational Solid Mechanics (3,3) Same as Engineering Science 653-54 and Mechanical Engineering 653-54.


690 Advanced Topics in Aerospace Engineering (3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

GRADUATE COURSES

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

502 Registration for Use of Facilities (1-15) Re-registration for students 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.


523 Theory of Elasticity (3) Equations of equilibrium; strain-displacement relations compatibility, and constitutive equations for three-dimensions. Beams, disks, thick-walled tubes, plates with holes; stress concentrations. Airy and complex potential stress function, plane strain stress and strain in rectangular and polar coordinates. Thermal stresses in beams, rings, plates, and shells; thermal buckling problems.


528 Ceramic Matrix Composites: Material and Mechanics (3) Micromechanics and microstructural design of ceramic-matrix composites; interfacial characterization and mechanics; electron microscopy examination; nondestructive evaluation; fracture; fatigue; applications. Prereq: Consent of instructor. (Same as Materials Science and Engineering 538.)


533 Dynamics (3) Same as Mechanical Engineering 533 and Aerospace Engineering 533.

534 Mechanical Vibrations (3) Same as Mechanical Engineering 534 and Aerospace Engineering 534.

539 Continuum Mechanics (3) Cartesian tensors, transformation laws, basic continuum mechanics concepts; stress, strain, deformation, constitutive equations. Conservation laws for mass, momentum, energy, and entropy; solutions in solid mechanics. (Same as Aerospace Engineering 539 and Mechanical Engineering 559.)

541 Fluid Mechanics I (3) Same as Mechanical Engineering 541 and Aerospace Engineering 541.

542 Fluid Mechanics II (3) Same as Mechanical Engineering 542 and Aerospace Engineering 542.

551 Finite Elements for Engineering Applications (3) Computational procedures for differential equations in engineering and sciences. Approximation, boundary conditions, error estimation/estimation, element implementation, comparison to legacy finite difference methods. Applications in 1, 2, and 3 dimensions, non-linearity, unsteady problems, coupled equation systems. Examples from diverse technical fields; fluid mechanics, heat/mass transfer, elasticity, electromagnetics, reacting systems. Computer projects. Prereq: Bachelor’s degree in engineering or natural science. (Same as Aerospace Engineering 551 and Mechanical Engineering 557.)


553 Computational Solid Mechanics (3) Finite element techniques in structural mechanics and linear elasticity. Two and three-dimensional formulations; isoparametric elements, numerical quadrature. Equations of motion, element matrices, applications. Applications in beams, plates and shells; use of representative program packages in PC and networked Unix-CAD environments. Prereq: 551. (Same as Aerospace Engineering 556 and Mechanical Engineering 557.)


566 Optical Engineering I (4) Wave optics; scalar diffraction theory; introduction to Fourier optics; ray or geometric optics; lens, mirror, gratings; paraxial design methods; introduction to aberrations.
568 Optical Engineering II (4) Statistical optics; spontaneous and induced emission; black and gray body radiation; incoherent, partial and totally coherent radiation; spectral coherence function; detectors; radiometry. Prereq: 566.

571 Biomechanics of Hard and Soft Tissue (3) Introduction to terminology, physiology, and analytical methods for mechanics of living tissue. Continuum mechanics; analysis of hard and soft issue, biological fluid flows. Flow properties of blood, rheology of blood in micro vessels; bioviscoelasticity of fluids and solids, mechanical properties of blood vessels; skeletal, heart and smooth muscle mechanics. Research paper. (Same as Biomedical Engineering 571.)

572 Biomedical Fluid Mechanics (3) Application of fluid mechanics theory to fluid flows in living systems. Solutions to differential equations of motion for blood flow in arteries, veins and the microcirculation. Measurement of flow properties of blood and other biological fluids. Analysis of pathological flows, blood flow through arterial stenoses. Study of flow through artificial heart valve prostheses and in extracorporeal devices. Prereq: 541. (Same as Biomedical Engineering 572.)

576 Expert Systems in Engineering (3) (Same as Nuclear Engineering 576 and Mechanical Engineering 576.)

577 Neural Networks in Engineering (3) (Same as Nuclear Engineering 577 and Mechanical Engineering 577.)

578 Fuzzy Systems in Engineering (3) (Same as Nuclear Engineering 578.)

581 Special Topics in Engineering Mechanics (3) Mechanics problems related to recent developments. Prereq: Consent of instructor. May be repeated with consent of department.

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

590 Selected Engineering Problems (2-6) Enrollment limited to engineering program. Prereq: Consent of advisor. May be repeated. Maximum 6 hrs. S/NC only.

595 Seminar (1) All phases of engineering science, reports on current research at UTK and UTShi. May be repeated. S/NC only.

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


645 Theory of Turbulence (3) Mathematical descriptions of turbulence; isotropic turbulence, energy spectra, Kolmogoroff's hypothesis, large and small eddy structure for turbulent flows; turbulent diffusion by continuous movement; applications to turbulent jets, wakes, pipe flow, and boundary layers. Prereq: 542. (Same as Aerospace Engineering 445.)

651-52 Advanced Topics in Computational Fluid Dynamics (3,3) Modern approximation theory for non-linear Navier-Stokes systems. Algorithm constructions; finite element, finite volume; accuracy, convergence, stability; smooth and non-smooth solutions, shocks, artificial dissipation mechanisms. Two- and three-dimensional, compressible viscous and inviscid flows, potential and complete Navier-Stokes descriptions: turbulence closure models, reacting flows; mixed subsonic-supersonic; Computer projects, production software. Prereq: 551, 552. (Same as Aerospace Engineering 651-52 and Mechanical Engineering 661-62.)

653-54 Advanced Topics in Computational Solid Mechanics (3,3) Fracture mechanics; singularity solutions; numerical integration of singular problems, variable stiffness, initial strain-stress methods, plasticity, creep; geometrically non-linear problems, large deflection, stability, shell structures, solids; accuracy, convergence, adaptive grids; systems of nonlinear equations, solvers. Use of production-level finite element software. Computer projects. Prereq: 553. (Same as Aerospace Engineering 653-54 and Mechanical Engineering 663-64.)

657 Computational Mechanics Seminar (1) Current developments in computational mechanics. For departmental thesis students only. May be repeated.

671 Advanced Topics in Applied Artificial Intelligence (3) (Same as Nuclear Engineering 671 and Mechanical Engineering 671.)

681 Advanced Topics in Engineering Mechanics (3) Advanced problems in mechanics, group or individual. Prereq: Consent of instructor. May be repeated with consent of department.

Mechanical Engineering

NOTE: Not all the courses listed below are available at both the UT and the UTShi campuses.

GRADUATE COURSES


451 Systems and Controls (3) Analytical models of physical systems; comprised of combinations of mechanical, fluid, electrical, and thermal systems. Analysis and design of feedback control systems using transient and frequency response techniques, stability analysis, sampled data systems. Prereq: 345 Instrumentation and Measurement, Electrical and Computer Engineering 301 Circuits and Electro Mechanical Components.


455 Introduction to Design (2) Engineering economy, optimization, design for automation, reliability, patents and product liability; design of mechanical engineering solid mechanics system. Participation in team design evaluation and report. Prereq: Dynamics and Vibrations of Machines.

456 Introduction to Thermal Design (2) Engineering economy, optimization, design for automation, reliability, patents and product liability; design of mechanical engineering solid mechanics system. Participation in team design evaluation and report. Prereq: 322, 344.


469 Machine Design (4) Design of complete machine; documentation, complete specifications, design calculations, working drawings, and cost analysis. Written and oral report. Prereq: 455, 466.

471 Refrigeration and Air Conditioning (3) Vapor compression and absorption cycles; heat pump systems; psychometric processes; air washers; cooling towers; solar radiation; building heat transmission. Prereq: 332, 344.

475 Thermal Engineering (3) Thermal systems, turbomachinery, heat exchangers, combustion and system analysis and design, second law and economic analysis. Pr Engr: 332, 346.

479 Thermal Engineering Design (4) Design of complete thermal-fluid system, economic, technical and optimization aspects. Participation in team design effort, final presentations and design report. Prereq: 456, 475.

483 Introduction to Reliability Engineering (3) (Same as Nuclear Engineering 483, Chemical Engineering 483, and Industrial Engineering 483.)

484 Introduction to Maintenance Engineering (3) (Same as Nuclear Engineering 484, Chemical Engineering 484, Industrial Engineering 484, and Materials Science and Engineering 484.)

494-95 Selected Topics in Mechanical Engineering (1-4,1-4) Problems and topics related to developments and practice in mechanical engineering. Prereq: Consent of instructor.

500 Thesis (1-15) P/NP 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 Product Development Process (1) Basic elements in product development process and project management. Business and engineering interrelations to development of new products. Multidisciplinary teams to explore possible new product opportunities. Prereq: Consent of instructor. (Same as Industrial Engineering 504.)


506 Product Selection and Evaluation (2) Development of operational requirements and features for new product having potential for business venture. Market potential, design feasibility and manufacturing requirements. Design alternatives created and evaluated against set of performance requirements determined from market analysis. Preferred product concept selected by end of semester. Prereq: 504. (Same as Industrial Engineering 506.)

507 Application of Linear Algebra in Engineering Systems (3) (Same as Chemical Engineering 507, Electrical and Computer Engineering 507, and Materials Science and Engineering 507.)

508 Integrated Product, Process and Manufacturing System Design (3) (Same as Industrial Engineering 508.)

509 Multidisciplinary Project (1) (Same as Industrial Engineering 509.)

510 Prototype Development and Evaluation (3) Prototype of selected product made and tested against required operating conditions. Design changes implemented to meet customer’s needs. Fabrication drawings and manufacturing plans finalized for introduction of product to marketplace. Prototype development managed using project management plan. Prereq: 555.


512 Heat Transfer II (3) Analysis of steady-state and time-dependent heat transfer by numerical methods. Analysis of laminar and turbulent convection heat transfer in internal and external flows, forced and buoyancy driven flows. Prereq: 541.

514 Phase Change Heat Transfer (3) Mechanisms and modeling of nucleate and film boiling processes; critical heat flux; forced convection boiling and post dry-out heat transfer; condensation processes; heterogeneous nucleation; dropwise and filmwise condensation; flow condensation; liquid-solid phase change processes; moving phase fronts; mathematical modeling. Prereq: 544, 511.

521-22 Thermodynamics I and II (3,3) Macroscopic thermodynamics, including First and Second Law analyses, availability, phase and chemical equilibrium criteria, combustion, gas mixtures, and property relations, determination of thermodynamic properties from molecular structure, spectroscopic data, kinetic theory, statistical mechanics, quantum physics, Schroedinger equation. Prereq: 520.

523 Special Topics in Thermodynamics (3) Application of thermodynamics to topics of current interest in mechanical engineering. Prereq: Consent of instructor.

525 Combustion and Chemically Reacting Flows I (3) Fundamentals of parametric analysis of mechanical systems. Kinematics and dynamics of particles and solids in three dimensions. Rotating coordinate systems. Prereq: 116, 431 or equivalent. (Same as Engineering Science 525 and Aerospace Engineering 525.)

526 Combustion and Chemically Reacting Flows II (3) Advanced thermodynamics and parametric analysis of mechanical systems; application of probability density functions to turbulent flames; turbulent reacting flows with premixed and/or non-premixed reactants; spray combustion models; fluidized bed combustion; chemically reacting boundary-layer flows; gas turbine/rocket motor combustors; furnaces; introduction to supersonic combustion and supersonic flow. Prereq: 525.

527 Thermal Systems Analysis (3) Application of basic principles of heat transfer, fluid mechanics, and thermodynamics to gas turbine cycle analysis and computer simulation models for parametric analysis of thermal systems problems via commercial software. Prereq: 344.

533 Dynamics (3) Kinematics and dynamics of particles in three dimensions. Rotating coordinate systems. Hamilton’s principle; Lagrange’s equations of motion; mechanics of rigid bodies. Prereq: Mathematics 431 or Engineering Analysis, undergraduate vibrations course. (Same as Aerospace Engineering 533 and Engineering Science 533.)

534 Mechanical Vibrations (3) Vibrations of linear, discrete, undamped and damped systems. Lagrange’s equations for holonomic systems. Modal analysis. Laplace transforms and time to frequency domain tran- sients. Prereq: Undergraduate vibrations course. (Same as Aerospace Engineering 535 and Engineering Science 534.)

535-36 Advanced Strength of Materials (3,3) Three-dimensional transformations for stress and strain, elementary theory of elasticity, unsymmetrical bending, beams on elastic foundation, energy methods, shear center; thick-walled pressure vessels, elementary theory of plates. Prereq: Mechanics of Materials II or Mechanical Engineering 466, Mathematics 431 or Engineering Analysis. (Same as Aerospace Engineering 552-53 and Engineering Science 521-22.)


539 Continuum Mechanics (3) (Same as Engineering Science 539 and Aerospace Engineering 539.)

541 Fluid Mechanics I (3) Derivation of equations governing flow of inviscid and viscous fluids (conservation of mass, Newton’s second law, conservation of energy). Equations of state and constitutive relations. Euler and Navier-Stokes forms and nondimensionalization. Exact solutions and introduction to potential and boundary-layer flows. Prereq: Fluid mechanics. (Same as Aerospace Engineering 541 and Engineering Science 541.)


551-52 Mechanical Engineering Design (3,3) Design of mechanical engineering devices and systems. Prereq: Consent of instructor.

561 Finite Elements for Engineering Applications (3) (Same as Engineering Science 551 and Aerospace Engineering 551.)

562 Computational Fluid Dynamics (3) (Same as Engineering Science 552 and Aerospace Engineering 552.)

563 Computational Solid Mechanics (3) (Same as Engineering Science 553 and Aerospace Engineering 553.)

576 Expert Systems in Engineering (3) (Same as Nuclear Engineering 576 and Engineering Science 576.)

577 Neural Networks in Engineering (3) (Same as Nuclear Engineering 577 and Engineering Science 577.)

581 Rocket Propulsion I (3) Rocket propulsion fundamentals; thermodynamics of nonreacting and chemically reacting ideal gases, rocket nozzle design; ideal rocket performance parameters; rocket heat transfer; coreflow properties of rocket engine systems; ground testing; introduction to solid propellant rockets. Prereq: Consent of instructor.

582 Rocket Propulsion II (3) Solid propellant rocket performance, homogeneous and heterogeneous propellant chemistry and combustion system performance, thermal decomposition and gas phase reaction models; effect of chamber pressure and additives on solid propellant burn rates; droplet burning; analysis of two-phase solid rocket exhaust flow. Introduction to nuclear and electric propulsion; electrical resistance and magnetic field methods, performance modeling, hydrodynamics, wave thrusters, exotic propulsion systems. Prereq: Consent of instructor.

584-85 Turbomachinery Systems I, II (3,3) Ideal cycle analysis of turbine engines, real cycle analysis, component performance analysis, component design and systems integration (inlets, nozzles, combustors, turbines, flowthrough theory, turbine engine component matching, transient operation, surge and rotating stall, engine control systems, structural considerations. Prereq: First year graduate standing and consent of instructor.

586 Mechanics and Control of Robotic Manipulators (3) Fundamentals of robotic manipulation: kinematics and dynamics of manipulators, control system design, trajectory planning, advanced force and impedance control strategies. Prereq: 451, 553, or equivalent.


588 Introduction to Hybrid Electric Vehicles (3) Series parallel, and dual configurations. Sizing and analysis of typical HEV components: motors, auxiliary power sources, on-board energy storage, and fuels. Steady-state HEV force and power modeling schemes. Flight simulation of HEV systems; computer simulation tools. Prereq: Consent of instructor.

589 Hybrid Electric Vehicle Control Systems Design and Analysis (3) Dynamic modeling, simulation and analysis of complete hybrid electric vehicle systems. Linear control design techniques and discrete logic design applied to HEV power trains and operating mode controls. Digital and real-time control and hardware issues of automotive systems. Design and human factors engineering issues of vehicle controls and displays. Prereq: 588 or consent of instructor.

590 Selected Engineering Problems (2-6) Enrollment limited to students in problems program. Prereq: Consent of advisor. May be repeated. S/NC only.

594 Culminating Integrated Project Report (3) Final phase of product development process. Multidisciplinary teams submit and defend comprehensive project report. Report includes all engineering and business considerations needed to convince potential investors to fund proposed business ventures. Prereq: Consent of instructor. (Same as Industrial Engineering 562.)

595 Seminar (1) All phases of mechanical engineering, reports on current research at UTK and UTSMI. May be repeated. S/NC 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, multiphase flow, high speed reacting and nonreacting flows, advanced boundary layer techniques, combustion, perturbation and variational methods of analysis, heat exchanger theory and design. May be repeated. Maximum 9 hrs. Prereq: 525.

613 Advanced Radiation Heat Transfer (3) Radiation heat transfer in absorbing, emitting and scattering media; interaction of thermal radiation with conduction and convection heat transfer. Prereq: 511, 512.


642 Advanced Topics in Thermodynamics (3) Comparison of macroscopic and microscopic approaches to equilibrium of pure substances, metastable states. Non-equilibrium thermodynamics. Prereq: Consent of instructor.

651-52 Advanced Topics in Computational Fluid Dynamics (3,3) (Same as Engineering Science 651-52 and Aerospace Engineering 661-62.)

653-54 Advanced Topics in Computational Solid Mechanics (3,3) (Same as Engineering Science 653-54 and Aerospace Engineering 663-64.)


671 Advanced Topics in Applied Artificial Intelligence (3) (Same as Nuclear Engineering 671 and Engineering Science 671.)


Medical Biology

See College of Veterinary Medicine and Comparative and Experimental Medicine

Microbiology

(College of Arts and Sciences and College of Veterinary Medicine)

MAJOR DEGREES
Microbiology ......................... M.S., Ph.D.
Veterinary Medicine .................... D.V.M.

Jeffrey Becker, Head

Professors:
Becker, Jeffrey M., Ph.D. ............... Cincinnati
Brian, D. A., Ph.D., D.V.M. .......... Michigan State
Moore, R. N., Ph.D. ...................... Texas
Riggsby, W., Stuart, Ph.D. ............. Yale
Rouse, B. T., Ph.D. ....................... Guelph
Sayler, Gary S., Ph.D. ................... Idaho
White, D. C. (Distinguished Scientist), Ph.D. ...................... Rockefeller

Associate Professor:
Small, Pamela, Ph.D. ................... Stanford

Assistant Professors:
Sangster, Mark, Ph.D. ............... Western Australia
Sparer, Tim, Ph.D. ....................... Emory
Wilhelm, Steve, Ph.D. ............... Western Ontario

The Department of Microbiology offers both the M.S. and Ph.D. Students have the option of selecting from a variety of graduate research programs. For a departmental brochure, contact the department head.

ADMISSION REQUIREMENTS

Students are expected to have completed an undergraduate program with a 3.0 or better GPA on a 4.0 system. Included in the undergraduate course credits should be (1) a full year of general biological science, (2) one year of organic chemistry and (3) two years of chemistry, including one year of organic, (4) one year of physics, and (5) an introductory course in microbiology. In many cases, deficiencies in requirements may be removed by taking appropriate courses during the first year of graduate study. The department also requires the general portion of the Graduate Record Examination. A satisfactory score on each part is 550 or higher with rare exceptions. Three letters of recommendation should be submitted by current or former faculty members.

Each new graduate student meets with an advisory committee chaired by the departmental Director of Graduate Studies to plan a program of study for the first one or two semesters until a research advisor is selected. All first-year students participate in a laboratory rotation program during the first semester of study. This program allows the student to adjust smoothly to the research programs of the department, to develop a background of research procedures and concepts, and to facilitate the selection of a research professor. Usually the student selects a research professor toward the end of the laboratory rotation period. The major professor assists in the selection of and carrying out of a suitable research program and in the naming of a thesis or dissertation committee.

THE MASTER’S PROGRAM

The program leading to the M.S. is designed to provide the student with broad basic knowledge, to permit the acquisition of technical competence in the fundamentals of research, and to encourage creative and independent thinking. Two to three calendar years are usually needed for the course of study that has the following requirements: (1) 30 hours including 6 thesis credits; (2) a 3.0 GPA in all courses taken for graduate credit after 12 hours of credit have been earned in courses graded on the A-F system; (3) a 3.0 GPA in courses taken in the department; (4) a complete course sequence in biochemistry or molecular biology; (5) presentation of a research thesis and its oral defense.

THE DOCTORAL PROGRAM

The program leading to the Ph.D. is designed to develop the student’s ability to pursue independent and original research in microbiology and allied fields, to teach both oral and written communication of the results of research to the scientific community, and to train effective teachers. Students may enter the program after receiving either a bachelor’s or master’s degree. Students who enter with a bachelor’s degree usually receive the Ph.D. after four or five years; those with the master’s degree usually take three or four years to complete the degree. Departmental requirements are: (1) a 3.0 GPA in all courses taken for graduate credit after 12 hours of credit have been earned in courses graded on the A-F scale; (2) a 3.0 GPA in courses taken in the department; (3) satisfactory performance in at least one semester as a teaching assistant; (4) one semester of physical chemistry; (5) one course in statistics; (6) two semesters of biochemistry or molecular biology; (7) satisfactory performance in a comprehensive examination that must be attempted before the end of the fifth semester in the program and passed before admission to candidacy; and (8) the presentation of a research dissertation and its oral defense.

GRADUATE COURSES

410 Bacterial Physiology (3) Modern concepts of structure and function of bacterial cell. Prereq: Introduction to Microbiology.
420 Medical Microbiology (3) Disease-producing microorganisms, including bacteria, rickettsia, chlamydia and fungi. Prereq: Introduction to Microbiology.
429 Medical Microbiology Laboratory (2) Laboratory exercises in medically important areas of microbiology: microorganisms, pathogenesis and immunology. Prereq: Introduction to Microbiology Lab. Coreq: 420.
430 Immunology (3) Principles of inflammation and immunity; immunoglobulin structure and theories of formation and diversity; complement, hypersensitivities, cell cooperation and recognitions in immune mechanisms; soluble factors. Prereq: General Genetics.
470 Microbial Ecology (3) Physiological diversity and taxonomy of microorganisms from natural environments. Functional role of microorganisms in natural and simulated ecosystems. Prereq: 310.
500 Thesis (1-15) P/NP 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.
575 Applied Microbiology and Bioengineering (3) (Same as Chemical Engineering 575, Environmental Engineering 575, and Biosystems Engineering 575.)
591 Foreign Study (1-15) See College of Arts and Sciences.
592 Off-Campus Study (1-15) See College of Arts and Sciences.
593 Independent Study (1-15) See College of Arts and Sciences.
595 General Seminar (1) Lectures and seminars by invited speakers, faculty, and graduate students. May be repeated. Maximum 18 hrs. S/NC only.
596 Laboratory Rotation (1) Familiarization with research areas in department through series of rotations in laboratories of individual faculty members. May be repeated. Maximum 18 hrs. S/NC only.
600 Doctoral Research and Dissertation (3-15) P/NP only.
601 Journal Club in Microbial Physiology (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/NC only.
602 Journal Club in Microbial Pathogenesis (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/NC only.
603 Journal Club in Immunology (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/NC only.
604 Journal Club in Virology (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/NC only.
605 Journal Club in Microbial Genetics (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/NC only.
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: Consent of instructor. May be repeated. Maximum 12 hrs.

Microbiology-Veterinary Medicine

See College of Veterinary Medicine and Comparative and Experimental Medicine

Modern Foreign Languages and Literatures

(College of Arts and Sciences)

MAJORS DEGREES

French .......................................................... M.A.
German ................................. M.A.
Spanish ......................................... M.A.
Modern Foreign Languages .......... Ph.D.

Carolyn R. Hodges, Head

Professors:
Barrette, Paul E., Ph.D. ........... California
Brady, Patrick (Shumway Chair of Excellence), D.U.P. ........... Sorbonne
Campion, Edmund J., Ph.D. .......... ...Yale
Creel, Bryant, Ph.D. ........... California
DiMaria, Sara, Ph.D. ........... Wisconsin
Handelsman, Michael H. (Liaison), Ph.D. ....... Florida
Heflin, William H., Ph.D. ........ Florida State
Hodges, Carolyn R., Ph.D. ......... Chicago
HolmUnd, Christine, Ph.D. ....... Kentucky
Levy, Karen D., Ph.D. ........... Chicago
Rivera-Rodas, Oscar, Ph.D. ....... California
Romeiser, John B. (Liaison), Ph.D. ....... Vanderbilt

Associate Professors:
Beauvois, Margaret, Ph.D. ............ Texas
Blackwell, Stephen H., Ph.D. ....... Indiana
Brezio-Skow, Flavia, Ph.D. ......... Washington
Essif, Les, Ph.D. .................. Brown
Hoeyng, Peter, Ph.D. ............. Wisconsin
Kaplan, Gregory, Ph.D. .......... Pennsylvania
LaCure, Jon, Ph.D. ............. Indiana
Lee, David, Ph.D. (University of London)
McAlpin, Mary K., Ph.D. ....... Columbia
Nakuma, Constancio, Ph.D. .... Sorbonne
Ohsengor, Stefanie, Ph.D. ....... McGill
Pervukhina, Natalia K., Ph.D. ....... Bryn Mawr
Silva-Filho, Eudice, Ph.D. ....... North Carolina

Assistant Professors:
Arnold, Nike, Ph.D. .............. Texas
Ayo, Alvare A., Ph.D. ......... Arizona
Berwald, Olaf, Ph.D. .......... North Carolina
Cano, Luis, Ph.D. .............. Pennsylvania State
Cruz-Camara, Nuria, Ph.D. .... SUNY (Buffalo)
Gimmel, Mildred, Ph.D. ......... Indiana
Gregory, Amy, Ph.D. ........... Texas
Horiguchi, Noriko, Ph.D. ......... Pennsylvania

The Department of Modern Foreign Languages and Literatures offers graduate programs leading to the Master of Arts degree with majors in French, German and Spanish, and the Doctor of Philosophy degree with a major in Modern Foreign Languages. Inquiries should be addressed to the head of the department.

THE MASTER'S PROGRAMS

French
Thesis Option:
1. Completion of a minimum of 30 semester hours of coursework plus at least 6 hours in course 500 Thesis. French 501 is required. A maximum of 6 hours may be taken at the 400 level, the rest at the 500 level, and under certain conditions the student may take 600-level seminars. If the student chooses to have a minor (such as Italian or Portuguese), at least 24 hours (including 6 hours of thesis) must be taken in the major, 6 in the minor.
2. A thesis, with a minimum of 6 semester hours in course 500.
3. A written examination covering the coursework and selected items from a master reading list.
4. A final oral examination covering the thesis.

Non-Thesis Option:
1. Completion of at least 30 semester hours, with a maximum of 9 at the 400 level, the rest at the 500 level, including French 501. Under certain conditions, the student may take 600-level seminars. If the student chooses to have a minor (such as Italian or Portuguese), at least 24 hours must be taken in the major, 6 in the minor.
2. A research paper from a course, which the candidate substantially expands with the approval of the committee.
3. A written examination covering the coursework and selected items from a master reading list.
4. A final oral examination covering the research paper.

German
Thesis Option: The minimum requirements are 24 semester hours of coursework and 6 hours of Thesis 500. German 510 and 519-20 are required, as are three courses on German literature or culture, one of which may be at the 400 level. In addition, students must take three further courses, only one of which may be chosen from 411-12 or 485. All graduate teaching assistants should take 512, and other candidates may take 512 or any other course above 500. A maximum of three 400-level courses may be counted toward the 24 semester hours of course credit. All M.A. candidates must sit for a standardized language examination, such as the Zentrale Mittelstufenprüfung. Students who are interested in future Ph.D. level study are strongly advised to choose the thesis option.

Non-Thesis Option: The minimum requirements are 30 semester hours of coursework, including at least one 600-level course, for which a seminar paper is required. German 510 and 519-20 are required, as are three courses on German literature or culture, one of which may be at the 400 level. In addition, students must take three further courses, only one of which may be chosen from 411-12 or 485. All graduate teaching assistants should take 512, and other candidates may take 512 or any other course above 500. A maximum of three 400-level courses may be counted toward the 30 semester hours of coursework. A common written exam over the designated reading list is required, as is a standardized language exam, such as the Zentrale Mittelstufenprüfung. Each non-thesis M.A. candidate will have a committee of three faculty members in German to whom the student will submit a dossier consisting of the seminar paper and one paper previously submitted in a graduate course. The length and type of the papers is described in greater detail in the Manual for Graduate Students in German.

Spanish
Thesis Option:
1. Completion of a minimum of 24 semester hours in coursework plus at least 6 hours in course 500 Thesis. Spanish 550 is required. A maximum of 6 hours may be taken at the 400 level, the rest at the 500 level, and under certain conditions the student may take 600-level seminars. If the student chooses to have a minor (such as Italian or Portuguese), at least 24 hours (including 6 hours of thesis) must be taken in the major, 6 in the minor.
2. A thesis, with a minimum of 6 semester hours in course 500.
3. A written examination covering the coursework and selected items from a master reading list.
4. A final oral examination covering the thesis.

Non-Thesis Option:
1. Completion of at least 30 semester hours, with a maximum of 6 at the 400 level, the rest at the 500 level, including Spanish 550. Under certain conditions, the student may take 600-level seminars. If the student chooses to have a minor (such as Italian or Portuguese), at least 24 hours must be taken in the major, 6 in the minor.
2. Three term papers that have been accepted by the student’s advisory committee.
3. A written examination covering the coursework and selected items from a master reading list.

THE DOCTORAL PROGRAM

The Ph.D. in Modern Foreign Languages requires advanced training in a major language and either a second language or applied linguistics.

Admission Requirements
Applicants must have completed a B.A. in either French, German or Spanish to be accepted into this program. Both graduates of institutions in the United States and those with undergraduate degrees from institutions outside the United States must have a grade point average of at least 3.0. Consideration will also be given to applicants who do not have an undergraduate degree in one of the three foreign languages but do have the equivalent of an undergraduate major in one of them.

Degree Requirements
Candidates must complete a minimum of 63 semester hours of coursework beyond the bachelor’s degree in addition to 24 hours of doctoral research and dissertation.

For candidates with French or Spanish as a first concentration, two tracks are available: The coursework for Track I must be distributed as follows: at least 39 hours in the first concentration; at least 18 hours in the second concentration; and at least 6 hours in a cognate field or in either the first or second concentration as approved by the student’s graduate committee. The coursework for Track II must be distributed in this way: at least 45 hours in the first concentration; at least 12 hours in the second concentration; and at least 6 hours in a cognate field or in either the first or second concentration as approved by the student’s graduate committee. Because Track II students will have taken 12 graduate hours instead of 18 hours in the second concentra-
tion, they will normally not be eligible to teach that field at institutions which follow SACS guidelines for college foreign language teaching.

The coursework for all concentrations must be distributed as follows:

1. First Concentration: German. A minimum of 39 hours of German courses beyond the bachelor's degree, distributed as follows:
   - 400 level: A maximum of 6 hours of 400-level classes taken for the M.A. may be applied.
   - 500 level: A minimum of 21 hours must be taken. These must include German 512, 519, 520, and 550. Thesis hours are excluded. If 512 is used as part of a second concentration in applied linguistics, another course must be substituted in the first concentration.
   - 600 level: A minimum of 12 hours must be taken, exclusive of dissertation hours.

First Concentration: French or Spanish. A minimum of either 39 (Track I) or 45 (Track II) hours of French or Spanish courses beyond the bachelor's degree, distributed as follows:

1. 400 level: A maximum of 6 hours of 400-level classes taken for the M.A. may be applied.
2. 500 level: A minimum of 21 (Track I) or 27 (Track II) hours must be taken. These must include French 512, 519, 584 or Spanish 512 and 550. Thesis hours are excluded. If 512 is used as part of a second concentration in applied linguistics, another course must be substituted in the first concentration.
3. 600 level: A minimum of 12 hours must be taken, exclusive of dissertation hours.

2. Second Concentration: A minimum of 18 (German or Track I) or 12 (Track II) hours beyond the bachelor's degree, taken in the field of applied linguistics or in a second language, either French, German, Italian, Portuguese (Track II only), Russian or Spanish. For Track I and German, 12 of these 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. German students choosing applied linguistics must take German 425, 435 or 510, 512, 3 hours of German linguistics, such as 426, 436, 631, or 632, and 6 hours of linguistics electives in English or German. Spanish students choosing applied linguistics must take Spanish 421 or 429; 425; 512; and 9 (Track I) or 3 (Track II) hours of appropriate electives in English or Spanish. The student's graduate advisor must approve the electives chosen.

Cognate Field. Six hours in graduate courses numbered 400 and above in a field outside the department or language family of the first concentration but related to the student's principal area of research. Students choosing applied linguistics as a second concentration are strongly urged to take their cognate work in a second language. With the consent of the student's graduate committee, the 6 hours in the cognate field may be substituted by 6 hours in either the first or second concentration.

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).

For students choosing applied linguistics as an area of second concentration, reading competence in a second language is required. Competence will be determined by translation of a text from the foreign language into English, the test to be administered by the department.

A comprehensive examination on the language and literature of the first and second concentrations must be passed before the student may be admitted to candidacy. The candidate is required to defend his/her dissertation in an oral examination. Central emphasis is put on the doctoral dissertation as a final test of the candidate's scholarly qualifications.

Graduate Teaching Assistants with a second concentration in another language should have the 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, McCleure, Rotary fellowships).

Asian Languages

GRADUATE COURSES

431 Readings in Chinese Literature (3) Prerequisite: Mastery of intermediate-level Chinese or consent of instructor. May be repeated. Maximum 9 hrs.

451 Readings in Japanese Literature (3) Prerequisite: Mastery of intermediate-level Japanese or consent of instructor. May be repeated. Maximum 9 hrs.

French

GRADUATE COURSES

410 Medieval French Literature (3) Major representative works of medieval French literature. Texts in modern French. Prerequisite: 300-level literature course.

411 French Literature of the 16th Century (3) Highlights of 16th-century French literature. Excerpts from Rabelais and Montaigne; readings 12 poems (I-III) by writers from Lyon and members of the Pléiade. Prerequisite: 300-level literature course.

412 French Literature of the 17th Century (3) Masterspieces of seventeenth-century French literature. Prerequisite: 300-level literature course.

413 French Literature of the 18th Century (3) Major works of Enlightenment. Prerequisite: 300-level literature course.

414 French Literature of the 19th Century (3,3) French Romanticism and its counter movements: Realism, Fannism, and Naturalism. Prerequisite: 300-level literature course.

415 French Literature of the 20th Century (3) Evolution of 20th-century French literature. Prerequisite: 300-level literature course.

419 German Fairy Tales and Literary Fantasies (3) How and why forms of literary fantasies ranging from apocalyptic dreams to enchanted visions have changed over the centuries. Strong interdisciplinary component, tracing interconnections between philosophy, psychology, religion and literary history, as well as exploring the relationship between literary, musical, and artistic representations of specific themes. Prerequisite: 6 hours of 300 courses or equivalent, excluding 331-332.

420 French Cinema (3) French cinema from earliest days through New Wave directors. Prerequisite: 300-level literature course. May apply toward major. (Same as Cinema Studies 420.)

421 Phonetics (3) Foundation in science of phonetics. Practical exercises and individual performance. Graduate credit not available to students majoring in Romance language. Prerequisite: Intermediate Composition and Conversation or equivalent.

422 Advanced Grammar (3) Improving one's written and oral French in the context of written and oral practice in French.

423-24 Advanced Conversation (1,1) Informal conversation with native speaker on contemporary topics. Stressing oral skills for on-the-spot communication. Prerequisite: Intermediate Composition and Conversation or French for Business. 2 hrs. weekly.

425 Introduction to Descriptive Linguistics (3) Theory and practice of techniques of linguistic analysis in subfields of phonetics, phonology, morphology, syntax, semantics, pragmatics and historical linguistics; discussion of relevance to learning and teaching of foreign languages and to study of literary texts. Recommended prerequisite: Language, Linguistics and Society. (Same as German 425, Linguistics 425, and Spanish 425.)

426 Methods of Historical Linguistics (3) (Same as German 426, Spanish 426 and Linguistics 426.)

429 Romance Linguistics (3) Development of Classical Latin through Latin American Romance languages. (Same as Spanish 429 and Linguistics 429.)

430 Theatrical French (4) Comprehensive introduction to theatrical production and performance in French. Collaboration in creative staging of a French play and participation in public performance. Prerequisite: 300-level literature course.

431 Highlights of French Civilization (3) Survey of French civilization from the Gauls to World War II. Historical events, daily life, all forms of arts. Prerequisite: 300-level literature course.

432 Contemporary French Culture (3) Current French cultural issues placed in historical perspective with comparative emphasis. Taught in English; readings in French for majors.

434 Literature of Quebec (3) Survey of literature of Quebec as well as French literature connected with North America. Readings include explorer and missionary works, such as Voyages of Champlain and Journals of Jesuits, and literature of contemporary Quebec. Prerequisite: 300-level literature course.

445 Advanced French for Business (3) Advanced contemporary French language and culture as relates to business transactions. Comparative approach to business issues. Students learn how to conduct business transactions, explore differences and similarities between francophone business culture(s) and those of North America and Japan. Building knowledge of business terminology while being sensitized to cultural differences and dangers of simplistic stereotyping. Prerequisite: French for Business or consent of instructor.

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

501 Techniques in Literary Analysis (3) Required for M.A. program. Close stylistic analysis of texts representative of different eras and of different genres. Development and improvement of student's written French.

502 Registration for Use of Facilities (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.
510 The French Language (3) French as spoken and written from Medieval period to present.

512 Teaching a Foreign Language (3) Practical application of methods for teaching and evaluating basic language skills and foreign language skills, and cultural aspects through 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.

515 Technology Enhanced Language Learning (3) Introduction to TELL. Overview of existing software, programs, and professional literature on topic. Hands-on development of instructional Web site for teaching language, culture, or literature.

519 Bibliography and Methods of Research (3) Critical research tools and scholarly contributions in French literature and language. Practical exercises on compiling of scholarly data using computer-based and non-computer sources.

520 French and Francophone Film (3) French and Francophone culture through film.

530 French and Francophone Theater (3) Changing approaches to French and Francophone Theater.

540 French Literature and Culture I (3) Literary and cultural heritage of French Middle Ages.

550 French Literature and Culture II (3) Literary and cultural heritage of 18th-19th centuries. Focus on Francophone world to evolution of literature, so-called romanticism and naturalism, and the 20th century.

550 Study in German Literature (3) Literary and cultural heritage of 16th-17th century France. Prerequisite: Consent of instructor.

560 French Literature and Culture III (3) Literary and cultural heritage of 18th-19th century France. Prerequisite: Consent of instructor.

570 French and Francophone Literature and Culture I (3) Literary and cultural heritage of France and other Francophone countries in first part of 20th century.

573 French and Francophone Literature and Culture II (3) Literary and cultural heritage of France and other Francophone countries from late 20th century to present.


584 Modern Theory and Criticism (3) Survey of twentieth century critical theory, including psychoanalysis, Marxism, structuralism, and more.

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

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

593 Independent Study (1-15) See College of Arts and Sciences. Letter grade or S/NC.

594-95 French Directed Readings (3,3)

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

610 Doctoral Seminar in French and Francophone Studies, or Linguistics (3) Content varies. May be repeated. Maximum 12 hrs with consent of department.

611-12 Advanced Conversation and Composition (3,3) Prerequisite: 311-12 or equivalent or consent of department.

415 Special Topics (3) Topics vary. May be repeated. Maximum 6 hrs.

416 Metropolis Revisited (3) The 20th Century German or Austrian metropolis in the mirror of history, literature, theory, art, architecture, and music. Taught in English. Prerequisite: Consent of instructor and enrollment in that sequence and consent of instructor.

419 German Fairy Tales and Literary Fantasies (3) How and why of literary fantasies ranging from apocalyptic dreams to enchanted visions have changed over the centuries. Strong interdisciplinary component, focusing interconnections between philosophy, psychology, religion and literary history, as well as exploring the relationship between literary and non-literary musical and artistic representations of specific themes. Prerequisite: 6 hours of 300-level courses or equivalent, excluding 331-332.

420 Selected Topics in German Literature from 1750 to the Present (3) Prerequisite: 6 hrs of 300-level courses (excluding 331-32 and courses in English translation) or equivalent.

425 Introduction to Descriptive Linguistics (3) (Same as French 425, Spanish 425, and Linguistics 425.)

426 Methods of Historical Linguistics (3) Phonetics, distinctive feature analysis, sound change types, nature of sound change, principles of reconstruction, and fundamental assumptions about language change through time. Survey of typological and functional linguistic change, language families, Proto-Indo-European, and other proto languages. Prerequisite: 6 hrs of upper division foreign language courses (excluding courses in translation or graduate reading courses). (Same as French 426, Spanish 426, and Linguistics 426.)

431 Images of Nature and the Body in German Culture (3) Representations of nature from idyllic rural refuge and object of praise to scientific object and precarious resource. Other themes include sexuality, the body, childhood, and aging. Discussions based on literary and documentary texts and films. Prerequisite: 6 hours of 300-level courses or equivalent, excluding 331-332.

432 German Creative Thinking: Interdisciplinary Dialogues (3) Interdisciplinary connections between German literature and art, music, philosophy, theatrical praxis, psychology, dance, anthropology, history, and the sciences. Comparative analyses of literary and non-fictional texts, films, and other media. Prerequisite: 6 hours of 300-level courses or equivalent, excluding 331-332.

433 Nation, Race, and Ethnicity (3) Examination of cultural constructions of nation, race, and ethnicity and how they have challenged each other and developed since the eighteenth century. Close study and analysis of fiction, non-fiction, and films that address controversial topics such as assimilation, integration, racial/ethnic identity, formation and multiculturalism. Prerequisite: 6 hours of 300-level courses or equivalent, excluding 331-332.

434 Extraordinary Wo(Men)-Outcasts, Rebels, Martyrs and Saints (3) Examination of German texts and visual media that have challenged mainstream thinking throughout the centuries. Strong interdisciplinary component, focusing on literary and artistic forms that depict struggles involving religion, politics, and gender. Prerequisite: 6 hours of 300-level courses or equivalent, excluding 331-332.

435 Structure of the German Language (3) Contrastive English-German segmental and suprasegmental phonemes, contrastive English-German linguistic structures, selected topics in advanced German grammar and syntactic analysis. Prerequisite: 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. Prerequisite: 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. Prerequisite: 6 hrs of upper-division German courses in translation and graduate reading courses.

494 German Community Service Practicum (1) Supervised by the director of the Lower-Division German program, students either assist German classes at local schools or perform supervised service with local institutions that promote awareness of German culture among the general public. Prerequisite: 18 hours of upper division German courses and consent of program chair. Maximum of one hour credit per semester. May be repeated for a maximum of 3 hours.

500 Thesis (1-15) P/NP 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.

510 German Phonetics and Advanced Grammar (3) Advanced work in phonetics, pronunciation, and selected topics in German grammar. For teachers and prospective teachers. Prerequisite: Consent of instructor.

512 Teaching a Foreign Language (3) Practical application of methods for teaching and evaluating basic language skills and foreign language skills, and cultural knowledge through seminars, demonstrations, peer teaching, and observation of foreign language classes. Required of all M.A. and Ph.D. students holding GTAs, except those whose previous training or experience warrants excuse by department.

519 Bibliography and Methods of Research (3) Critical research tools and scholarly contributions in German literature and language. Practical exercises on compiling of scholarly data using computer-based and non-computer sources.

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) Theoretical and methodological approaches to German literature and culture among the general public. Prerequisite: 18 hours of upper division German courses or equivalent, excluding courses in translation and graduate reading courses. (Same as Linguistics 436.)

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. Letter grade or S/NC.

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

621-22 Seminar in German Literature (3,3) May be repeated. Maximum 18 hrs.

631-32 Seminar in German and Germanic Philology (3,3).

German

GRADUATE COURSES

331-32 Elements of Language, culture, and Francophone world to evolution of literature, so-called romanticism and naturalism, and the 20th century.

550 French Literature and Culture II (3) Literary and cultural heritage of 18th-19th century France.

560 French Literature and Culture III (3) Literary and cultural heritage of 18th-19th century France.

570 French and Francophone Literature and Culture I (3) Literary and cultural heritage of France and other Francophone countries in first part of 20th century.

573 French and Francophone Literature and Culture II (3) Literary and cultural heritage of France and other Francophone countries from late 20th century to present.


584 Modern Theory and Criticism (3) Survey of twentieth century critical theory, including psychoanalysis, Marxism, structuralism, and more.

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

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

593 Independent Study (1-15) See College of Arts and Sciences. Letter grade or S/NC.

594-95 French Directed Readings (3,3)

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

621-22 Seminar in German Literature (3,3) May be repeated. Maximum 18 hrs.

631-32 Seminar in German and Germanic Philology (3,3).

Italian

GRADUATE COURSES

156 Modern Foreign Languages and Literatures
401 Dante and Medieval Culture (3) Introduction to significance of this great Italian writer. Prereq: 212 or consent of instructor.

402 Petrarach and Boccaccio (3) Prereq: 212 or consent of instructor.

403 Literature of the Rinascimento (3) From Pulci to Tasso, Dante, Caccio, and Cinquecento. Prereq: 212 or consent of instructor.

405 Modern Italian Poetry (3) From Pascinio to Montale. Prereq: Italian 212 or consent of instructor.

406 The Modern Italian Novel (3) From Manzoni to Calvino. Prereq: 212 or consent of instructor.

409 Directed Readings (3)

410 Italian Theatre (3) Survey of Italian theatre from Renaissance to present. Prereq: Intermediate Italian or consent of instructor.

421 Topics in Italian Literature and Cinema (3) Italian literature and cinema from 1930 to present focusing on literary works translated into English and adapted into film. Investigation of relationship between literature and cinema and achievement of greater understanding of Italian culture since 1930. Films in Italian with English subtitles. May be repeated. Maximum 6 hrs. (Same as Cinema Studies 421.)

510 Readings in Italian Literature (3) Topics vary. May be repeated with consent of department.

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

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

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

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### Portuguese

#### GRADUATE COURSES

400 Portuguese for Speakers of Another Romance Language (3) Accelerated class for beginning students of Portuguese with strong background in another Romance language. Introduction to grammar, reading, and culture of Portugal and Brazil. Prereq: 3 hours at 300-level in another Romance language or equivalent.

431-32 Topics in the Literature and Language of Portuguese-speaking World (3,3) Outstanding works of literature and culture from Portuguese countries. Topics may vary. Prereq: At least one course at the 300 level or the equivalent. May be repeated. Maximum 12 hrs.

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

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

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

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### Russian

#### GRADUATE COURSES

401-02 Advanced Grammar, Conversation, and Composition (3,3) Prereq: Russian Composition and Conversation or equivalent.

425 Introduction to Descriptive Linguistics (3) (Same as French 425, German 425, Spanish 425, and Linguistics 425.)

426 Methods of Historical Linguistics (3) (Same as French 426, German 426, Spanish 426, and Linguistics 426.)

430 Selected Topics in Russian Literature (3) Content varies. May be repeated. Maximum 9 hrs.

451-52 Senior Seminar (3,3) For majors in Russian; minors admitted at discretion of instructor. Intensive study of language, literary style, and literary criticism based. Topics vary. May be repeated with consent of department. Maximum 6 hrs.

455 Latin American Film and Culture (3) Latin American and cinema. Films and videos from 1900s to present as works of art and in light of political, cultural, and social contexts. Taught in English. Graduate credit available only for Latin American Studies and Cinema Studies majors. 1 hr lecture, 2 hrs screening, and 1 hr discussion. (Same as Latin American Studies 465 and Cinema Studies 465.)


480 Social Forces in Hispanic Literary Expression (3) Analysis of major Hispanic texts that address factors and events that influenced and/or continued to influence social and cultural evolution of Hispanic works during the 20th century. Topics vary. May be repeated. Maximum 6 hrs with consent of department.

482 Trends in Hispanic Thought (3) Intellectual/philosophical currents represented in literary works, selected thinkers, or movements from historical periods of Spain and Latin American countries. Prereq: 3rd Intermediate Composition and Grammar. 332 Survey of Spanish Literature: 1700-Present, and completion of 9 additional hours of upper division Spanish. May be repeated. Maximum 6 hrs with consent of department.

484 Race, Ethnicity, and Nation in Hispanic Literature (3) Close reading and analysis of literary texts that address issues of race and ethnicity in Hispanic world, with regard to identity and concepts of nationhood. Topics: mestizaje; conceptual distinctions between race, ethnicity, and nation; Latin American and Indigenismo; Afrocentrism; issues of monarchy and empire; relationship between Jews, Christians, and Moors in Spain. Prereq: 323 Intermediate Composition and Grammar. 332 Survey of Spanish Literature: 1700-Present and completion of 9 additional hours of upper division Spanish. May be repeated. Maximum 6 hrs with consent of department.

486 Literary and Artistic Movements in the Hispanic World (5) Relationships (thematic, cultural, socio-political, aesthetic, philosophical, etc.) between specific trends in literature and other artistic media, in light of historical contexts in which those relationships emerged. Prereq: 323 Intermediate Composition and Grammar. 332 Survey of Spanish Literature: 1700-Present and completion of 9 additional hours of upper division Spanish. May be repeated. Maximum 6 hrs with consent of department.

489 Topics in Hispanic Civilization (3) Analysis of major trends, issues and/or movements in the civilizations of Spain and Spanish America. Political, literary, and cultural perspectives dealing with topics from Middle Ages to present day. Prereq: 323 Intermediate Composition and Grammar. 332 Survey of Spanish Literature: 1700-Present and completion of 9 additional hours of upper division Spanish. May be repeated. Maximum 6 hrs with consent of department.

500 Thesis (1-15) P/0N only.

502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when student uses University facilities (recreational, ideological, philosophical, social, and political implications of films and comparison of them with treatments of related subjects in other types of artistic production. Prereq: 3rd Intermediate Composition and Grammar. 332 Survey of Spanish Literature: 1700-Present, and completion of 9 additional hours of upper division Spanish. Taught in Spanish. May be repeated. Maximum 6 hrs with consent of department. (Same as Cinema Studies 434.)

461 Special Topics (3) Aspects of Hispanic literature, culture, linguistics, or foreign language pedagogy. Topics may be repeated with consent of department. Maximum 6 hrs.
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.

531 Old Spanish (3) Evolution of Spanish language from its origins through 15th century.

532 Medieval Spanish Literature (3) Literary works of 11th through 15th century. Application of literary theories to understand literature, nature and evolution of major literary genres during Spanish Middle Ages, and socio-historical contexts of medieval works. May be repeated. Maximum 6 hrs with consent of department.

533 Golden Age Prose (3) Wides range of prose fiction in Spain during 16th and 17th centuries: Moorish, picarque, sentimental, pastoral and exemplary novels, and dialogues.

534 Don Quijote (3) Cervantes' masterpiece in socio-cultural and literary context of its time: study of thematic, structural, and stylistic issues: crisis of aristocracy, Quijotico 'madness,' discrepant cognitive and ethical perspectives, satiric irony, culture of sentiment, and Cervantes' legacy to subsequent literary periods. Content varies. May be repeated. Maximum 6 hrs with consent of department.

535 Golden Age Poetry (3) Garcilaso, Fray Luis de León, San Juan de la Cruz, Lope de Vega, Quevedo, and Gongora.

537 Golden Age Drama (3) Major dramatists of period: Lope de Vega, Tirso de Molina, Ruiz de Alarcón, Guillén de Castro, Calderón de la Barca, Moreto, and Rojas Zorrilla.


541 19th-Century Spanish Prose (3) Costumbromismo, realism, and naturalism in the novel, short story, and essay as represented in major authors: Larra, Mesonero Romanos, Fernán Caballero, Alarcón, Valera, Palacio Valdés, Pereda, Galdós, Pardo Bazán. Content varies. May be repeated. Maximum 6 hrs with consent of department.

542 20th-Century Spanish Literature: Generation of '98 through Civil War (3) Principal achievements and representative directions in literature of Spain through Civil War years.

543 20th-Century Spanish Literature: Post-Civil War through Present (3) Principal achievements and representative directions in literature of Spain from post-Civil War period to present.

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)

561 Spanish American Colonial Literature (3) From pre-Columbian era through 18th century. Reading and analysis of selected works from Colonial Spanish American period and their Continental sources. Indigenous texts and authors. Content varies. May be repeated. Maximum 6 hrs with consent of department.


572 Spanish American Narrative: Boom to Present (3) Critical study of major trends and movements that established Spanish American narrative as influential force in world literature during second half of 20th century. Content varies. May be repeated. Maximum 6 hrs with consent of department.

573 Regional Approaches to Interpreting Spanish American Literature (3) Interpretation of Spanish American literature taking into consideration regional differences attributable to such factors as race, geography, immigration, and economic development. Key regions include Mexico and Central America, Caribbean, Andean countries, and the Southern Cone. Comparisons vary between specific regional perspective and transregional one. Content varies. May be repeated. Maximum 6 hrs with consent of department.

574 Spanish American Modernismo and Vanguardismo (3) Critical study of principal writers and literary works associated with Spanish American modernismo and vanguardismo published between 1880 and 1950. Concepts and expressions of modernity are explored in literature and art. Content varies. May be repeated. Maximum 6 hrs with consent of department.

575 Spanish American Modernismo and Vanguardismo (3) Critical study of major poets of Spanish America from 1950 to present. Content varies. May be repeated. Maximum 6 hrs with consent of department.

576 Contemporary Spanish American Poetry (3) Reading and analysis of Spanish American's major dramatic works published and performed since 1950. Content varies. May be repeated. Maximum 6 hrs with consent of department.

577 Contemporary Spanish American Theater (3) Reading and analysis of Spanish American's major dramatic works published and performed since 1950. Content varies. May be repeated. Maximum 6 hrs with consent of department.


582 Seminar in Spanish Language (3) Topics vary in field of Peninsular literature. May be repeated with consent of department. Maximum 9 hrs.

583 Seminar in Spanish American Language (3) Topics vary. May be repeated with consent of department. Maximum 9 hrs.

Music
(College of Arts and Sciences)

MAJOR DEGREES

Music ........................................... M.M.

Roger L. Stephens, Director

Professors:
Brock, John P., M.M. ..................... Alabama
Coker, J., M.A. ......................... Sam Houston

Combs, F. M., M.A. ...................... Missouri
Jacobs, K. A., D.M.A. .......... Texas
Leach, C. F., D.M. .................... Northwestern
MacMorran, W. S., M.M. ............ Wisconsin
McClelland, D. K., M.A. .......... Columbia
Moore, M. C., Ph.D. .................. Michigan
Northington, D. B., D.M.A. ............ Yale
Pederson, D. M., Ph.D. .......... Iowa
Sousa, G., Ph.D. ....................... Ohio State
Stephens, Roger L., M.M. .......... East Carolina
Stutzenger, D. R., D.M.A. .......... Maryland

Associate Professors:
Adams, Fay, M.M. .............. Tennessee
Batey, A. L., D.M.A. .......... South Carolina
Binder, S. L., D.M. .......... Florida State
Boling, M. E., M.M. .......... Tennessee
Brown, Donald R., Hs.D. ...... Colorado
Brunell, D. E., D.M. .......... Iowa
Carter, P. Z., M.M. ............... California
Davis, Dolly C., Ph.D. .......... Louisiana
Freeman, Carroll, M.P.A. ...... Oklahoma City
Gay, Jr., L. C., Ph.D. .......... Columbia
Hough, Don, M.M. .............. Tennessee
Murphy, B. A., Ph.D. .......... Ohio State
Royse, David, Ph.D. .......... Kent State
Searle, R. S., M.M. .......... Tennessee
Smith, C., B.M. ............... SUNY-Fredonia
Spero, G. R., M.M. .......... Indiana
Stephens, M. B., M.M. .......... Ohio State
Wentzel, A. N., M.M. .......... Southern Cal
Zelnamovich, Matus, M.A. ..... Loyola

Assistant Professors:
Al-Taee, N., Ph.D. .......... UCLA
Baldwin, Wesley, D.M.A. .......... Maryland
Carlson, R. G., Ph.D. ......... UNC, Chapel Hill
Ewell, P., Ph.D. ............ Yale
Haar, Paul, M.M. ........... Kansas
Hawthorne, W., Ph.D. .......... Cincinnati
Lee, Christy, D.M. ............ Florida State
Powell, Edward, D.M.A. .... North Texas
Richter, Jorge, M.M. .......... Andrews
Ryder, Donald, D.M.A. ......... Iowa

MISSION STATEMENT

The School of Music provides specialized training in music to prepare students for professional work or advanced study; for teaching music in the elementary and secondary schools, and in higher education; and for general cultural enrichment.

The curriculum of the School of Music, therefore, is designed to present the learning of music as an integrated whole. Solo and ensemble performance, theoretical and historical studies, concert attendance, and electives both within and outside the school are intended to provide a balanced education. The School also provides general music studies and performance.

PROGRAMS

The School of Music offers the Master of Music degree with a concentration in accompanying, choral conducting, composition, instrumental conducting, jazz, music education, music theory (with an optional emphasis in music technology), musicology, performance (organ, piano, strings, voice,
Concentrate in Performance, Pedagogy, Composition, Musicology, and Music Theory are available.

Music Education

GRADUATE COURSES

510 Foundations of Music Education (3) Historical, philosophical and aesthetic bases. Prereq: Consent of instructor.

520 Research in Music Education (3) Definition of research problems, data collection and analysis, and research report writing. Application of knowledge of research techniques to analysis of existing research literature in music education. Prereq: Consent of instructor.


570 Studies in Multicultural Music Education (3) Study of music literature, art and customs of various cultures appropriate for students in K-8. Strategies and techniques for teaching music at this level.

571 Musical Repertoire Laboratory (1) Performance of music from various cultures: production of musicals appropriate for students in grades K-8. Singing, dancing, acting, costumes, set design, traditional and non-traditional instrumental ensembles. Limited to students majoring or concentrating in art, dance or theatre. Prereq or coreq: 570. May be repeated. Maximum 2 hrs.

574 Analysis for Teaching for Professional Development (2) Strategies to document and analyze effectiveness of teaching and professional development. Study and application of various approaches. Coreq: 575.

575 Professional Internship in Teaching (1-8) Teaching and teaching-related experiences in professional settings in public schools. Enrollment limited to post-baccalaureate students in professional year program. Prereq: Admission to Teacher Education program and consent of School of Music. May be repeated. Maximum 12 hrs. S/N/C only.

580 Seminar in Music Education (3) Class investigation and individual reporting of pertinent topics and issues in music education. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

590 Special Topics in Music Education (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

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

593 Special Problems in Music Education (3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

Music Ensemble

GRADUATE COURSES

Prerequisite: By audition or consent of instructor.

502 Jazz-Saxophone Ensemble (1) May be repeated. Maximum 4 hrs.

503 Small Jazz Ensemble (1) May be repeated. Maximum 12 hrs.

504 Jazz Ensemble (1) May be repeated.

505 Studio Orchestra (1) May be repeated. Maximum 12 hrs.

506 Trombone Choir (1) May be repeated.

510 Percussion Ensemble (1) May be repeated.

511 Marimba Choir (1) May be repeated.

515 Chamber Music Ensemble (1) May be repeated. Maximum 12 hrs.

520 UT Singers (1) May be repeated.

530 Chamber Singers (1) May be repeated.

540 Opera Theatre (1) May be repeated.

550 Concert Band (1) May be repeated.

552 Symphonic Band (1) May be repeated. Maximum 12 hrs.

553 Wind Ensemble (1) May be repeated. Maximum 12 hrs.

554 Varsity Band (1) May be repeated.

559 Marching Band (1) May be repeated.

570 Symphony Orchestra (1) May be repeated.

580 Concert Choir (1) May be repeated.

589 Women’s Chorale (1) May be repeated.

599 Accompanying (1) May be repeated.

Music History

GRADUATE COURSES

410 Music History Genre (3) Topics vary. May be repeated. Maximum 6 hrs.

420 History of Opera (3) Dramatic, vocal, and orchestral elements in opera of Italian, French, and German schools, 1600-present.

430 Symphonic Literature (3) Literature for orchestra from Baroque to present, evolution of symphony.

450 Composer Seminar (3) Life and works of single composer. Subjects vary.

460 Music Aesthetics (3) Nature of music and musical experience, sense perception and emotions, music, and role of artist in society. Aesthetic viewpoint of individuals and historical eras through selected writings.

480 Music in Christian Worship (3) Hymnody, liturgies, and liturgical music.

540 Music in the Renaissance (3) From 1400 to 1600. Mass, motet, chansons, madrigal, and other vocal and instrumental forms and genres.

550 Music in the Baroque Period (3) From c.1600 to 1750; rise of opera and oratorio, sacred and secular cantatas, instrumental forms, performance practice.

560 Music in the Classic Period (3) Evolution of classical style from pre-classic music to music of Haydn, Mozart, and early Beethoven.

570 Music in the Romantic Period (3) Nineteenth-century musical styles from Beethoven to post-romantics.

580 Music in the Twentieth Century (3) From 1890, Debussy, to present, Stockhausen and others.

585 Topics in Music of the Americas (3) Topics vary.

590 Introduction to Ethnomusicology (3) Ethnomusicology as a scholarly discipline. History, theories, and methodologies as applied to study of music in culture. Prereq: Music in World Culture or equivalent.
Music Instrumental

**GRADUATE COURSES**

**490 Instrumental Conducting (3)** Development of knowledge and skills in instrumental conducting; study of various periods and composers and relationship of different styles to conductor's art; musical analysis and practice in conducting. Prereq: Music Education 240 or equivalent.

**510 Advanced Improvisation (3)** Further development of individual skills and solving individual problems in jazz improvisation. Prereq: 210 and 220.

**420 Jazz Pedagogy (1)** Methods and materials relating to teaching of jazz, designing and administering jazz programs, and rehearsal techniques for jazz ensembles. Prereq: Studio music and jazz major or consent of instructor.

**520 Seminar in Jazz (3)** Topic varies.

Music Jazz

**GRADUATE COURSES**

**410 Advanced Improvisation (3)** Further development of individual skills and solving individual problems in jazz improvisation. Prereq: 210 and 220.

**420 Jazz Pedagogy (1)** Methods and materials relating to teaching of jazz, designing and administering jazz programs, and rehearsal techniques for jazz ensembles. Prereq: Studio music and jazz major or consent of instructor.

**520 Seminar in Jazz (3)** Topic varies.

Music Keyboard

**GRADUATE COURSES**

**420-30 Piano Literature I (3)** Development of organ and organ literature from Middle Ages to present; problems of style and interpretation; pedagogical literature and methods; organ design. Prereq or coreq: Music History 220 and consent of instructor.

**460-70 The Organ and Its Literature I,II (3)** Development of organ and organ literature from Middle Ages to present; problems of style and interpretation; pedagogical literature and methods; organ design. Prereq or coreq: Music History 220 and consent of instructor.

**480 Teaching Class Piano (3)** Historical survey and evaluation of teaching materials and methodology for college and/or adult beginning piano classes, with collateral teaching experience. Prereq: Consent of instructor.

**485-95 Suzuki Piano Method I,II (2)** Psychology, procedures, and literature of Suzuki piano method. Must be taken in sequence. Prereq: Consent of instructor.

**490-491 Internship (2)** Opportunity for pedagogy students to gain experience in teaching beginning students under supervision of experienced instructors. Weekly discussion seminars.

**520 Piano Literature Seminar (3)** Topics vary. May be repeated. Maximum 6 hrs.

**531-41 Recital Project (2)** Preparation and accompaniment of full recital for accompanying concentrations only. 531--Vocal recital, 541--Instrumental recital. Prereq: Consent of instructor.

**540-50 Advanced Piano Pedagogy I, II (2)** Evaluation and study of methods and materials for teaching piano at all levels. Supervised laboratory teaching. Prereq: Consent of instructor. 550--Introduction and principles of Kodaly, Orff, Suzuki, Dalcroze Eurythmics, and class piano teaching. Prereq: Consent of instructor.

**560 Organ Literature Seminar (3)** Topics vary. May be repeated. Maximum 6 hrs.

**590 Advanced Instrumental Conducting (2)** Preparation and juried performance of band or orchestral work(s). Prereq: Consent of instructor.

Music Performance

**GRADUATE COURSES**

**403 Flute (1)**

**405 Oboe (1)**

**410 Bassoon (1)**

**415 Clarinet (1)**

**420 Saxophone (1)**

**425 Horn (1)**

**430 Trumpet (1)**

**435 Trombone (1)**

**440 Baritone (1)**

**445 Tuba (1)**

**450 Percussion (1)**

**455 Voice (1)**

**460 Violin (1)**

**465 Viola (1)**

**470 Cello (1)**

**475 String Bass (1)**

**476 Electric Bass (1)**

**479 Guitar (1)**

**480 Piano (1)**

**485 Harpsichord (1)**

**490 Organ (1)**

**494 Composition (1)**

**495 Composition with Electronic Media (1)**

**497 Improvisation (1)**

Music Technology

**GRADUATE COURSES**

**540 Computer Music Transcription (3)** Projects in notation, playback, and publication of music incorporating elements of word processing, graphic design, sequencing, and page layout. Study of MIDI protocol as applied to computer music workstation design. No credit toward M.M. concentration in Music Theory with technology emphasis. Prereq: Consent of instructor.

**555 Computer Projects (3)** High-level programming languages used to design and implement computer-managed instruction; Internet development tools; writing of documentation for computer projects. Prereq: 540 or equivalent.

**560 Technology in Music Research (3)** Use of technology for research projects in music analysis and pedagogy; development and execution of research project. Prereq: 550.

Music Theory

**GRADUATE COURSES**

**430-40 Counterpoint I,II (3)** Study of species counterpoint in modal and tonal styles, works of Palestrina and J. S. Bach. 430 - Prereq: 210 Theory III and 230 Advanced Ear Training III with grade C or higher. 440 - Prereq: 430 with grade C or higher.

**450 Choral Arranging (2)** Analysis of scores and writing of arrangements for choirs. Prereq: 210 Theory III and 240 Advanced Ear Training IV with grade C or higher. 460 - Prereq: 450 with grade C or higher.

**520 Analytical Techniques (3)** Analytical techniques, contemporary approaches. Tonal and neotonal music. Prereq: Consent of instructor.

**530 Music Theory Pedagogy (3)** Techniques, methods, and materials involved in college-level theory programs. Use of technology and review of existing software. Prereq: Consent of instructor.

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

Music Voice

**GRADUATE COURSES**

**410-20 Song Literature I,II (2)** German songs. 420-French, Italian, Russian, Scandinavian, Czechoslovakian, British, and American art songs. Graduate credit not available for students in vocal performance.

**425 Functional Diction for Singers (3)** Comprehensive survey of singing diction in six languages: English, French, German, Italian, Latin, and Spanish. Basic instruction in International Phonetic Alphabet; development of basic diction skills; overview of diction styles and traditions in each language; survey of diction resources and reference materials. Does not
fulfill deficiency requirements for graduate students in voice or accompanying.

510 Vocal Literature Seminar (3) Topics vary. May be repeated. Maximum 6 hrs.

520 Performance Techniques for Singers (1) Improvisation, movement, and basic techniques for dramatic vocal performance. Prereq: Vocal major or consent of instructor. May be repeated for credit. Maximum 2 hrs.

530 Opera Performance (2) Prereq: Consent of instructor. May be repeated. Maximum 4 hrs.

540 Opera Production (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

550-60 Advanced Vocal Pedagogy I,II (2,2) 550—Study of vocal production, examination of different methods. 560—Study of teaching materials, observation of studio teaching, analysis of vocal problems in selected students, and supervised teaching.

565 Special Projects in Vocal Pedagogy (3) Course is available only for graduate students majoring in vocal pedagogy. Prereq: Consent of instructor.

590 Vocal Chamber Music Performance (2) Prereq: Consent of instructor.

575 Internship in Vocal Pedagogy I (1) Opportunity for vocal pedagogy students to develop and improve applied teaching skills through a shared practicum experience in a seminar setting. Includes supervised instruction. Available only for graduate students majoring in vocal pedagogy. Prereq: Consent of instructor. May be repeated. Maximum 2 hours.

580-85 Choral Literature I,II (2,2) Choral music from middle ages to present with consideration of historical development of major choral genres.

590 Advanced Choral Conducting (2) Expansion and continued refinement of conducting technique. Score reading and preparation, rehearsal techniques, and interpretation of styles and performance practices. May be repeated. Maximum 8 hours.

594 Project in Choral Conducting Performance (1-3) Public performance, critical document; recording project. Prereq: Consent of instructor. May be repeated.

595 Choral Conducting Seminar (3) Topics vary. Prereq: 590 or consent of instructor. May be repeated.

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**Nuclear Engineering**

(College of Engineering)

**MAJOR DEGREES**

Nuclear Engineering ............... M.S., Ph.D.

Dodd, H.L., Head

**Professors**

Dodd, H.L. (Head), Ph.D. ........... Tennessee, P.E.

Groer, P.G., Ph.D. ..................... Vienna, P.E.

Miller, L.F., Ph.D. ..................... Texas A&M, P.E.

Ruggles, A.E., Ph.D. .................. Rensselaer, P.E.

Townsend, L.W., Ph.D. ............... Idaho, P.E.

Upadhyaya, B.R., Ph.D. ............. California, P.E.

**Research Professors**

Fontana, M.H., Ph.D. ................. Purdue, P.E.

Grossbeck, M.L., Ph.D. .............. Illinois, P.E.

Mihalcz, J.T., Ph.D. ................. Tennessee, P.E.

Mynatt, F.R., Ph.D. ................. Tennessee, P.E.

**Associate Professors**

Hines, J.W., Ph.D., M.B.A. ........... Ohio State, P.E.

Pevey, R.E., Ph.D. ................. Tennessee, P.E.

Scott, T.H., Ph.D. ................... Florida, P.E.

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**Research Assistant Professors**

A.V. Griboek, Ph.D. ......................... Russia (IPPE)

H.M. Moussa, Ph.D. ................. Tennessee, P.E.

**Emeritus Faculty**

Uhrig, R.E., Ph.D. ..................... Iowa State, P.E.

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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 program focusing on fission energy or fusion energy, or a radiological engineering concentration, which prepares students for careers in the radiation safety field (health physics). Both programs are designed for graduates of accredited undergraduate programs in engineering, physics, chemistry, biology, or mathematics. 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 an introductory course in nuclear engineering. If such competencies do not exist, the student must take appropriate courses for undergraduate credit. In addition to a B.S. degree in nuclear engineering, or the equivalent, must take 431 (Radiation Protection) and 470 (Nuclear Reactor Theory), both of which may be taken for graduate credit. The department head is the contact for all interested students, both those with nuclear engineering degrees and those from other disciplines. More detailed information about the Department of Nuclear Engineering is available on the web at http://www.engr.utk.edu/nuclear/

**THE MASTER’S PROGRAM**

A graduate program leading to the Master of Science degree is available to graduates of recognized undergraduate curricula as described above. Each applicant will be advised as to the necessary prerequisite courses before he/she enters the program. The minimum requirements for the M.S. degree in nuclear engineering are:

1. A major consisting of 12 semester hours of graduate courses in nuclear engineering which must include at least one of the following sequences: 511, 512, 521, 522; 551, 552; 571, 572; 581, 582.

2. A minor consisting 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.

4. One of the following three options for a culminating experience:

   a. A thesis project (6 hours of 500).
   b. Two to four engineering practice projects (6 hours of 598).
   c. One engineering practice project (3 hours of 598) plus 6 hours of additional nuclear engineering coursework.

Thus, options (a) and (b) result in a minimum total of 30 hours and option (c) results in a minimum total of 33 hours. The determination of which option a student may undertake is made by the student’s graduate committee and is based on the student’s personal interests, academic background, and work experience, as well as the nature of projects currently available in the department.

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**THE DOCTORAL PROGRAM**

Students in the field of nuclear engineering desiring to study for the Doctor of Philosophy degree must have a Bachelor of Science or Master of Science from a recognized university with a major in engineering, physics, chemistry, biology, or mathematics. All candidates are required to demonstrate general competence in a comprehensive examination in the areas of engineering science, mathematics, chemistry, physics, and nuclear engineering.

Specific requirements for the Ph.D. in nuclear engineering include:

1. A minimum of 48 semester hours beyond the bachelor’s degree, exclusive of credit for the M.S. thesis or nuclear engineering practice.

2. A maximum of 24 semester hours in doctoral research, Nuclear Engineering 600.

3. A minimum of 30 semester hours in nuclear engineering courses numbered 500 and above (or the equivalent), with at least 9 semester hours of 600-level courses. These are exclusive of thesis or dissertation credit.

4. A minimum of 12 semester hours in mathematics, computer science, or statistics courses beyond nuclear engineering undergraduate requirements numbered 400 or above.

5. A minimum of 6 semester hours in courses numbered 500 or above from a department other than nuclear engineering. The choice depends on the student’s overall program and should expand his/her knowledge in a given field.

The first part of the comprehensive examination is prepared by the nuclear engineering faculty and consists of 12 hours of written examination that is administered over a three-day period. All past written examinations are filed in the library, and students are encouraged to review them. Students are invited to take the written
examination after completing approximately 30 semester hours of graduate coursework. A student who fails the written examination must take and pass the examination the next time it is offered to remain in the Ph.D. program. Registration for 600 is not permitted until the written examination is passed. The second part of the comprehensive examination is completed with the successful oral defense of a written dissertation proposal. A candidate must successfully defend, in an oral examination, all work presented for the degree—all coursework and the dissertation.

CERTIFICATE IN MAINTENANCE AND RELIABILITY ENGINEERING

The College of Engineering offers a certificate program in maintenance and reliability engineering. The program is designed primarily for part-time students in that all of the courses are available through distance education (see http://www.anywhere.tennessee.edu/ne/default.htm).

The 12-credit certificate is earned by completing 483 and 484, which are cross-listed among all participating departments in the College of Engineering, plus two elective courses selected from a list of courses provided by the participating departments. Currently, the available elective courses are Industrial Engineering 516 and 591, Mechanical Engineering 534 and 599, Nuclear Engineering 579 and 585. The selection of elective courses is determined through an advising conference with each individual student, and is based on the student’s personal interests, academic background, and work experience. Applicants must meet the minimum criteria established by the Graduate Council.

CERTIFICATE IN NUCLEAR CRITICALITY SAFETY

The Department of Nuclear Engineering offers a certificate program in nuclear criticality safety. The program is designed primarily for part-time students in that all of the courses are available through distance education (see http://www.anywhere.tennessee.edu/ne/default.htm).

The 12-credit certificate is earned by completing 421, 543, and 582 plus one of the following three courses: 470, 571, or 581. The selection of one of the latter three courses is determined through an advising conference with each individual student, and is based on the student’s personal interests, academic background, and work experience. Applicants must meet the minimum criteria established by the Graduate Council. Students without a nuclear engineering background must take 301 (Fundamentals of Nuclear and Radiological Engineering) prior to beginning the graduate coursework described above.

GRADUATE CREDIT FOR UNDERGRADUATE COURSES

400-level courses in nuclear engineering may be used for graduate credit. However, at least two-thirds of the minimum required hours in the M.S. program must be taken in courses numbered 500 or above.

GRADUATE COURSES

403 Nuclear and Radiological Engineering Laboratory III (3) Cross-section Measurements, diffusion properties of neutrons, shielding, dynamics and controls, alpha and beta spectroscopy, radiation fields and dosimetry. Prereq: Nuclear and Radiological Engineering Laboratory II.

404 Nuclear Fuel Cycle (3) Mining, milling, fabrication, in-core management, reprocessing, waste disposal, regulatory and radiation health issues and requirements. Prereq: 470 or equivalent.


421 Introduction to Nuclear Criticality Safety (3) Fundamentals of nuclear criticality safety; criticality accidents; safety standards; overview of experiments, computational methods, and applications. Prereq: 301 Fundamentals of Nuclear/Radiological Engineering.


432 Radiation Risk Analysis (3) Radiation risk estimates for external and internal radiation, dose-response models, dose rate effects, prediction of radiation risks, radiation safety standards.

470 Nuclear Reactor Theory I (3) Fundamentals of reactor physics relative to cross sections, kinematics of elastic scattering, reactor kinetics, reactor systems and nuclear data. Analytical and numerical methods applicable to general criticality problems, eigenvalue searches, perturbation theory, and multigroup diffusion equations. Prereq: 301 Fundamentals of Nuclear/Radiological Engineering.

471 Nuclear Reactor Theory II (3) Thermal spectrum computational methods: heterogeneous effects in fast and thermal spectra; considerations in reactor core design; equations, thermal, and control variables; power distribution calculations and reactivity control methods. Prereq: 470.

483 Introduction to Reliability Engineering (3) Probabilistic failure models, parameter estimation (maximum likelihood, Bayes techniques), model identification and comparison, accelerated life tests, failure prediction, system reliability, preventive maintenance and warranty models. Senior standing or consent of instructor. (Same as Chemical Engineering 483, Industrial Engineering 483, and Mechanical Engineering 483.)

484 Introduction to Maintenance Engineering (3) Principles of maintenance and reliability engineering and maintenance management. Information extraction from machinery measurements, rotating machinery diagnostics, nondestructive testing, life prediction, failure models, lubrication oil analysis, establishing predictive maintenance program, and computerized maintenance management systems. Prereq: Senior standing in engineering and consent of instructor. (Same as Chemical Engineering 484, Industrial Engineering 484, Materials Science and Engineering 484, and Mechanical Engineering 484.)

494 Special Topics in Nuclear Engineering (3) Problems related to research. Prereq: Senior standing and consent of instructor. May be repeated. Maximum 6 hrs.

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

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

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 non-dimensional 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 and application of these methods to nuclear plant dynamics, simulation and control problems.


541 Reactor Fuel Management (3) Topics relative to in-core fuel management. Applicable topics in reactor physics, reactor core calculation and control and numerical methods. Prereq: 470 or consent of instructor.


543 Selected Topics in Nuclear Criticality Safety (3) Criticality safety computational and experimental methods for enrichment, reprocessing, and transport applications; overview of safety practices and regulatory requirements. Prereq: 421 or consent of instructor.

550 Radiation Measurements Laboratory (3) Physics and electronics associated with radiation detection and measurement, methods of data analysis. Applicability of particular detector measurements and fundamentals of radiation detection instrumentation operation. Prereq: 551.


552 Radiological Assessment and Dosimetry (3) Transport of radi nuclides in environment, food chain pathways, internal dosimetry and personnel dosimetry. Prereq: 551 or consent of instructor.

553 Radiation Risk Analysis (3) Methods for radiation risk prediction, survival analysis, parameter estimation, real data analysis, extrapolation techniques. Prereq: 552 or consent of instructor.

567 Medical Physics I (3) Ionizing radiation use in radiation therapy to cause controlled biological effects in cancer patients. Phys 57 of interaction of various radiation modalities with body equivalent materials and physical aspects of clinical applications. Lecture and lab. Prereq: Consent of instructor.

568 Medical Physics II (3) Physics of ionizing radiation therapy with emphasis on quality assurance, treatment planning, radiation protection, and special treatment procedures. Lecture and lab. Prereq: 567.

571 Reactor Theory and Design (3) Analytical and numerical techniques for neutronics modeling of nuclear systems. Forward and adjoint Boltzmann transport equation. Multigroup diffusion theory, Core analysis methods and codes. Prereq: 470 or consent of instructor, and must be taken in courses numbered 500 or above.

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: Consent of instructor.

577 Neural Networks in Engineering (3) Neural network techniques for use in intelligent systems. Rationale for neural computing, structure of neural computing systems, programming. Prereq: Consent of instructor. (Same as Engineering Science 577 and Engineering Science 577.)

578 Fuzzy Systems in Engineering (3) Fuzzy numbers, fuzzy environment, uncertainty and randomness, approximate reasoning, fuzzy models and structures, decision process in fuzzy environment, fuzzy computing, fuzzy logic controllers, fuzzy expert systems and other engineering applications. (Same as Engineering Science 578.)
579 Advanced Monitoring and Diagnostic Techniques (3) Fundamentals of machinery monitoring and diagnosis and application of advanced statistical and artificial intelligence based techniques such as ridge regression, principal component analysis (PCA), linear and non-linear partial least squares (PLS), neural networks, and fuzzy logic. Prereq: Graduate standing or consent of instructor.


582 Monte Carlo Analysis (3) Analysis of radiation transport problems in radiation shielding by Monte Carlo method, use of MCNP code system. Random sampling, evaluation of integrals, analog particle transport, techniques of variance reduction, forward and adjoint modes of analysis, importance function biasing, splitting/wedge window survival biasing and contribution theory. Prereq: Consent of instructor.

585 Process System Reliability and Safety (3) Qualitative and quantitative techniques for assessing and improving process systems reliability and safety. Fault tree analysis and associated dependent failure analysis. Prereq: Consent of instructor. (Same as Chemical Engineering 585.)

597 Special Topics in Nuclear Engineering (3) Lectures and recitation on recent advances in nuclear engineering. Prereq: Consent of instructor. May be repeated with consent of department.

598 Nuclear Engineering Practice (3-9) Experience in solving and reporting on engineering problems. Prereq: Approval of department. May be repeated. Enrollment limited to alternative plan students. S/NC only.

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

611-12 Selected Topics in Reactor Theory (3.3) Transport theory, control rod theory, stochastic methods. Selected topics from literature. Prereq: 572.

621 Selected Topics in Radiation Protection (3) Prereq: 551, 552. May be repeated with consent of department.

653 Theory of Information Processing (3) Modern system theoretical methods for evaluating system performance from dynamic measurements. Prereq: 522 or equivalent.

671 Advanced Topics in Applied Artificial Intelligence (3) Recent advances in engineering applications of artificial intelligence. Prereq: 577. (Same as Mechanical Engineering 671 and Engineering Science 671.)

697 Special Topics in Nuclear Engineering (3) Investigation of new developments. Prereq: Consent of instructor.

Nursing

(College of Nursing)

MAJOR DEGREE
Nursing ........................................ M.S.N., Ph.D.

Joan L. Creasia, Dean
Sandra McGuire, Chair of M.S.N. Program
Sandra Thomas, Chair of Ph.D. Program

Professors:
Creasia, Joan L., Ph.D. ............... Maryland Droppelmann, Patricia G., Ph.D. .... Tennessee Farr, Glen, Pharm.D. ............... Tennessee Groe, Maureen, Ph.D. ............. Illinois Mozingo, Johnie N., Ph.D. ........... Walden Thomas, Sandra P., Ph.D. ......... Tennessee

Associate Professors:

Assistant Professors:

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, nurse anesthesia, nursing administration, and nursing of women and children. The program is accredited by the National League for Nursing Accrediting Commission and is unconditionally approved by the Tennessee Board of Nursing.

The purpose of the Master's program in nursing is to prepare leaders, managers, and practitioners who facilitate achievement of optimal health in the dynamic health care system. The program prepares advanced practice nurses for a career in adult health nursing, nursing of women and children, mental health nursing, and nurse anesthesia as well as role preparation as nurse practitioners, clinical nurse specialists or nursing administrators. Advanced practice nursing involves the delivery of care, management of resources, interdisciplinary collaboration, and application of technology, information systems, knowledge, and critical thinking.

Admissions Requirements

1. Meet requirements for admission to graduate study.
2. Achieve a score of 500 or above on the verbal and on the quantitative portions of the Graduate Record Examination.
3. Achieve a TOEFL score of 550 or above if native language is not English.
4. Applicants for nurse anesthesia require an interview.
5. Hold a Bachelor's degree in Nursing (BSN) from an accredited program.

a. Hold or be eligible for licensure to practice nursing in Tennessee.

b. Have a cumulative undergraduate GPA of at least 3.0 on a 4-point scale.

c. Have satisfactorily completed the following prerequisite courses: chemistry (8 hrs); microbiology (including lab); anatomy and physiology (6-8 hrs); nutrition (covering lifespan in health and illness); behavioral sciences (12 hrs in sociology, anthropology, growth and development, and at least one general psychology course); undergraduate research course or equivalent; 3 hours of graduate level statistics prior to enrollment in graduate research course.

c. This option not available for nurse anesthesia students.

6. New students normally are admitted to the program only at the beginning of fall semester. However, under special circumstances, subject to resources, a space available basis, a B.S.N. graduate may be admitted at the beginning of spring or summer terms in a temporary non-degree status. Applications from full-time BSN and master’s entry students for fall admission must be received by February 1. Part-time and post-master’s applications must be received by October 1. Nurse anesthesia applications must be received by March 1 for spring admission.

Non-Degree Status

Only 503, 505, 510, 511, and 515 are open to students in Non-Degrees Status. Students not yet accepted into the Master’s Program must see the Chair of the MSN Program for advising prior to enrolling in any course.

Special Requirements

1. Each student must hold personal professional liability insurance and health 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 applicant must present evidence of current 2-person CPR certification.

5. Non-registered nurse students must have completed courses in chemistry, nutrition, microbiology, anatomy, and physiology plus 12 semester hours of behavioral science courses.

6. Contact student services for more detailed information about the application process: Student Services/MSN Program, UT
College of Nursing, 1200 Volunteer Blvd., Knoxville, Tennessee 37996-4180; phone: 865 974-7606.

**Thesis and Non-Thesis Options**

The thesis option is available for interested students and is especially encouraged for those who are considering pursuit of doctoral degrees sometime in the future. Students who choose the non-thesis option must register for 582 Scholarly Inquiry for Advanced Practice Nursing.

**Program Requirements**

All students must complete a minimum of 36 semester hours distributed as follows:

- **Core (9 credits)**
  - 503 Health Promotion in Advanced Practice Nursing 3
  - 510 Theoretical Foundations of Nursing 3
  - 520 Advanced Practice Nursing and Health Delivery Systems 3

- **Advanced Practice Core (9 credits)**
  - 504 Advanced Health/Physical Assessment 3
  - 505 Advanced Clinical Pharmacology 3
  - 515 Advanced Pathophysiology for Nursing Practice (not required for nurse anesthesia students) 3

- **Required for nurse anesthesia students:**
  - 506 Advanced Anesthesia Pharmacology 3
  - 516 Advanced Pathophysiology: Neurological and Cardiovascular with Anesthesia Implications 2
  - 517 Advanced Pathophysiology: Respiratory/Renal with Anesthesia Implications 2
  - 518 Advanced Pathophysiology: Obstetrics/Regional Anesthesia 2
  - 521 Basics of Nurse Anesthesia 6
  - 522 Integrated Health Science for Anesthesia 3
  - 523 Advanced Principles of Nurse Anesthesia Practice 2

- **Research (6-9 credits)**
  - 501 Nursing Research: Methods, Design and Analysis 3
  - 502 Scholarly Inquiry for Advanced Practice Nursing 3

- **Concentration (12-17 credits)—choose one**
  - 530-31 Adult Health Nursing I,II 12
  - 550-51 Nursing of Women and Children I,II 16
  - 560-61 Mental Health Nursing I,II 12
  - 570-71-72 Family Nurse Practitioner I,II,III 17
  - 590-91 Nursing Administration I,II 12

- **Elective (9 credits)—Required for students in nursing administration concentration only.**

  *Not required for nursing administration concentration.

Students who enter the program as non-RNs must complete the following undergraduated courses in addition to meeting the requirements listed above:

- 311 Foundations of Professional Nursing Practice 5
- 319 Pathophysiology of Health Deviations 4
- 333 Health Assessment 3
- 341 Health Promotion 3
- 351 Pharmacology I 2
- 352 Health Maintenance and Restoration across the Life Span 5
- 381 Professional Leadership Issues I 2
- 382 Health Promotion and Maintenance in the Community 4
- 406 Pharmacology II 2
- 415 Family/Community Health Nursing 6
- 421 Health Maintenance and Restoration in Mental Health 4
- 451 Professional Leadership Issues II 2
- 461 Health Restoration across the Life Span 5
- 432 Health Promotion, Maintenance and Restoration in the Community 3
- 490 Specialty Preceptorship 4

Registered nurses whose bachelor's degrees are not in nursing must have completed courses in chemistry, nutrition, microbiology, anatomy, and physiology plus 12 hours of behavioral science courses. They must also complete 305, 432, and 452 and complete or successfully challenge the following:

- 311 Foundations of Professional Nursing Practice 5
- 319 Pathophysiology of Health Deviations 4
- 333 Health Assessment 3
- 351 Pharmacology I 2
- 352 Health Maintenance and Restoration across the Life Span 5
- 403 Health Promotion and Maintenance in Childbearing Families 5
- 406 Pharmacology II 2
- 421 Health Maintenance and Restoration in Mental Health 4
- 451 Professional Leadership Issues II 2
- 461 Health Restoration across the Life Span 5
- 490 Specialty Preceptorship 4

A total of 19 credits can be obtained by successful completion of the NLN ACE Examination. See undergraduate catalog for other challenge options. RNs who are in the process of completing a BSN at UT with the intent of enrolling in the MSN program follow the same plan with the addition of 471.

**Final Examination Requirements**

All students must successfully complete a final examination as required by the Graduate Council. For thesis students, the examination will consist of an oral defense of the thesis as well as other written or oral questions designed to measure student mastery of the entire program of study. For non-thesis students, the written examination will cover the entire program of study and may, at the discretion of the student's committee, be followed by an oral examination.

**Special Policies**

1. If the clinical performance of any student for any course is found to be unsatisfactory, the student will receive a grade of “F” for the course.
2. If a student achieves a final grade of “D” or “F” for any required undergraduate or graduate nursing course, he or she will not be permitted to repeat the course and will be required to withdraw from the program.
3. If the clinical performance of any student is characterized by unethical, unprofessional or unsafe behavior, or behavior that places the client in jeopardy, the student will be required to withdraw from the program.
4. Students are expected to maintain a 3.0 cumulative GPA; however, students must maintain a grade of B or better in clinical concentration courses and/or directed clinical practice. Graduate students are not permitted to repeat a course, repeat an exam or do additional work for the purpose of raising a grade already received. A student who receives a final grade below a B in a clinical concentration course will be dismissed from the program. A student whose cumulative GPA drops below a 3.0 as a result of earning grades of C in other courses will be placed on academic probation. A student will be allowed to continue in graduate study while on academic probation as long as each semester's grade point average is 3.0 or better and the grade for clinical concentration work is at least 3.0.

**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, and expand the theoretical basis of nursing.
2. Conduct research that generates knowledge and advances nursing as a discipline.
3. Provide leadership as nurse scientists who can function in a variety of roles and settings.
4. Collaborate with members of other disciplines in health-related research.
5. Develop, implement, evaluate, and recommend health care policy.
6. Demonstrate professionalism, advocacy, ethical principles and scientific integrity.

**Admission Requirements**

1. Meet requirements for admission to graduate study.
2. Hold a master's degree in nursing from a program accredited by the National League for Nursing. Some outstanding applicants who are prepared at the bachelor's level in nursing may be considered. In such cases, graduate level courses in nursing theory, concentration specialty, and/or research will be integrated into the formal program of doctoral degree requirements.
3. Have a minimum cumulative graduate grade-point average of 3.3 on a 4.0 scale for previous college work.
4. Have a combined score of at least 1000 on the verbal and quantitative sections of the Graduate Record Examination.
5. Have successfully completed a basic statistics course and graduate nursing theory and research courses prior to enrollment in nursing doctoral level courses.
6. Have TOEFL scores of at least 550 if native language is not English.
7. Complete Graduate Program Data Form, College of Nursing.
8. Submit Graduate Rating Forms from three college level instructors and/or nurses and administrators who have supervised applicant’s professional work.
9. Submit a sample of scholarly writing (e.g., thesis, published paper).
10. Submit an essay describing personal and professional aspirations.
11. Submit Graduate Application for Admission, academic transcript(s), Graduate Record Examination scores, and, if required, TOEFL scores to the Office of Graduate Admissions. Submit three Graduate Rating Forms, sample of scholarly writing, and Graduate Program Data Form with essay to the Director of the PhD program prior to November 1 of the year prior to fall admission.
12. Schedule a personal interview with the College of Nursing MSN Student Admissions Committee prior to March 16 of the year preceding Fall admission. International applicants may be interviewed by telephone or teleconferencing at the discretion of the admissions committee.

Program Requirements
The following courses are required for all students:

601 Nursing Knowledge Development 3
602 Theory Analysis and Construction 3
603 Nursing Research and Inquiry 3
605 Middle-Range Theoretical Formulations for Nursing Science Development 3
606 Nursing Research Seminar 3
607 Qualitative Nursing Research 3
608 Quantitative Nursing Research 3
609 Research Practicum* 2
610 Nursing Science Seminar 2
611 Advanced Nursing Seminar 2
612 Health Nursing Policy/Planning 3
613 Nursing Leadership in Complex Systems 3
   -- Inferential Statistics 3
   -- Multivariate Statistics 3
   -- Cognates 6
   -- Elective 3
600 Dissertation 24
TOTAL 72

*Note: 1 hour per semester must be taken for 2 semesters.

Possible cognate areas include, but are not limited to, anthropology, child and family studies, psychology, education, management, medical ethics, public health, social work, philosophy, and statistics.

Doctoral Committee
Early in the student’s program, a nursing faculty advisor will be selected by the student in consultation with the program director. The student’s comprehensive examination committee consists of the faculty teaching core courses and one representative from the cognate area. The student then selects the dissertation committee. Four faculty holding the rank of assistant professor or above comprise the committee, three of whom (including the chair) must be approved by the Graduate Council to direct doctoral dissertations. At least one member of the committee must be from an academic unit other than nursing.

Special Policies
1. A maximum of 6 graduate hours taken before acceptance into the doctoral program may be applied toward the degree.
2. A minimum grade of B in all nursing doctoral courses and a 3.0 cumulative GPA are required for continuation in the program.

Nursing Education Minor
Graduate students in the College of Nursing may pursue a Nursing Education Minor. The minor consists of 12 hours: 6 hours in Nursing and 6 in Education.

Required courses in the College of Nursing are 566 Education Principles and Strategies (3) and 565 Nursing Education Practicum (3). Students select from a listing of courses in the College of Education, Health, and Human Sciences (see CON Graduate Handbook for listing) or courses at the discretion of the student and advisor.

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 about aging in American society with his/her major concentration.

POST-MASTER’S CERTIFICATES
The College of Nursing offers post-master’s certificate programs for nurses who need additional training. A master’s degree in nursing is required for admission. The total hours will vary depending on the student’s academic record, clinical experience and objectives. Students must complete a minimum of 12 credits. Most students complete 16-20 hours of course credit with the exception of those pursuing the nurse anesthesia certificate. Typically, this certificate program requires students who have completed the master’s degree in nursing within the preceding five years to complete 60-70 hours of course work. Contact the MSN chair for more information.

• Adult Health Nursing
  Course requirements are 530, 531, and 572, plus additional hours as determined by the college.

• Family Nurse Practitioner
  Course requirements are 570, 571, and 572, plus additional hours as determined by the college.

• Mental Health Nursing
  Course requirements are 560 and 561, plus additional hours as determined by the college.

• Nurse Anesthesia
  In addition to the general requirements for admission to graduate study and the College of Nursing, the following are required of all nurse anesthesia certificate applicants:
  1. One year of critical care experience with adult clients.
  2. Certification in Advanced Cardiac Life Support (ACLS) and Pediatric Advanced Life Support (PALS).
  3. A personal interview. Course requirements are 506, 516, 517, 518, 521, 522, 523 of nurse anesthesia didactic content, plus additional hours as determined by the college and 54 hours of nurse anesthesia clinical practice courses, 544, 545, 546, 547, 548, 549, 583.

  • Nursing Administration
  Course requirements are 590 and 591, plus additional hours as determined by the college.

  • Nursing Education
  The Post-Master’s Certificate in Nursing Education consists of 12 hours: 6 hours in Nursing and 6 in Education. Required courses in the College of Nursing are 566 Education Principles and Strategies (3) and 565 Nursing Education Practicum (3). Students select from a listing of courses in the College of Education, Health, and Human Sciences (see CON Graduate Handbook for listing) or may substitute courses at the discretion of the student and advisor.

  • Nursing of Women and Children
  Course requirements are 550 and 551, plus additional hours as determined by the college.

GRADUATE COURSES

400 Aging and Society (3) An examination of the health and social effects of longevity and the aging process including societal and personal attitudes about old age. Resources, trends, issues, and potentials of aging are explored. Volunteer community service, a service learning component, is required. Open to students in all colleges.

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

501 Nursing Research: Methods, Design, and Analysis (3) Basic principles of research process in application to clinical questions; critical evaluation of nursing and health-related research. Prereq or coreq: Graduate level statistics.

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/N only.

503 Health Promotion in Advanced Practice Nursing (3) Principles of health promotion, education, and innovative strategies for achieving wellness of individuals, families, groups, and communities. Prereq: Admission to MSN program or consent of instructor.

504 Advanced Health/Physical Assessment (3) Development of advanced clinical reasoning and assessment skills to determine client health status and needs. Application of physiological, pathophysiological, and psychosocial concepts with implications for advanced practice nursing. Prereq: Admission to MSN program or consent of instructor. Didactic (2.5) and lab (1.5).

505 Advanced Clinical Pharmacology (3) Pharmacological agents utilized to treat common, recurrent health problems; indications, contraindications, side and interactive effects of commonly prescribed drugs. Prereq: Undergraduate pharmacology course or consent of instructor.

506 Advanced Anesthesia Pharmacology (3) Continuation of 505. Pharmacological implications of anesthetic delivery to acutely ill patients with multisystem influences. Advanced states of illness, extremes of age, and co-morbidities. Agents used in general
anesthesia, regional anesthesia, IV regional anesthe-sia, acute pain management, and chronic pain man-
agement. Anesthetic implications of pharmacotherapy in perioperative and postoperative care. Prereq: 504 or 505.

509 Graduate Seminar in Public Health (1) (Same as Public Health 509, Exercise Science 509, Nutrition 509, and Social Work 509.)

510 Theoretical Foundations of Nursing (3) (Histori-cal evolution of nursing science; nursing’s metaparadigm and selected philosophies, conceptual models and theories as structures which guide critical thinking in analysis, reasoning, and decision making for advanced practice. Prereq or coreq: Admission to MSN program or consent of instructor.

511 Statistical Applications to Nursing Research (3) Descriptive and inferential statistics: statistical concepts and applications to clinical settings and their implications for advanced practice nursing.

515 Advanced Pathophysiology for Nursing Practice (3) Advanced physiologic and pathophysiologic concepts, principles, and theories applied to deviations of human systems. Prereq: Undergraduate pathology course.

516 Advanced Pathophysiology: Neurological/Cardiovascular with Anesthesia Implications (2) Review of anatomy and physiology and integrated pathophysiology involved in patients requiring anesthetic care for cardiac surgical procedures (both children and adults), and those patients without cardiomyopathy, bypass, interventional surgical procedures for vascular and mass occupying lesions, patients requiring somato-sensory evoked potential monitoring, and patients requiring anesthetic for noncardiac and non-neuro- logical procedures who present with either neurologi-cal and/or cardiovascular morbidity. Prereq: 521, Coreq: 523.


520 Advanced Practice Nursing and Health Deliv-ery System (4) Exploration of health care delivery system: health policy and organizational, social, ethi-cal, political, economic and technological factors which impact advanced practice nursing and delivery of health care. Prereq: Admission to MSN program or consent of instructor.


522 Integrated Health Science for Anaesthesia (3) Fundamental principles of chemistry and physics as related to practice with nurse anesthesia. Correlation of principles to clinical anesthesia practice. Prereq, or coreq: 521.

523 Advanced Principles of Nurse Anaesthesia Practice (2) Continuation of 521. Advanced concepts/principles of anesthetic agent and drug and legal impli-cations of nurse anesthesia practice.

530 Adult Health Nursing I (6) Advanced nursing practice for health promotion, restoration, and mainte-nance of youth, middle-aged, and older adults. Theo-ries and research to advanced practice with individual clients in variety of settings. Prereq: 504, 505, 515. Prereq or coreq: 503, 510, 520. Didactic (2) and practicum (4).

531 Adult Health Nursing II (6) Continuation of 530. Delivery, provision, and management of health care for adult groups and communities. Prereq: 530. Coreq: 532. Didactic (2) and practicum (4).

544-45-46-47-48-49 Clinical Nurse Anaesthesia Practicum/Seminar I, II, III, IV, V, VI (2-11) Integration and application of selected knowledge and skills in the development of clinical skills in nurse anesthesia practice under supervision of Certified Registered Nurse Anes-thetist (CRNA) and/or anesthesiologist. Prereq: 544: Admission to program in nurse anesthesia, concentration. Prereq for 545: 544, 521, 504, 505. Must be taken in sequence.

550 Nursing of Women and Children I (8) Advanced practice nursing for women and children with special emphasis on obstetrics, gynecologic surgery, and trauma. Prereq: 504, 505, 515. Prereq or coreq: 503, 510, 520. Didac-tic (3) and practicum (5).

551 Nursing of Women and Children II (8) Continuation of 550. Role refinement of nurse practitioner or clinical specialist in women’s health and gynecologic surgery. Prereq: 550, 501. Prereq or coreq: 582. Didactic (3) and practicum (5).

556 Mental Health Nursing I (6) Theories of advanced therapeutic interventions for clients experi-encing mental health problems. Prereq: 504, 505. Prereq or coreq: 503, 510, 520. Didactic (2) and practicum (4).

557 Mental Health Nursing II (6) Continuation of 556. Advanced practice nursing in community settings for families and groups with actual and potential mental health problems. Prereq: 556, 501. Prereq or coreq: 582. Didactic (2) and practicum (4).

560 Mental Health Nursing I (6) Theories of advanced therapeutic interventions for clients experi-encing mental health problems. Prereq: 504, 505. Prereq or coreq: 503, 510, 520. Didactic (2) and practicum (4).

564-566-568-570-575-576-578-580-582-585 Seminar in Gerontology (1) (Same as College of Education 585, Educational Psychology 585; Exercise Science 585: Health 585; Public Health 585; Social Work 585; and Sociology 585.)

590 Nursing Administration: Macro-Analysis (6) Exploration, analysis, and application of selected or-ganizational, management, and leadership theories and financial principles to delivery of nursing services. Prereq: 504, 505. Prereq or coreq: 501, 520. Didactic (2) and practicum (4).


593 Independent Study (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

600 Doctoral Research and Dissertation (3-15) Prereq: Qualitative Research Methods (3) and Quantitative Research Methods (3).

601 Nursing Knowledge Development (3) Philosophical and historical context of knowledge for nurs-ing science; extant nursing models and theories as found in advanced practice nursing building; concept develop-ment in theory building.

602 Theory Analysis and Construction (3) Analysis of existing theories of person, environment, health, nursing, and caring; introduction to and practical ex-ploitation of existing and new theory development. Prereq: 601, 610, or consent of instructor.


606 Nursing Research Seminar (3) Selected topics pertaining to dissertation proposal process, research experience, and defense.

607 Qualitative Nursing Research (3) Critique and application of qualitative nursing research methods. Prereq: 601, 602, 603.

608 Quantitative Nursing Research (3) Critique and application of quantitative nursing research methods. Prereq: 601, 602, 603, 604, 605, 606.

609 Research Practicum (1) Research practicum (1) under the supervision of faculty and/or university. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. S/NC or letter grade.

610 Nursing Science Seminar (2) Critical Analysis and synthesis of literature in selected focus area within nursing science. Prereq: Admission to doctoral program in nursing or consent of instructor.

611 Advanced Nursing Seminar (2) Exploration of historical and current issues of interest to docto- rally prepared nurses.

612 Advanced Nursing Seminar (2) Exploration of health and policy issues related to advanced practice nurs-ing.

613 Nursing Leadership in Complex Systems (3) Exploration, analysis, and application of selected organizational, management, and leadership theories and financial principles to delivery of nursing services. Prereq: 504, 505. Prereq or coreq: 501, 520. Didactic (2) and practicum (4).

614 Nursing Preceptorship (3) Individually-designed clinical role, field, or internship experiences in variety of administrative, educational, research, or clinical prac-tice settings. Prereq: 501, 602.

Nutrition (College of Education, Health, and Human Sciences)

MAJORS DEGREES
Human Ecology .............................. Ph.D.
Nutrition ................................. M.S., M.S.-M.P.H.

Jay Whalen, Head

Professors:
Karlstad, Michael, Ph.D. ............... Loyola
Sachan, Dileep S., Ph.D. ................. Illinois
Skinner, Jean D., Ph.D. ................. Oregon State
Whelan, Jay, (Liaison), Ph.D. ........... Penn State
Zemel, Michael, (Liaison), Ph.D. ...... Wisconsin

Associate Professors:
Bailey, James W., Ph.D. ............... Iowa State
Burney, Janie, Ph.D. ..................... Tennessee
Greer, Betty P., M.A. ................. Tennessee
Haughton, B., Ed.D. .................... Columbia
Moussa, Naima, Ph.D. ................. Paris

Assistant Professors:
Bittle, Joyce (Memphis), Ph.D. ...... Tennessee
Jones, Sonya, Ph.D. ..................... North Carolina
Kim, Jung-Han, Ph.D. ................. Tennessee
Truett, Gary, Ph.D. .................... Georgia

The Department of Nutrition offers graduate programs leading to degrees, majors, and concentrations in:

**Master of Science**
- Nutrition
- Nutrition Science
- Public Health Nutrition

**Master of Science – Master of Public Health (Dual Degree)**

**Doctor of Philosophy**
- Human Ecology
- Nutrition

The Master of Science program is available in Nutrition, with a concentration in nutrition science or public health nutrition.

A graduate degree combined with a Dietetic Internship (D.I.) beyond the baccalaureate degree qualifies the graduate to apply for the Registration Examination to become a Registered Dietitian (R.D.). Students may request more information from the department about the D.I. program. The Dietetic Internship is currently granted accreditation by the Commission on Accreditation for Dietetics Education of The American Dietetic Association, 216 W. Jackson Blvd., Chicago, IL 60606-6995, Tel: 312 899-5400. Students may also select an interdisciplinary minor in gerontology.

**ADMISSION REQUIREMENTS**

A complete file for review includes the Graduate Application for Admission file, completed departmental application form, Graduate Record Examination (GRE) scores for the general section, and three Graduate 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, 37996-1900. Forms may also be obtained from the Department’s web site at http://nutrition.utk.edu/.

Admission into the graduate program in the department is dependent on completion of undergraduate courses that give the necessary background for success in the graduate program. Required undergraduate courses include: general and organic chemistry, physiological chemistry/biochemistry, physiology, statistics and advanced nutrition. Admission to the Ph.D. program in Human Ecology with a concentration in Nutrition Science requires a master’s degree. Applicants to all programs with related experience may be given preference.

**THE MASTER’S PROGRAM**

Students may choose a thesis or non-thesis option in Nutrition. Attendance at Nutrition 540 is required every semester.

**Thesis Option:** The program consists of a minimum of 33 hours with at least 16 hours of coursework in the department. NTR 511, 512, 540, 541 and 3 hours of graduate level statistics are required. Students in public health nutrition must take 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 or 600 level is required.

An oral comprehensive examination is required upon completion of the thesis.

**Non-Thesis Option:** The program consists of a minimum of 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 M.S.-M.P.H. PROGRAM**

The College of Education, Health, and Human Sciences offers a coordinated dual program leading to the conferral of both the Master of Science with a major in Nutrition (public health nutrition concentration) and the Master of Public Health. The dual program allows students to complete both degrees in less time than would be required to earn both degrees independently.

The program is designed to meet the needs of students who are interested in the benefits of majors in both nutrition and public health. Therefore, it accommodates the interests of students who: 1) plan a career in public health nutrition and want to acquire the knowledge and skills of the nutritionist and public health professional; 2) plan a career in...
nutrition and want to acquire the knowledge and skills and the perspective of the public health professional; or 3) plan a career in public health and want to acquire the knowledge, skills and perspective of the nutritionist.

Admission Requirements

Applicants for the M.S.-M.P.H. program must make separate application to, and be competitively and independently accepted by, the Department of Nutrition for the M.S., Department of Health and Safety Sciences for the M.P.H., and the Public Health Academic Program committee.

Students who have been accepted by both departments may apply for approval to pursue the dual program anytime prior to, or after, matriculation in either or both departments. Such approval will be granted, provided that dual program studies be started prior to entry into the fourth semester of the M.S. and M.P.H. programs.

Curriculum

A dual degree candidate must satisfy the requirements for both the M.S. (public health nutrition concentration) and the M.P.H. degrees, as well as the requirements for the dual program. All candidates for the dual degree must successfully complete Health and Society (PH 555), two credits of Seminar in Public Health (PH 509), and a minimum of 60 credits. The Department of Nutrition will award a maximum of 9 semester hours of credit toward the M.S. degree for successful completion of approved graduate level courses offered in the Department of Health and Safety Sciences. The Department of Health and Safety Sciences will award a maximum of 11 semester hours of credit toward the M.P.H. degree for successful completion of approved courses offered in the Department of Nutrition. All courses for which such cross-credit is awarded must be approved by the Public Health Academic Program Committee and the student’s graduate committee. A single block field experience (or public health internship) is required of all students and the analytical field paper incorporates public health nutrition and the student’s public health concentration.

Dual degree students who withdraw from the program before completion of the requirements for both degrees will not receive credit towards the M.S. or M.P.H. degree for courses taken in the other program, except as such courses qualify for credit without regard to the dual program.

Approved Dual Credit

M.S. courses to be counted toward the M.P.H. program must include 10 semester hours of Field Study in Community Nutrition (NTR 515) and 1 semester hour of Graduate Seminar in Public Health (NTR 509). M.P.H. courses to be counted toward the M.S. include Public Health Administration (PH 520), Biostatistics (PH 530), and Epidemiology (PH 540).

THE PH.D. PROGRAM

The Doctor of Philosophy degree enables students to study the science of nutrition from the cellular/molecular level to the application of nutrition principles by people in a changing environment.

The doctoral program emphasizes cellular/molecular nutrition, human nutrition, nutritional epidemiology, and experimental nutrition. Cognate areas may include anthropology, biochemistry, chemistry, communications, education, food technology, human development, physiology, public health, sociology, statistics, and/or toxicology.

Minimum requirements include:
1. Sixteen hours in nutrition including 4 hours at the 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.

MINOR IN NUTRITION

The graduate minor consists of Nutrition 511 and 512 plus at least three hours from any letter-graded 500-level or above nutrition courses.

GRADUATE COURSES

500 Thesis (1-15) P/NP 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.
508 Culture, Food, and Nutrition (3) Food-related behavior of individuals and groups in United States. Sociocultural, economic, and technological influences. Nutrition and food surveys, public policy. Prereq: Advanced Nutrition or consent of instructor.
509 Graduate Seminar in Public Health (1) (Same as Public Health 509,Exercise Science 509, Nursing 509 and Social Work 509.)
511 Advanced Physiological Chemistry (4) Bioenergetics, flux control and hormonal interrelationships. Prereq: Advanced Nutrition or equivalent.
513 Community Nutrition I (3) Orientation to community assessment of nutrition problems, needs, and resources; functional roles of public health nutritionist. Concurrent field experiences. Prereq: Advanced Nutrition or consent of instructor.
514 Community Nutrition II (3) Planning, implementation, and evaluation of public health nutrition programs. Concurrent field experiences. Prereq: 513 or consent of instructor.
515 Field Study in Community Nutrition (1-12) Personal participation in and analysis of state or regional community nutrition program. Location of in-depth study to be selected in consultation with instructor. Prereq: 513, 514 and consent of instructor. S/NC only.
517 Childhood and Adolescent Nutrition (3) Application of nutrition principles to school age children: effects of diseases on growth and health maintenance; nutritional assessment and counseling for nutrition. Prereq: Advanced Nutrition or consent of instructor.
518 Nutrition and Aging (3) Nutritional problems of adults; nutritional requirements, dietary intakes; effects of nutrition on biological aging. Prereq: Advanced Nutrition or consent of instructor.
520 Nutritional Ecology (2) Examination of issues in natural, political, physical, and social environments that impact availability of food and nutrients in U.S. food supply.
521 Physiological Basis for Diet and Disease (3) Altered nutrient needs as result of metabolic changes that occur in selected disease states. Prereq: Nutrition in Disease or consent of instructor.
522 Nutrition Counseling (2) Individual eating habits and disorders, evaluation strategies for effectiveness of helping process. Prereq: Nutrition in Disease or consent of instructor.
524 Nutrition Education: Principles, Implementation, and Evaluation (3) Conceptual models, principles, application, and evaluation models in nutrition education research. Prereq: 508 or consent of instructor.
530 Molecular Application in Nutrient-Gene Interaction (1) Theories and applications of gene regulation methodologies. Experimentation with DNA and RNA. RNA and DNA isolation and analysis to illustrate nutrient regulation of gene expression. Combination of lab/lecture.
540 Seminar in Nutrition (1) May be repeated. S/NC only.
541 Research Methods (2) Basic principles of planning, conducting, and interpreting nutrition and foodservice systems administration research. Prereq: 6+ graduate hrs in nutrition and food system administration and statistics.
542 Advanced Experimental Nutrition (2) Application of research principles to individual project using experimental animals. Prereq or coreq: 541.
544 Survey Methods in Food and Nutrition (2) Application of survey research methods to nutrition projects: assessment of food consumption, nutrient intake, nutritional status, sociocultural-economic parameters, food production and service. Prereq or coreq: 541.
547 Field Experience (3-9) Experience in food-related industry or agency under supervision of faculty member. Prereq: Consent of instructor. S/NC only.
548 Directed Study in Nutrition (1-3) Advanced study in nutrition. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.
549 Special Topics (1-3) Recent advances in nutrition or food systems administration. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.
600 Doctoral Research and Dissertation (3-15) P/NP only.
602 Advanced Topics in Nutrition Science (1-3) Comprehensive individual study and group discussion of topics related to current problems in nutrition. Prereq: 512 or consent of instructor. May be repeated.
603 Current Trends in Food and Sociocultural Change (2) Critical evaluation of research. Prereq: 508 or consent of instructor.

Pathology

See College of Veterinary Medicine and Comparative and Experimental Medicine
Philosophy
(Chapel of Arts and Sciences)

MAJOR DEGREES

Philosophy ........................................... M.A., Ph.D.

John Hardwig, Head

Professors:
Aquila, Richard E., Ph.D. .................. Northwestern
Arnold, Denis G., Ph.D. ................. Minnesota
Cohen, Sheldon M., Ph.D. ............... Northwestern
Graber, Glenn C., Ph.D. .................... Michigan
Hardwig, John, Ph.D. ...................... Texas
Nolt, John E., Ph.D. .............................. Ohio State
Postow, Betsy C., Ph.D. ...................... Yale

Associate Professors:
Bennett, James O., Ph.D. ..................... Tulane
Bohstedt, Kathleen Emmett (Liaison), Ph.D. ..................... Ohio State
Hamlin, H. Phillips, Ph.D. .................... Georgia

Assistant Professors:
Kaplan, Jonathan M., Ph.D. ............ Stanford
McLeod, Carolyn W., Ph.D. ............... Dalhousie
Reidy, David A., Ph.D. ......................... Kansas

The Department of Philosophy offers graduate study leading to the Master of Arts and Doctor of Philosophy. The M.A. program includes thesis and non-thesis options and offers a concentration in medical ethics and in religious studies. The Ph.D. program also has a concentration in medical ethics. Detailed information may be obtained from the Director of Graduate Studies in Philosophy.

THE MASTER’S PROGRAM

The department offers both a thesis and a non-thesis option. The course requirements for an M.A. with thesis are 30 hours, including 6 hours in Philosophy 500. Of non-thesis hours, at least two-thirds must be in courses at or above the 500 level. No philosophy course numbered under 400 may be taken for graduate credit. There are no particular courses that M.A. students are required to take. The nature of the student’s coursework should be determined in consultation with the student’s faculty committee. The non-thesis M.A. requires 30 hours of coursework of which at least two-thirds must be in courses at or above the 500 level. Students seeking the non-thesis option must also pass a final written examination on all work offered for the degree. An additional oral examination may be required. As a part of the Master’s degree, in addition to a final comprehensive examination, a culminating (capstone) experience is expected. Examples of culminating experiences include presenting a paper at a refereed national or regional philosophy conference, or presenting a paper at a departmental colloquium.

THE DOCTORAL PROGRAM

Students must hold an M.A. with a major in Philosophy or an equivalent degree when entering the Ph.D. program. Thirty-three hours of coursework beyond the M.A. are required, of which 6 hours will be in courses numbered above 600. See the Philosophy Department Graduate Student Handbook for specific course requirements.

Students must demonstrate a reading knowledge of one foreign language, normally a living language in which there exists a significant body of philosophical literature. (In special circumstances relating to the area of dissertation research, the Graduate Committee may approve a language not satisfying these conditions.) This may be done by passing the doctoral language examination given by the appropriate department, if available, or by passing French 302 or German 332 with a B or better. Bi- or multilingual (normally, foreign) students whose native language (other than English) is one in which there is a significant body of philosophical literature, are exempted from the foreign language requirement. Students receiving the Ph.D. with concentration in medical ethics are also exempted.

CONCENTRATIONS

Medical Ethics
The department has an M.A. and Ph.D. program of graduate study with a concentration in medical ethics. Detailed information concerning the program may be obtained from either the Director of Graduate Studies in Philosophy or the Director of the Medical Ethics Program.

Religious Studies
The department has an M.A. program of graduate study with a concentration in religious studies. Details concerning the program may be obtained from the Director of Graduate Studies in the Department of Religious Studies.

GRADUATE COURSES

400 Special Topics (3) May be repeated when topic varies. Maximum 6 hrs.
411 Modern Religious Philosophies (3) (Same as Religious Studies 411)
419 Science as Method (3) (Same as Ecology and Evolutionary Biology 419 and Botany 419)
420 Topics in History of Philosophy (3) Figures or movements from antiquity through mid-twentieth century. Prereq: 6 hrs of philosophy or consent of instructor. May be repeated when topic varies. Maximum 9 hrs.
435 Intermediate Formal Logic (3) Metatheory of formal logic and philosophy of logic. Prereq: Consent of instructor.
440 Contemporary Ethical Theory (3) Topics in meta-ethics 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.
462 Philosophy of Biology (3) Current issues: nature of natural selection, adaptation, and fitness; level of selection debate; nature of species; interaction of environment and organism, and others. Prereq: upper division coursework in philosophy or biology or consent of instructor.
472 Philosophy of Language (3) Problems of meaning, reference and truth. Relation between words and world. How sentences manage to be about the world. What is true? Prereq: 3 philosophy courses 200 level or above.
473 Philosophy of Mind (3) Problems of mind and body in relation to consciousness and personal identity. Prereq: 6 hrs of philosophy or consent of instructor.
479 Studies in Recent Continental Philosophy (3) Selected thinkers or topics: existentialism, phenomenology, hermeneutics, structuralism, post-structuralism. Prereq: 6 hrs of philosophy or consent of instructor. May be repeated when topic varies. Maximum 6 hrs.
500 Thesis (1-15) P/NP 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.
510 Philosophical Research (3) Paper workshop (writing, revising papers, getting papers ready to publish). Does not count toward hours required for degree. May be repeated. S/NC only.
520 Topics in Ancient or Medieval Philosophy (3) Intensive critical work on major philosopher or school. May be repeated. Maximum 9 hrs.
522 Topics in Modern Philosophy (3) Intensive critical work on major philosopher or school. May be repeated. Maximum 9 hrs.
524 Topics in Twentieth-Century Philosophy (3) Intensive critical work on themes in late 20th-century philosophy. May be repeated. Maximum 9 hrs.
528 Topics in Contemporary Philosophy (3) Intensive critical work on themes in late 20th-century philosophy. May be repeated. Maximum 9 hrs.
540 Topics in Ethics or Value Theory (3) May be repeated. Maximum 9 hrs.
542 Topics in History of Ethics (3) Dominant movements in history of ethics. May be repeated. Maximum 9 hrs.
544 Topics in Applied Ethics (3) Single author, tradition, or topic in ethical theory, application to issues in health, business, technology, ecology, and other practical fields. May be repeated. Maximum 9 hrs.
546 Orientation to Medical Ethics (3) Survey of ethical theories in application to issues in medical ethics.
547 Ethical Issues in Mental Health (3) Values in “mental health” and “mental illness,” informed consent in psychiatry, competence, patients’ rights, involuntary hospitalization and treatment, and behavior control therapies.
548 M.A. Clinical Practicum (3) Series of clinical rotations at one or more local health care institutions. Open only to graduate students concentrating in medical ethics. Prereq: 547 and consent of Medical Ethics Committee and the UTMCK Graduate Education Committee.
575 Topics in Metaphysics and Epistemology (3) May be repeated. Maximum 9 hrs.
577 Topics in Philosophy of Mind (3) Relation of mental to physical and of role of words in discourse for mental activities, thinking and feeling. May be repeated. Maximum 9 hrs.
585 Special Topics (3) May be repeated. Maximum 9 hrs.
587 Advanced Clinical Medical Ethics (3) Critical concepts in medical ethics, relationship of theory to practice, and professional roles and responsibilities for health care ethics consultant. Open only to Ph.D. students concentrating in medical ethics. Prereq: Consent of Medical Ethics Committee.
588 Ph.D. Clinical Practicum (9) Series of clinical rotations at one or more local health care institutions. Open only to Ph.D. students concentrating in medical ethics. Prereq: 587 and consent of Medical Ethics Committee and the UTMCK Graduate Education Committee.
590 Topics in Social and Political Philosophy (3) Philosophical problems concerning social and political life: family, state, freedom, justice; major theoretical responses: anarchism, social contract, Marxism. May be repeated. Maximum 9 hrs.
591 Foreign Study (1-15) See College of Arts and Sciences.
**Physics and Astronomy**

(College of Arts and Sciences)

**MAJOR DEGREES**

Physics ............................................. M.S., Ph.D.

Soren Sorensen, Head

Professors:

- Barnes, F. E., Ph.D. ......................... California
- Bingham, C. R., Ph.D. ....................... Tennessee
- Breinig, M., Ph.D. ............................ Oregon
- Childers, R. W., Ph.D. .......................... Vanderbilt
- Crater, H. W. (UTSI), Ph.D. ................. Yale
- Eguiluz, A. G., Ph.D. ............................ Brown
- Elston, S. B., Ph.D. ........................... Massachusetts
- Georghiu, S., Ph.D. .............................. Manchester
- Greene, G. L., Ph.D. ............................ Harvard
- Guidry, M. W., Ph.D. ............................ Tennessee
- Handler, T. L., Ph.D. .......................... Rutgers
- Kamychkov, I., Ph.D. ............................ ITEP (Russia)
- Lewis, J. W. L. (Distinguished Professor) (UTSI), Ph.D.............. Mississippi
- Macek, J. (Distinguished Scientist), Ph.D. .......... Rensselaer
- Nazarewicz, W., Ph.D. .......................... Warsaw
- Painter, L. R., Ph.D. .............................. Tennessee
- Peggs, D. J., Ph.D. ............................... New Hampshire
- Plummer, E. W. (Distinguished Scientist), Ph.D. ............... Cornell
- Quinn, J. J. (Willis Lincoln Chair of Excellence), Ph.D. ............ Maryland
- Riedinger, L. L., Ph.D. .......................... Vanderbilt
- Shih, C. C. (Grosipol), Ph.D. .................. Cornell
- Sorensen, S. P., Ph.D. .......................... Copenhagen
- Thompson, J. R., Ph.D. .......................... Duke
- Ward, B. F. L., Ph.D. ............................ Princeton
- Weitinger, H. H., Ph.D. .......................... Groningen (Netherlands)

Assistant Professors:

- Dai, P., Ph.D. ................. Missouri
- Davis, L. (UTSI), Ph.D. ................. Auckland
- Efremenko, Y. Y., Ph.D. ............... ITEP (Russia)
- Levin, J. C., Ph.D. ............................... Oregon
- Mandrus, D. G., Ph.D. .......................... SUNY (Stony Brook)
- Pangere, C. (UTSI), Ph.D. .............. New Zealand
- Read, K. F., Ph.D. ............................. Cornell
- Shieh, S. Y., Ph.D. ................. Maryland
- Siopsis, G., Ph.D. ............................. Cal Tech

**Graduate Programs**

Graduate programs leading to the Master of Science and Doctor of Philosophy are offered in a number of concentration areas: astrophysics; atomic, molecular, optical and low temperature physics; biophysics; chemical physics; condensed matter and surface physics; elementary particle physics; geophysics (Master’s only); health physics (Master’s only); mathematical and computational physics; nuclear and relativistic heavy ion 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 laser applications, quantum and applied optics, laser spectroscopy, fluid physics, medical physics, computational physics, and theoretical physics. For additional information, contact the department head.

**ADMISSION REQUIREMENTS**

A student who enrolls in graduate study 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 courses prerequisite to graduate study.

A student who intends to present Physics as a graduate minor will have completed an undergraduate minor in Physics or its equivalent. Physics 311 and 431-32 constitute the minimum coursework prerequisite to a minor in Physics.

In addition to meeting the Graduate Council’s minimum requirements, applicants are strongly encouraged to submit scores from the Graduate Record Examination (general and subject).

All first-year graduate students are required, for advising purposes only, to take a diagnostic examination in undergraduate physics during the fall semester registration period.

**THE DOCTORAL PROGRAM**

All students are expected to take the graduate core curriculum in physics consisting of the following courses: Physics 521-22, 531, 541, 551, and 571. Students concentrating in chemical physics may substitute Chemistry 572 for Physics 551, and should complete at least 6 semester hours from Chemistry 570, 571, 670. Students must take a minimum of 15 hours of 600-level courses, with 6 of these hours in their concentration area. Physics 601-02 are normally required of students concentrating in atomic physics.
Physics 621-22 of students in nuclear physics; Physics 626-27 of students in elementary particle physics (and/or Physics 611-12 for students concentrating in theoretical elementary particle physics); Physics 615-16 of students in astrophysics and cosmology; and Physics 671-72 of students in condensed matter and surf ace physics.

To be admitted to Ph.D. candidacy students must: a) fulfill all general requirements by the Graduate Council, b) pass the qualifying examination, c) have at least a 3.0 GPA on graduate core curriculum in physics, d) maintain general commendations and e) pass the comprehensive examination.

The qualifying examination is designed to test the student's general knowledge of the fundamentals of physics. The performance needed to pass this examination corresponds to a mature command of the material typically included in the undergraduate physics major curriculum. The qualifying examination should be passed after the student's first year of study. Based on the student's performance on a) the qualifying examinations, b) the coursework, c) the GRE scores and d) optional research participation, the faculty will decide if the student will be allowed to continue in the Ph.D. program.

Students are required to find a research advisor and form a doctoral committee before the end of the second year of study. This committee is responsible for advising the student and monitoring his/her progress toward the doctoral degree.

The comprehensive examination is designed to test the student on a) specific knowledge and skills in the areas essential to the student's research program, b) capability to successfully complete the doctoral dissertation and c) general knowledge of the graduate core curriculum. The most essential component of this examination is the presentation and defense of an original research project.

The comprehensive examination must be passed before the end of the third year of study. It contains both a written and an oral component and is conducted by the student's doctoral committee and an additional faculty member appointed by the department head.

The areas of research will be chosen with reference to one of the fields in which research facilities can be made available either at The University of Tennessee laboratories in Knoxville; The University of Tennessee Space Institute at Tullahoma, Tennessee; the Oak Ridge National Laboratory; Oak Ridge, Tennessee; or at other laboratories in Knoxville; The University of Tennessee Space Institute at Tullahoma, Tennessee; or at other laboratories in Knoxville; the Oak Ridge National Laboratory; Oak Ridge, Tennessee; or at other

Astronomy

GRADUATE COURSES

411 Astrophysics (3) Development of analytical physical models of galactic structure of universe, stellar and interstellar matter, and planetary systems. Topical and interdisciplinary, consideration of quasars, pulsars, black holes and current developments in field. Acceptable for major credit in physics. Prereq: Physics 136 Introduction to Physics for Physical Science and Mathematics Majors, or 138 Honors Fundamentals of Physics for Physics Majors, or 222 Elements of Physics, or 232 Fundamentals of Physics: Wave Motion, Optics, and Modern Physics, and consent of instructor.

507 Contemporary Optics (3) Topics in geometrical, physical, Fourier, and nonlinear optics and introductory laser physics. Extensive use of computer calculations and design of practical and sophisticated optical systems.

508 Laser Physics (3) Mode analysis, stable and unstable resonators; rate equations and population inversion, saturation, relaxation oscillations, fluctuations and noise, laser theory of the ruby laser, photon coherence; mode-locking and frequency stabilization; specific laser types: semiconductor and solid-state, excimer, copper vapor and dye lasers.

511-12 Theoretical Physics (3,3) Concepts and applications in applied physics. Topics: one-body, two-body and rigid body dynamics, ideal fluid, small oscillations and waves, electromagnetic fields, electrostatic and magnetostatic problems, EM waves, duality and quantization, absorption and emission, statistical ensemble and thermal equilibrium, and other modern applications of current interest, in areas of quantum chemistry, biophysics, optics, spectroscopy, and astrophysics. Recommended background: Familiarity with computational methods.

513 Problems in Theoretical Physics I (3) Fundamentals of physics: classical mechanics (Newtonian mechanics, Lagrangian and Hamiltonian dynamics, Lagrangian and Hamiltonian dynamics, condensed matter and surface physics. 16 hrs lab per week.

490 Senior Seminar (1-3) Topic of current interest. May be repeated with consent of department. Maximum 6 hrs.

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

501 Graduate Research Participation (3) Advanced research techniques under supervision of staff research director whose research area coincides with interests of student. Open to all graduate students in good standing. Prereq: Consent of department and research director. May be repeated with consent of department. Maximum 15 hrs. S/NC only.

502 Research Participation for 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.

503 Physics Colloquium (1) Lectures and discussion on current research topics. Continuous registration required for current graduate students. May be repeated. Maximum 1 credit. S/NC only.

505 Physics of Fluids (3) Fluid physics, overview of fluid mechanics and associated computational techniques; general description of laminar and turbulent flows; subsonic, supersonic and hypersonic flows; continuum, transitional and free-molecular flows; pipe flow, nozzle flow and sonic orifice expansion flows; reacting and nonreacting flowfields; shock-tube physics; and introduction to a method of characteristics and Monte Carlo computational techniques.

506 Experimental Methods (3) Introduction to experimental methods of spectroscopy through hands-on operation of FTIR, Raman, NMR, photoelectron, laser, electron, X-ray, Rutherford, and state-of-the-art of cw and pulsed lasers, radiation detectors, photomultiplier tubes, image intensifiers, image converters; high-vacuum systems including cryogenic-based devices, data acquisition techniques including lock-in amplifiers, box-car integrators, digital electronics methods and micro-computer data acquisition.

510 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.

511-12 Theoretical Physics (3,3) Concepts and applications in applied physics. Topics: one-body, two-body and rigid body dynamics, ideal fluid, small oscillations and waves, electromagnetic fields, electrostatic and magnetostatic problems, EM waves, duality and quantization, absorption and emission, statistical ensemble and thermal equilibrium, and other modern applications of current interest, in areas of quantum chemistry, biophysics, optics, spectroscopy, and astrophysics. Recommended background: Familiarity with computational methods.


521-22 Quantum Mechanics (3,3) Fundamental principles of quantum mechanics; angular momentum, electron spin, particles in electric and magnetic fields, perturbation theory, variational methods, scattering theory, quantum mechanics, quantum mechanics of electromagnetic field, emission, absorption, and scattering of light, bremsstrahlung, pair creation and annihilation. Application of quantum mechanics to problems of atomic, molecular, nuclear, and solid state physics. Prereq for 521: 522

531 Classical Mechanics (3) Variational formulation, Lagrange's and Hamilton's equations, constraints, canonical transformations, Hamilton-Jacobi theory and action-angle variables.

532 Advanced Classical Mechanics (3) Advanced topics in classical mechanics, KAM theorem and Hamiltonian chaos, dissipative chaos. Topics may vary according to interest of students and instructor. Prereq: 531.

541-42 Electromagnetic Theory (3,3) 541—Review of electrostatics, magnetostatics, and quasi-static problems; Maxwell's field equations and their solutions in dielectrics and conductors. 542—Advanced topics: electromagnetic field theory, retarded potentials and gauge transformations, radiation produced by accelerating charges. 541—Advanced topics: magnetostatics, collisions between charged particles, bremsstrahlung, multipole fields. Topics may vary according to interest of students and instructor. Prereq or coreq for 541: 571. Prereq for 542: 541.

551 Statistical Mechanics (3) Ergodic theory, classical ensemble theory, quantum mechanical ensembles, relation of statistical mechanics to thermodynamics, transition to and approach to equilibrium, phase transition, fluctuations and correlations. Prereq: 521, 531, 571.


561 The Theory of Relativity (3) Geometry of space-time, relativistic electrodynamics, particle mechanics and quantum mechanics. Electromagnetic field equations, Schwarzschild solutions, the classical test of general relativity. Prereq or coreq: 531 and 542.

571-72 Mathematical Methods in Physics (3,3) Linear vector spaces, matrices, tensors, curvilinear coordinates, applications of tensor analysis to electrodynamics. Partial differential equations and boundary value problems, Green's functions, integral transforms, integral equations, elementary functions, Bessel functions, calculus of variations. Prereq: Advanced calculus and differential equations. Must be taken in sequence. (Same as Mathematics 517-518.)

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.


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

601-02 Atomic Physics (3,3) 601—Survey of research problems and methods. Topics of current interest. Intended for all graduate students. 602—Advanced problems for students specializing in field.

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, photon echoes, self-induced transparency; saturation and Doppler-free spectroscopy; laser cooling and trapping. Prereq: 521, 541.


610 Quantum Optics (3) Quantum theory of emission and absorption of radiation; frequency-dependent susceptibility; coherence theory, field quantization and coherent photon states; interaction of radiation with atoms; photon optics, counting and higher-order coherence; atomic scattering phenomena. Prereq: 521.

611 Advanced Quantum Mechanics and Field Theory (3) Survey of problems and methods. Topics of current interest. Intended for all graduate students.

612 Advanced Topics in Quantum Field Theory (3) Renormalization, Lamb shift, anomalous magnetic moments, gauge theories, electroweak theory, quantum chromodynamics, grand unified theories, and advanced topics in laser physics and quantum optics. Topics vary according to interest of students, instructor and present state of physics. Prereq: 611 or consent of instructor.

615-616 Astrophysics and Cosmology (3,3) 615—Stellar evolution: hydrostatic equilibrium, energy production and transport, star birth, main sequence, red giants, variable stars, and stellar explosions. General relativity and gravitation, white dwarfs, neutron stars, pulsars, and black holes. 616—Galaxies and the interstellar medium. Active galaxies, quasars, and supermassive black holes. Large-scale structure, the expanding Universe, cosmologies, big bang, cosmic background radiation, inflation, dark matter, formation of structure, and fate of the Universe. The Planck scale and quantum gravity.

621-22 Nuclear Physics (3,3) 621—Survey of research problems and methods. Topics of current interest. Intended for all graduate students. 622—Advanced problems intended for students specializing in the field.

626-27 Elementary Particle Physics (3,3) 626—Survey of elementary particle physics: experimental methods, conservation laws, invariance principles, and models. Interactions intended for all graduate students. 627—Advanced topics intended for students specializing in field: quark models, electroweak interactions and unification of elementary forces.

642 Advanced Topics in Modern Physics (3) Advanced theoretical or experimental topics not covered in other courses. May be repeated with consent of department. Maximum 9 hrs.

643 Computational Physics (3) Developing computer algorithms for solving representative problems in various fields of physics, celestial dynamics in astrophysics, boundary value problems in electromagnetism, atomic and nuclear structure, band structure in solid state physics, transport problems in statistical mechanics, Monte Carlo simulation of liquids, fitting and interpolation of data, correlation analysis, or optimization strategy. Prereq: 521, 531, 571.

571-72 Advanced Solid State Physics (3,3) 671—Survey of research problems and methods. Topics of current interest. Intended for all graduate students. 672—Advanced problems intended for students specializing in field.

### Plant Sciences

(第六版农业科学与自然资源) MAJORS DEGREES

**Plant Sciences and Landscape Systems**

Professors:
- Albrecht, Mary L., Ph.D. .... Ohio State
- Allen, Fred L., Ph.D. ........ Minnesota
- Auge, Robert M., Ph.D. .... Washington State
- Dayton, Dennis E., Ph.D. .... NC State
- Lockwood, David W., Ph.D. .... Georgia
- Daniel, Gary L., Ph.D. .... Iowa State
- Miller, Robert D., Ph.D. .... Kentucky
- Mullins, Charles A., Ph.D. .... Tennessee
- Rhodes, G. Neil, Jr., Ph.D. .... NC State
- Samples, Tom J., Ph.D. .... Oklahoma State
- Sams, Carl E., Ph.D. .... Michigan State
- Stewart, C. Neal (Rachelle Chair), Ph.D. .... Virginia Tech
- West, Dennis R., Ph.D. .... Nebraska

Associate Professors:
- Bates, Gary E., Ph.D. .... Georgia
- Cheng, Z. Max, Ph.D. .... Georgia
- Gwathmey, C. Owen, Ph.D. .... California (Davis)
- Hamilton, Susan L., Ed.D. .... Tennessee
- Menendez, Gary L., M.S. .... Tennessee
- Mueller, Thomas C., Ph.D. .... Georgia
- Rogers, Sam M., M.L.A. .... Georgia
- Wyatt, Jim E., Ph.D. .... Florida

Assistant Professors:
- Garton, Stephen, Ph.D. .... Minnesota
- Kligerman, Bill E., Ph.D. .... Georgia
- Pantalone, Vincent, Ph.D. .... NC State
- Robinson, Darren K., Ph.D. .... NC State
- Sorochan, John, Ph.D. .... Michigan State
- Straw, R. Allen, Ph.D. .... Tennessee

Emeriti Faculty:
- Coffey, David L., Ph.D. .... Purdue

Insects (PSI). For additional information, please visit our departmental homepage at http://plsl.ag.uky.edu. Inquiries may be directed to the Chair, Graduate Committee, Department of Plant Sciences, The University of Tennessee, Knoxville, Tennessee 37996-4561, or uthor@uky.edu.

### THE MASTER’S PROGRAM

Both thesis and non-thesis options are available for the major in Plant Sciences and Landscape Systems, each guided by a graduate committee consisting of the major professor and two or more other faculty members. Studies are possible in a wide variety of commodities and subject areas, including fruits, vegetables, weeds, cereals, grains, turfgrass, woody ornamentals, and public horticulture. Students may specialize in one or more disciplines, including plant protection, molecular biology, breeding, genetics, biotechnology, physiology, ecology, culture and management.

### Admission Requirements

Students should have a Bachelor’s degree from an accredited college or university, with evidence of ability to do work of graduate quality. Applicants are expected to have a minimum cumulative grade-point average of 2.7 on a 4.0 scale.

Application must be made to both the Office of Graduate Admissions and the PSLS department. The departmental application requires three letters of reference (or three Graduate Rating Forms) from persons capable of assessing the applicant’s suitability for graduate work in plant science, resume, and a statement of professional goals and reasons for applying to the program. Applicants are also required to submit scores from the general Graduate Record Examination (GRE) to Graduate Admissions. (please send photocopy to department). Successful applicants will usually have a composite score on the verbal, mathematical and analytical sections of the GRE of at least 1400. Prior undergraduate course work in mathematics, biology and chemistry is recommended.

### Degree Requirements

1. Approval of the academic program by the master’s committee.
2. Successful completion of 12 hours of course work in the major at the graduate level (400 or above), exclusive of Plant Sciences and Landscape Systems 500, 502, and 503. Two of these hours must be Plant Sciences and Landscape Systems 504. Six of these hours may be satisfied by Botany 404, 412, 521, 522, Animal Science 571, Environmental and Soil Sciences 434, 444, 516, Ecology and Evolutionary Biology 431, 520, 560, Information Sciences 560, Art 481, or Geography 439.
3. Presentation of at least two departmental seminars.

Please see the Degree Program Requirements/Master’s Degrees section at the front of this catalog for additional information.

### Thesis Option

1. Satisfactory preparation of a written thesis proposal and its oral defense to the student’s committee.
THE DOCTORAL PROGRAM

A Ph.D. in Plants, Soils and Insects (PSI), with concentrations in horticulture, crop sciences, weed biology and plant improvement, is offered under a multi-departmental doctoral program. Three departments participate: Plant Sciences, Entomology and Plant Pathology, and the soils faculty in Biosystems Engineering and Environmental Sciences. Other concentrations within the PSI major include environmental and soil sciences, entomology, plant pathology, integrated pest management and bioactive natural products. Please see the Plant Sciences homepage for additional information, http://psls.ag.utk.edu/, or contact a faculty member in the area of interest.

Students may select a formal concentration as a focus of study but this is not a requirement. We recognize that modern research approaches in plant sciences often overlap. Students may specialize in one or more approaches, including plant biotechnology, molecular biology, breeding, genetics, physiology, ecology, culture and management. Research may feature fruits, vegetables, turfgrass, weeds, woody ornamentals, cereals, grains, fiber, public horticulture or model plant systems.

Admission Requirements

Submit application, fee, official transcripts, and scores from the general portion of the Graduate Record Examination to the Graduate Admissions Office. In your application, indicate that you are applying to the Plants, Soils and Insects doctoral program. Submit resume, three letters of reference (or three Graduate Rating Forms), photocopy of GRE scores and a short statement of professional goals and reasons for applying to the PSLS PhD Program Coordination, Department of Plant Sciences, 2431 Center Drive, 252 PSB, University of Tennessee, Knoxville, Tennessee, 37996-4561. In your statement letter and application, please indicate your concentration of interest and intended major professor.

Degree Requirements

To obtain the doctorate, the student must meet the following requirements:

1. The student and the major professor will select a minimum of three additional faculty, holding the rank of assistant professor or above, to serve on the student’s doctoral committee. The major professor and two committee members must be approved to direct doctoral research by the Graduate Council, and at least half of the committee must hold teaching appointments. At least one member of the committee must be from outside the department. The doctoral committee must be formalized by the end of the second semester of graduate study.

2. Subsequent completion of at least 34 hours of graduate coursework numbered 503 or higher. In addition, 24 hours of course 600 Doctoral Research and Dissertation are required.

3. Satisfactory preparation of a written dissertation proposal and its oral defense to the student’s committee. This must be completed during the first two semesters of graduate study and before enrollment in 600.

4. Passing both written and oral sections of the comprehensive examination. The candidate will be tested on his/her knowledge of the proposed dissertation and related fields.

5. Presentation of at least two departmental seminars (2 hours of PSLS 504), in addition to any further graduate credit.


Please see the Degree Program Requirements/Doctoral Degrees section at the front of this catalog for additional information.

Plant Sciences and Landscape Systems

GRADUATE COURSES

410 Nursery Management and Production (3) Modern management methods as applied to retail and wholesale nurseries and landscape contracting firms. Methods of producing liners, container and field-grown woody ornamental plants. Prereq: 220 Basic Landscape Plants, 330 Plant Propagation, and Environmental and Soil Sciences 210 Introduction to Soil Science, or consent of instructor. 2 hrs and 1 lab.

427 Management and Administration of Public Horticulture Institutions (3) Management of resources in non-profit institutions, support organizations and communities. Theoretical framework and institutional mission; strategic planning and programming; financial accounting and budgeting; development and fund raising; personnel policies; volunteer development; marketing and publicity; legal issues; relationships between staff and governing boards; the use of information technology in management and governing systems; and conservation/preservation and community development. Prereq: 326 Public Horticulture.


431 Physiology and Ecology in Agroecosystems (3) Plant physiology and ecology applied to crop production and management. Plant physiology and ecology principles related to crop production practices from seedbed preparation to harvesting. Interaction of crops with environment and sustainable agroecosystems. Prereq: Crop science. 2 hrs and 1 2-hr lab.

433 Agricultural Pesticides (3) Regulation of pesticide development, manufacture, transportation, marketing and use. Structure, use, mode of action, degradation and environmental impact of pesticides used in agriculture, forestry and related areas. Prereq: 1 yr biological sciences and 1 semester chemistry. 2 hrs and 1 lab.

434 Fruit and Vegetable Crops (3) Principles of production systems to counter environmental stresses and to increase productivity of warm and cool season vegetable crops, small fruit crops, and deciduous tree fruit crops. Storage of crops after harvest. Prereq: 230 Introduction to Crop Science. 2 hrs and 1 lab.

435 Field and Forage Crops (3) Agronomic principles of crop production and management. Crop improvement, cropping systems, tillage, fertilization, pest management, harvest and utilization of major field and forage crops. Prereq: 230 Introduction to Crop Science. 2 hrs and 1 lab.

436 Plant and Garden Photography (2) Principles and techniques of photography related to plants and gardens. Equipment options and field shooting under various weather conditions and in different seasons. Prereq: Senior standing and consent of instructor.

437 Public Garden Operations and Management (3) Analysis of year-round operations and management of public gardens. Case studies: time and labor management, budget development and management, implementation of volunteer programs, information dissemination methods for public outreach, management of grounds and facilities using the University of Tennessee Institute of Agriculture Gardens as model. Prereq: 326 Public Horticulture.

440 Advanced Turfgrass Management (4) Principles and scientific basis of turfgrass culture: adaptation, ecology, physiology, soil-water, and nutrients. Consideration of climatic influences on grass culture; physiology of clipping and water management; design, construction, and management of golf courses; and physiological influences of pest control measures. Prereq: 340 Turfgrass Management or consent of instructor. 3 hrs and 1 lab.

446 Horticultural Therapy (3) Application of horticulture as therapy for treatment, rehabilitation and/or training of individuals with disabilities. Prereq: Senior standing and consent of instructor.

450 Speciality Landscape Construction (3) Methods of design, materials, and construction techniques for specialized components of landscape industry. Irrigation systems, outdoor lighting, garden ponds and water features. Prereq: 350 Basic Landscape Construction.

451 Plant Tissue Culture (3) (Same as Botany 451.) Principles of Plant Breeding (3) Genetic principles and techniques used in crop improvement. Consideration of breeding methods for various types of plant reproduction systems and application. Discussion of heritability estimation, genetic advances through selection and theory upon which breeding methods are based. Prereq: Plant Sciences and Landscape Systems 471 and general genetics. 2 hrs and 1 2-hr lab.

460 Professional Practices in Landscape Construction and Management (2) Professionalism, salesmanship, proposal bidding, estimating, specification, and contract management in landscape services industry. Interaction with industry representatives through special presentations. Prereq: 350 Basic Landscape Construction or consent of instructor.
Political Science

(College of Arts and Sciences)

MAJORS

Political Science ......................... M.A., Ph.D.
Public Administration ....................... M.P.A., J.D.-M.P.A.

DEGREES

Patricia Freeland, Head

Professors:

Cunningham, Robert B., Ph.D. .......... Indiana University, Bloomington
Gant, Michael M., Ph.D. ..................... Michigan State University
Gorman, Robert A., Ph.D. ................. New York University
Lyons, William, Ph.D. ...................... Oklahoma State University
Scheb, John M., II, Ph.D. ................. Florida State University
Smith, T. Alexander, Ph.D. ............... Ohio State University
Stephens, Otis H. (Distinguished Professor), Ph.D. .......... Johns Hopkins University

Associate Professors:

Folz, David H. (Liaison), Ph.D. .......... Tennessee Tech University
Houston, David J., Ph.D. SUNY (Binghamton)
Kelly, Janet, Ph.D. ......................... Wayne State University
Nowens, Anthony J., Ph.D. ............... Kansas State University
Peterson, Robert L, Ph.D. ............... Yale University
Zhang, Yang (Liaison), Ph.D. .......... Kentucky State University

Assistant Professors:

Caprioli, Mary, Ph.D. ...................... Connecticut College
Carcieri, Martin, Ph.D. ..................... Yale University
Van Cott, Donna, Ph.D. .................... Georgetown University

The Department of Political Science offers the M.A., M.P.A., and Ph.D. The department also offers a dual program with the College of Law. Inquiries concerning all programs should be directed to the departmental office.

ADMISSION REQUIREMENTS

Three departmental recommendation forms must be submitted to the Office of Graduate Admissions, at least two of which must be completed by instructors at the institution most recently attended. In addition, scores on the general portion of the Graduate Record Examination must be submitted.

THE MASTER OF ARTS PROGRAM

A Bachelor’s degree or its equivalent is required for admission. Normally an overall average of 3.0 is also required together with an average of 3.2 in the last two years of political science or social science. In addition, a composite score of at least 1100 on the verbal and quantitative parts of the GRE is normally required.

Students pursuing the Master of Arts degree may follow one of two options:

Thesis Option: (30 hours) Coursework, preparation of a thesis, and an oral examination on coursework and the thesis, is required. At least 12 of these hours must be in political science, with 6 in the field of methodology (Political Science 510 and either 511 or 512). 6 hours may be earned through thesis credit.

Non-Thesis Option: (36 hours) Coursework, plus a written comprehensive examination on all coursework is required. At least 12 of these hours must be in political science, with 6 in the field of methodology (Political Science 510 and either 511 or 512), and 3 hours in the 600-level research seminar in the student’s first field of interest.

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, a student who has earned an average of 3.0 and a GPA of 3.2 in the last two years of political science or social science courses is required. In addition, a composite score of 1100 on the verbal and quantitative parts of the GRE is desired.

Acc to taking normal course loads for four years that otherwise would be required. Students pursuing the dual degree program must successfully complete 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.

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.

Applicants for admission 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. The J.D.-M.P.A. program in consultation with the appropriate coordinators in both academic units. Students may not take courses in the opposite program. During those first two years, 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 public policy courses each semester.

Dual degree students who withdraw from the program before completion of the requirements for both degrees will not receive credit toward either the J.D. or the M.P.A. degree for courses taken in the other program except as such courses qualify for credit without regard to the dual program.

Awarding of Grades

For grade recording purposes in the College of Law and the Department of Political Science, grades awarded in courses in the other unit will be converted to either Satisfactory or No Credit and will not be computed in determining a student's GPA or class standing. The College of Law will award a grade of Satisfactory for an approved M.P.A. course in which the student earns a grade of B or higher and a grade of No Credit for any lower grade. The Political Science Department will award a grade of Satisfactory for an approved law course in which the student earns a grade of 2.3 or higher and a grade of No Credit for any lower grade. The official academic record of the student maintained by the Registrar of the University shall show the actual grade assigned by the instructor without conversion.

THE DOCTORAL PROGRAM

The Ph.D. program prepares students for careers in college teaching, as well as careers in other occupations related to service in the public or private sectors. Applicants for admission to the program should normally have completed a 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.

Applicants for admission to the program must complete 84 hours beyond the bachelor's degree, including 24 hours of coursework beyond the master's degree, graded A-F; must successfully pass written comprehensive examinations in two broad subfields of political science, and must pass a final oral examination on the dissertation. In addition, students must satisfy a research tool requirement. Usually, students meet this requirement by completing 12 hours of coursework numbered above 500 in empirical theory and research methodology. However, if a student's advisor and program committee certify that competency in a foreign language is a more appropriate research tool, a foreign language can be used instead.

In addition to the total hours required for the degree, the following requirements must also be met:
1. At least 69 hours must be in political science courses.
2. At least 54 hours in political science must be in courses numbered above 500.
3. Completion of Political Science 510, 511, and 512.
4. Completion of at least three courses or seminars at UT in each of the two broad subfields in which the students take examinations.
5. Completion of at least one course or seminar in each of the five broad subfields available for graduate instruction in the department.
6. At least 6 hours must be earned in political science courses numbered above 600.
7. A total of 24 hours must be earned by writing the dissertation.

MINOR IN ENVIRONMENTAL POLICY

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

GRADUATE COURSES

430 United States Constitutional Law: Sources of Power and Restraint (3) Analysis of judicial review, constitutional powers of President and Congress, federalism, sources of regulatory authority, and constitutional protection of political and economic rights. (Same as Legal Studies 430.)
431 U.S. Constitutional Law: Civil Rights and Liberties (3) Analysis of current issues in civil rights and liberties including: first amendment freedoms, equal protection, privacy and rights of accused. (Same as Legal Studies 431.)
435 Criminal Law and Procedure (3) Substantive and procedural law in criminal justice field: constitutional questions and public policy issues. (Same as Legal Studies 435.)

441 Public Budgeting (3) Process, participants, and politics of government budgeting; federal government budgeting. Overview of budget reform measures and their effectiveness.

442 Administrative Law (3) Legal dimensions of administrative power and procedures, and constitutional controls over administrators. (Same as Legal Studies 442.)

451 Ethnic Conflict in Foreign Countries (3) Examination of political and violent conflict among ethnic and national groups and challenges these conflicts pose for democratic development.

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.

456 Latin American Government and Politics (3) Political development and contemporary politics of Latin America: contemporary politics. (Same as Latin American Studies 456.)

459 Government and Politics of Russia and Eastern Europe (3) System transformation, political processes and governmental structure in Russia and Eastern Europe.

461 Policy Making in Democracies (3) Comparative approach to theory and process of making public policies.

463 Contemporary Middle East Politics (3) Governments and movements in Middle East, their characteristics, bases, and interrelationships.

471 International Political Economy (3) The politics of international economic relations. Topics include globalization, development, trade, crime, the IMF, the WTO, and the environment and challenges to the status quo.

473 Negotiation, Bargaining and Diplomacy (3) Diplomacy, negotiation, and foreign policy decision-making. Theories of diplomacy and negotiation are applied in a simulation focusing on issues from international crime and global economic stability to world health and the environment.

474 International Organization (3) Constitutional framework and key functions of the United Nations. Topics include collective security, peacekeeping, human rights, development, regional organizations, and the role of the Secretary-General.

475 Ancient and Medieval Political Thought (3) Survey of major western political thinkers from Socrates to Marsili of Padua.

476 Modern Political Thought (3) Survey of major western political thinker from Machiavelli to Marx.

500 Thesis (1-15) P/NP 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.

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 analysis: univariate and bivariate statistics.

513 Quantitative Political Analysis (3) Methods and techniques in quantitative political analysis: multivariate model building.

514 Research and Methodology in Public Administration (3) Basic assumptions and techniques of research in public administration; measurement, analysis, and reporting of data.

520 Political Theory (3) Survey of major ideas, thinkers and works of Western political theory.

522 American Political Thought (3) Systematic examination of the normative and empirical theories of leading American political thinkers from the colonial period to the present.

530 American Government and Politics (3) Survey of literature, approaches to research and analysis, critical examination of major works, and overviews of research in various subfields. May be repeated with consent of department. Maximum 9 hrs.

532 Presidency (3) Systematic examination of the structure, functions and powers of the American presidency as they have evolved from the founding to the present.

533 Congress (3) Formal, empirical and theoretical approaches to and models of the institutional workings of Congress and the behavior of legislators.

535 Mass Political Behavior (3) Theoretical and empirical analyses of public opinion, political socialization, political attitudes and behavior, especially voting behavior.

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, policies, 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.

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.

549 Environmental Policy (3) Overview of contemporary environmental policy and its evolution. Examines the roles of values in the environmental arena. Provides a framework for policy analysis and analytical tools for selection and choosing among policy options.

550 Public Administration (3) Overview of public administration theory and function.

552 Organization Theory (3) Appraisal of major theories of organization and their applicability to public sector.

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) Examination of public administration in context of American political system, policy making and political roles of public administrators and agencies. May be repeated with consent of department. Maximum 9 hrs.

560 Public Financial Administration (3) Principles and techniques of public finance at state and local levels: budget preparation, execution and audit, risk management, capital planning, major tax structures, economic forecasting, cash management, and debt administration.

562 Public Management (3) Interpersonal and leadership skills, techniques and methods for planning, decision making, and implementation of management strategies in public sector. May be repeated with consent of department. Maximum 9 hrs.


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 governments. 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.

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

594 College Teaching in Political Science (1) Structural effectiveness, techniques, organization, and 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.

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.

610 Special Topics in Empirical Theory and Methodology (3) Advanced methods and procedures of analysis in political science. May be repeated with consent of department. Maximum 9 hrs.

615 Formal Political Analysis (3) Assumptions, methods and applications of formal political models, including game theory, rational 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.

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.

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.
THE MASTER’S PROGRAM

Graduate study leading to the M.A. degree in psychology is available with a concentration in experimental psychology. This program is appropriate for students who desire a master’s degree as part of their progress toward a doctorate or for those who wish to complement a degree in a different field.

Admission

Any student with a B.A. or B.S. may apply to the Department of Psychology for admission to the master’s program. All students must also submit scores from the Graduate Record Examination (general and subject).

Major Advisor and Committee

Initially, the Director of Experimental Psychology will advise the student. As soon as possible, the student must select an advisor and obtain his or her approval for registration. Subsequently, the advisor and student will select two additional faculty members to comprise the student’s master’s committee. Final committee approval comes from the Graduate Dean, upon recommendation by the Department Head.

Program Requirements

All students must complete 32 semester hours of graduate level courses in psychology. These hours must include 515, 521-22, or Statistics 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; plus additional graduate level hours to reach the 32-hour requirement. Students must earn a grade of B or better in all courses that are to count toward the 32-hour total. Students must also propose, conduct and successfully defend an original piece of research in the form of a master’s thesis.

THE DOCTORAL PROGRAM

A student with a B.A. or B.S. may apply to the Department of Psychology for admission to the doctoral program with a concentration in experimental psychology or clinical psychology. All students must submit scores from the Graduate Record Examination (general and subject).

Experimental Psychology

The Ph.D. program in Psychology with a concentration in experimental psychology is designed to allow students to select from a variety of specializations oriented toward careers in research, teaching, and application of psychology in academic, institutional, or industrial settings. The program is flexible, individualized, and emphasizes a professional apprenticeship model of training.

The basic requirements are:

1. Twelve hours of statistics and research (521-22 or Statistics 531-32 or equivalent and 6 additional hours in research methods or design).
2. Fifteen semester hours in experimental psychology (565 or equivalent and 4 courses from the following: 510, 511 or 512, 513, 543, 546 or 547, 550, 560, and 570 or 571).
3. Six semester hours of research practicum (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. Comprehensive examination, determined and evaluated by the student’s doctoral committee. This examination is comprised of an integrative review or theoretical paper and an oral exam or additional questions.
9. Twenty-four hours of dissertation research (600).
10. An original piece of research in the form of a doctoral dissertation, proposed, conducted, and defended.

Clinical Psychology

This program is designed to lay the groundwork for a career as a clinical psychologist capable of working in both academic and applied settings. The program emphasizes the theoretical foundations of psychology as well as supervised experience oriented toward the development of practical skills. The program embodies a model of clinical psychology in which practice and research are integrated.

Clinical program students must complete a predissertation research project by the end of the second year. Before forming the doctoral committee, each student must pass a comprehensive examination administered and evaluated by an advisory committee. The comprehensive examination is organized around a research case study of one client who has been assessed and/or treated by the student in the departmental psychological clinic. In addition to the case presentation, the paper presents the student’s comprehensive review of relevant research and theory as a context for procedure, results, and discussion of the case. All doctoral students must complete a minimum of 78 hours of graduate level courses, including courses required by the program; at least 6 hours in courses outside of psychology; and at least 24 hours of dissertation research (Psychology 600). Finally, students must complete an acceptable doctoral dissertation and conduct a satisfactory oral defense of the dissertation. Requirements are as follows:

1. Apprenticeship with one faculty member during the first year, two days each week.
2. Predissertation research project completed before forming a doctoral supervisory committee, reported in written form acceptable to two members of the faculty or, if reviewed and accepted for publication or external presentation, by one member of the faculty.
3. Supervised clinical placement two days (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);
The Counseling Psychology program is based upon the scientist-practitioner model of training which stresses both research and practice. It is designed to enable students to become behavioral scientists, skilled in psychological research and its application. Students are trained to work with people who have generally integrated or intact personal and vocational environments of the individuals, their work.

The Counseling Psychology program consists of a minimum of 107 semester hours of graduate credit. This includes 83 hours of course work and 24 hours of dissertation research (see below). Students are assigned a temporary faculty advisor upon admission to the program. By the end of the first calendar year students are expected to have selected an advisory committee. Prior to taking their comprehensive examinations, students must have an advisory committee meeting, present an acceptable program of study to the advisory committee, and have their research competency approved and accepted by the program’s research review committee. The examinations cover the counseling psychology core and the student’s cognate.

After passing comprehensive examinations, the student may form the doctoral committee, which approves the student’s dissertation proposal and verifies that the student’s dissertation is acceptable for the doctoral degree. The doctoral dissertation is original research that is theoretically based and psychological in nature. It must fulfill the requirements and procedures of the University of Tennessee Graduate Catalog, current edition.

The following are required of all students:
1. Students must accumulate a minimum of 600 hours of practicum experience. Students are required to have three semesters of individual practicum and one semester of group practicum. Practicum sites include the University of Tennessee Counseling Center, community agencies, the UT Career Resources Center, and area schools. Opportunities for additional practicum experiences exist in the community.
2. In addition to course work, students must demonstrate competency in research methodology and academic scholarship prior to the doctoral committee’s approval of the student’s dissertation proposal. The research project is to be initiated after the student has entered the Counseling Psychology program.
3. Satisfactory completion of the following curriculum:
   A. Psychological Foundations—minimum of 21 semester hours
   1. History and Systems of Psychology
   2. Biological Bases of Behavior
   3. Cognitive-Affective Bases of Behavior
   4. Social Basis of Behavior
   5. Individual Behavior—minimum of six semester hours
   6. Life Span or Developmental Psychology
   7. Quantitative and Research Skills—minimum of 15 semester hours
   1. Statistics—minimum of six hours
   2. Qualitative Research—minimum of three hours
   3. Research Design—minimum of three hours
   4. Directed Research
   C. Counseling Psychology Core—minimum of 39 semester hours
   1. Practicum I and II
   2. Vocational Theory and Practice
   3. Practicum—minimum of 9 semester hours
   4. Foundations of Counseling Psychology—minimum of 6 semester hours
   5. Cross-cultural Counseling
   6. Ethical, Legal and Professional Issues in Psychology
   7. Assessment—minimum of 6 semester hours
   8. Group Counseling
   9. Supervision
   D. Departmental Seminar
   4. Students are also required to complete a 2000-hour internship prior to graduation. In consultation with the student and the student’s doctoral committee chair, the Training Director approves the internship site, which must meet APA Guidelines.
   5. Students who wish to have experiences as a teaching assistant must first satisfactorily complete department’s teaching practicum course.

GRADUATE COURSES


409 Group Facilitation (3) Study of theory and technique through supervised experience in small groups. Prereq: General Psychology or consent of instructor. May be repeated. Maximum 6 hrs.

410 Sensory Processes and Perception (3) Survey of physiological and psychological theories of perception. Audition and vision. Prereq: General Psychology or consent of instructor. Statistics in Psychology or Statistical Reasoning or Introduction to Statistics or graduate standing.

415 Psychology of Religion (3) History of psychology of religion: various philosophical and empirical orientations. Psychological function of religion for individuals and society. Prereq: General Psychology or consent of instructor.

420 History and Systems of Psychology (3) History of psychological thought. Classical approaches and recent developments. Prereq: General Psychology or consent of instructor.

424 Psychology and the Law (3) Psychological aspects of legal systems. Prereq: General Psychology or 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: General Psychology or consent of instructor.

434 Psychology of Gender (3) Biological, psychological, and social factors of gender. Importance of gender roles and stereotypes for behavior and experience. Prereq: General Psychology or consent of instructor. (Same as Women’s Studies 434.)

440 Organizational Psychology (3) Social-psychological analysis of organizational behavior and systems theory. Prereq: General Psychology and Social Psychology or consent of instructor.


450 Comparative Animal Behavior (3) (Same as Ecology and Evolutionary Biology 450.)

459 Comparative Animal Behavior Laboratory (3) Coreq: 450. (Same as Ecology and Evolutionary Biology 459.)

461 Physiological Psychology (3) Nervous system and physiological correlates of behavior. Biological basis of emotion, learning, memory and stress. Prereq: General Psychology or consent of instructor and either Biodiversity and Organization or Function of the Cell, or Human Origins and Principles of Biological Anthropology.

470 Theories of Personality (3) Survey of major theories of human personality and their development. Prereq: General Psychology or consent of instructor.

475 Adolescent Development (3) Theoretical perspectives and empirical research findings pertinent to adolescent development. Prereq: General Psychology or consent of instructor.

480 Theories of Learning (3) Classical and current approaches to learning and cognition. Prereq: General Psychology or consent of instructor.

482 Topics in Psychology (3) Intensive analysis of special topics: Afro-American psychology or evaluation of programs in community. Prereq: General Psychology or consent of instructor. May be repeated. Maximum 6 hrs.

489 Supervised Research (1-9) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs in 489, 489, 491, 492, and 493 combined may apply toward undergraduate major.

500 Thesis (1-15) P/NP 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. May be repeated. May not be used toward degree requirements. May be repeated. S/NC only.
505 Research Design (3) Techniques for planning and conducting research in controlled and natural settings: experiments, quasi-experiments, observational studies, surveys, and program-evaluations. Development of questions and hypotheses for study. Design of studies to maximize validity. Prereq: Consent of instructor.

507 Foundations of Applied Psychology (3) Fundamental methods for application of psychology principles and techniques in community, organizational, and industrial settings, and related ethical and theoretical issues. Prereq: 505 and consent of instructor.

508 Readings and Special Issues in Psychology (1-3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

509 Research Practicum (1-3) Required of first-year graduate students in psychology. May be repeated. Maximum 9 hrs. S/NC only.

510 Topics in Psychology (3) Intensive examination of selected issues in psychology. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

511 Developmental Psychology (3) Normal processes of human socialization; physical, cognitive, and emotional development from conception through infancy, childhood, and adolescence. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

512 Life-Span Development (3) Theories and research concerning normal human development throughout life, adulthood and old age. Prereq: Consent of instructor.

513 Foundations of Psychology: Biological Factors, Perception, Learning, Thinking, Motivation (3) Intensive survey. Prereq: Consent of instructor.

515 Colloquium in Experimental Psychology (1) Research and practical issues in experimental psychology. Prereq: Consent of instructor. May be repeated. Maximum 4 hrs. S/NC only.

517 Foundations of Counseling Psychology (3) History, theory, research and practice of counseling psychology. May be repeated. Maximum 6 hrs.

521 Analysis of Variance for Social Sciences (3) Analysis of variance and statistical theory: application within social science framework. Contrasts among means, trend analysis, analysis of covariance, analysis of factorial designs, and multivariate approaches to analysis of within subjects data.

522 Multiple Regression for Social Sciences (3) Complete coverage of analyses and theory: application within social science framework. Bivariate correlation and regression, multiple regression, analysis of variable sets, interactions among continuous predictors, interactions with main effects, and application of multiple regression to testing procedures of mediation and moderation.

525 General Vertebrate Neuroanatomy (3) Lecture and laboratory. Structure and functioning of central and peripheral nervous system. Prereq: 461 or equivalent and consent of instructor.

527 Behavioral Neurology (3) Disorders of nervous system, organic brain dysfunctions. Diagnosis and treatment. Prereq: Consent of instructor.

528 College Teaching in Psychology (3) Concepts, techniques and materials for teaching psychology at college and/or university level. Supervised practice. Prereq: Consent of instructor. S/NC only.


531 Personality and Mental Hygiene (3) Mental health perspectives and their application to social institutions.

545 Advanced Animal Behavior (3) (Same as Ecology and Evolutionary Biology 545.)

546 Ethological Psychology (3) Basic ethology and comparative psychology. Implications for human behavior. Prereq: Consent of instructor. (Same as Ecology and Evolutionary Biology 546.)

547 Conceptual Foundations of Evolution and Behavior (3) Critical evaluation of seminal writings on theory and methods in comparative analysis of behavior. (Same as Ecology and Evolutionary Biology 547.)

550 Social Psychology (3) Survey of theory and research concerning interpersonal interaction and individual behavior in social context. Prereq: Consent of instructor.

554 Laboratory in Psychometrics (3) Further learning about psychometric theory from response theory (modern mental test theory), factor analysis, and applications of those methods using computer programs to simulated or empirical data. Prereq: 555. May be repeated. Maximum 6 hrs.

555 Psychometrics (3) Basic concepts: factor analysis, scaling, test theories, probability models and their applications, computerized adaptive testing and other tests. Prereq: Statistics 537-538 or equivalent. May be repeated. Maximum 6 hrs.

557 Applied Psychological Measurement (3) Issues and techniques in applying psychological measurement in organizational, clinical, and community research. Prereq: Statistics 537-538 or equivalent of consent of instructor. May be repeated. Maximum 6 hrs.

558 Interviewing and Observation (3) Sensitizing students to own feelings and beliefs and to feelings of interview and analysis of language content, style, and body language. Exploration of various important aspects of interviewee’s life. Prereq: Admission to doctoral program in clinical psychology or consent of instructor. Coreq: 559.

559 Laboratory in Interviewing and Observation (1) Prereq: Admission to doctoral program in clinical psychology or consent of instructor. Coreq: 558.

560 Psychology of Learning (3) Review of current evidence from research involving human and/or non-human animals. Prereq: 400 and consent of instructor. May be repeated. Maximum 6 hrs.

565 History and Systems of Psychology (3) History of philosophy concerning psychology. Major systems of psychology which emerged during 20th century. Prereq: Graduate standing or consent of instructor.

567 Group Dynamics and Methods (3) (Same as COUN 554.)

568 Prepracticum in Career Development (3) Didactic instruction and practice in counseling and career exploration. Prereq: Admission to doctoral program in Counseling Psychology.

569 Practicum in Counseling (3) (Same as COUN 555.)

570 Personality: Theory and Research I (3) Advanced survey of psychodynamic and neo-Freudian approaches to personality; related research. Prereq: Admission to clinical program or consent of instructor.

571 Personality: Theory and Research II (3) Advanced survey of humanistic approaches to personality; related research. Prereq: Admission to clinical program or consent of instructor.

572 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: 445, COUN 525 or equivalent. Satisfactory/No Credit grading only.

573 Descriptive and Theoretical Psychopathology (3) Current psychiatric taxonomy system. Theories of etiology for various diagnostic categories. Examples from written case vignettes and recorded interviews. Prereq: Admission to doctoral program in clinical psychology or consent of instructor.

574 Cross-Cultural Counseling: Theory and Research (3) (Same as COUN 570)

575 Psychopharmacology (3) Connections between pharmacology and psychology. Prereq: Consent of instructor.

576 Object Relations (3) European and American conceptualizations of psychological disorders and psychopathological development of object relations. Significance for psychotherapy, psychoanalysis, and psychoanalytic theory. Prereq: Admission to doctoral program in clinical psychology or consent of instructor.

580 Research Questions and Designs (3) Question- asking process in research and strategies or designs through which answers might be derived. Prereq: Admission to doctoral program in clinical psychology or consent of instructor.

593 Independent, Off-campus, or Foreign Study (1-15) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/NC only.

594 Psychological Assessment I (3) Basic concepts and techniques of adult assessment: intelligence tests and personality tests. Prereq: Admission to doctoral program in clinical psychology or consent of instructor.

595 Psychological Assessment II (3) Basic concepts and techniques of adult assessment: intelligence tests and personality tests. Prereq: Admission to doctoral program in clinical psychology and 594 or consent of instructor.

596 Laboratory in Psychological Assessment (1) Prereq: Admission to doctoral program in clinical psychology or consent of instructor. May be repeated. Maximum 4 hrs. S/NC only.

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

601 Seminar in Psychology (3) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.


610 Seminar in Applied Psychology (3) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

613 Seminar in Existential-Phenomenological Psychology (3) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.


623 Seminar in Methods of Naturalistic Research (3) Prereq: 546 or consent of instructor. May be repeated. Maximum 12 hrs.

625 Advanced Study in Personality (3) Theory, research and conceptual analysis. Coreq: 445 or equivalent with application to education and counseling. Prereq: 470 or equivalent. (Same as COUN 625.)

635 Ethical, Legal, and Professional Issues in Psychology (3) Research, human services, teaching and publishing within psychology. Prereq: Admission to doctoral program in psychology or consent of instructor. (Same as Counselor Education and Counseling Psychology 635 and Psychoeducational Services 635.) S/NC only.

661 Education Implications of Neuropsychology (1) Theories, assessment, and implications for the behavioral and cognitive manifestations. Prereq: 461 or consent of instructor.

667 Personality and Vocational Assessment (3) Use and interpretation of personality and vocational tests and personality tests. Prereq: 445 or COUN 525 or consent of instructor. (Same as COUN 671.)

670 Psychotherapy I (3) Theories and principles. Prereq: Admission to doctoral program in clinical psychology or consent of instructor.

671 Psychotherapy II (3) Theories and principles. Prereq: Admission to doctoral program in clinical psychology and 670 or consent of instructor.

672 Psychological Dysfunction (3) Classification methods, dynamics and treatment of dysfunctional individuals in counseling. Prereq: 425 and a course in abnormal psychology, or consent of instructor.

673 Laboratory in Psychotherapy (2) Prereq: Admission to doctoral program in clinical psychology or consent of instructor. Coreq: 670 or 671. May be repeated. Maximum 12 hrs.

674 Practicum in Counseling Psychology (3) Supervised practice of individual counseling. Minimum 135 clock hrs required each semester. Prereq: Admission to doctoral program in Counseling Psychology. 445 or equivalent, 589 and consent of instructor. May be repeated. Maximum 6 hrs.
Religious Studies

(College of Arts and Sciences)

Gilya G. Schmidt, Head

Professors:
Dungan, David L., Th.D. .......... Harvard
Fitzgerald, James L., Ph.D. .......... Chicago
Hackett, Rosalind I. J., Ph.D. ....... Aberdeen
Levering, Miriam L., Ph.D. .......... Harvard
Reynolds, Charles H., Ph.D. ....... Harvard
Schmidt, Gilya G., Ph.D. ............ Pittsburgh

Associate Professors:
Gwynne, Rosalind W., Ph.D. ......... Washington Hodges, John O., Ph.D. ......... Chicago Husseyn, Mark, Ph.D. ......... Minnesota

Assistant Professors:
Jacobs, Rachelle M., Ph.D. ......... Northwestern Stiebert, Johanna, Ph.D. ......... Glasgow

A master's degree in Philosophy with a concentration in Religious Studies is available. Contact the department for details of this program. Graduate courses in Religious Studies provide opportunities for students in a variety of disciplines to pursue work in Religious Studies as a graduate concentration.

GRADUATE COURSES

405 Modern Jewish Thought (3) History, culture, and geography of the nation Israel from the Levant from 1850 to present. Founding of modern state of Israel in 1948 and political complexities of Middle East. Israeli culture and literature. Writing emphasis course. (Same as Judaic Studies 405.)

411 Modern Religious Philosophies (3) Religious implications of major Western thinkers and movements from Nicolas of Cusa to nineteenth-century German idealists. (Same as Philosophy 411.)

412 Classical Indian Systems of Philosophy: The Moksha Tradition (3) Investigation of selected writings and philosophical problems of traditions of Samkhya, Yoga, Vedanta, Buddhism, or Jainism. Prereq: 374 or 376 or consent of instructor.

425 Seminar in Western Religions (3) Selected figures, themes, movements, and problems. Content varies. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

430 Seminar in American Religion (3) Selected figures, themes, movements, and problems. Content varies. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

440 Seminar in Comparative Religion (3) Selected figures, themes, movements, and problems. Content varies. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

490 Readings and Research in Religious Studies (3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

499 Proseminar in Religious Studies (3) For advanced students in religious studies; required for majors. Selected specific topics: nature and function of myth in religion, problem of evil, transcendence, theories of religion, hermeneutics, integrating various disciplines involved in study of religion. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.


506 Historical and Comparative Studies of Religions (3) Description and analysis of religious traditions, phenomena, and themes. May be repeated. Maximum 6 hrs.

507 Religion, Power and Society (3) Studies of religions in relation to social structure and political institutions: issues of gender, race, class, ethnicity, caste, slavery, religion and the state, globalization and human rights. May be repeated. Maximum 6 hrs.

513 Religion, the Arts, and the Media (3) Material and expressive culture, religion and journalism, mass communication technologies, and media culture. Issues of representation, cultural studies methodologies. May be repeated. Maximum 6 hrs.

514 Religion and Healing (3) Ecology of religion, nature, shamanism, healing of body and mind, spirituality, religious dimensions of medical ethics. May be repeated. Maximum 6 hrs.


520 Readings in the Study of Religion (1-6) May be repeated. Maximum 12 hrs.

532 Topics in the History of Religions (3) Prereq: Consent of instructor.

533 Topics in Religious Thought (3) Prereq: Consent of instructor.

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

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

593 Independent Study (1-15) See College of Arts and Sciences.
THE MASTER'S PROGRAM

The Master of Science in Social Work program prepares social workers to provide professional leadership in 1) clinical social work practice and 2) social work management and community practice. These objectives are met through a curriculum requiring of all students a professional foundation and a concentration in either clinical social work practice or social welfare management and community practice. The M.S.S.W. program is accredited by the Council on Social Work Education.

Admission Requirements

Admission to the master’s program is based on the following requirements:

1. A Bachelor’s degree from an accredited college or university with appropriate preparation in the social sciences. At least three-fourths of the applicant’s undergraduate work should be in the social sciences, humanities, physical sciences, and other Arts and Sciences subjects. Applicants must have a course in human biology and demonstrate a liberal arts perspective through coursework in at least four of the following five areas: economics or mathematics; government, political science or history; sociology or anthropology; psychology; philosophy, literature, or the arts. Applicants with other academic backgrounds may request consultation to discuss ways that they can meet the requirements.

2. A grade point of 2.7 or higher on a 4.0 scale. Applicants falling below this average may be considered for probationary admission on the basis of supplemental evidence of the ability to perform at a satisfactory level. The University requires a minimum GPA of 2.7 for admission to graduate study.

3. Personal qualifications acceptable for entrance into the professional practice of social work.

4. 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 higher, and (3) personal qualifications acceptable for entrance into the professional practice of social work. Students admitted into advanced standing are required to complete a minimum of 36 hours of study in either of the concentrations—clinical social work practice or social work management and community practice. These students will follow the curriculum plan and meet all requirements of the concentration during three semesters of study in the program.

Application for admission to the advanced standing program is through the regular admission process.

Extended Study

Planned part-time programs are available in all three locations of the college. Admission requirements are the same as for full-time study. Coursework can be completed over a three-year period.

Financial Aid

Students may apply directly to the University’s Financial Aid Office for assistance such as the National Direct Student Loan or the Work-Study Program. Information regarding scholarships administered by the College is made available after admission.

General Requirements

1. The program requires successful completion of a minimum total of 60 semester hours including completion of the foundation curriculum (30 hours) and 30 hours in one of the two concentrations (clinical social work practice or social welfare management and community practice).

2. Students may select a thesis or non-thesis option. Students pursuing the thesis option receive six credit hours for successful completion.

3. Students must successfully complete a comprehensive exam or thesis defense.

4. Students must have an overall GPA of 3.0 or better on all graded courses and satisfactory performance in field.

The Professional Foundation Curriculum

All students must complete 30 semester hours in the foundation curriculum consisting of 24 hours in foundation classroom courses and 6 hours in field practice. The foundation is the initial phase of the master’s program. It contributes to the process of professional identification and presents a comprehensive, broad base of theory, knowledge and skills from which to practice. The foundation classroom courses include Foundations of Social Work Practice I, II, and III; Human Behavior in the Social Environment I and II; Social Welfare Policy and Services; Social Work Research; and Social Work and Oppression. Students also complete a two-semester field placement, Field Practice (6 hours). Upon successful completion of the foundation curriculum, all students must complete a minimum of 30 hours in the concentration curriculum including field practice (12 hours). Students select a concentration in clinical social work practice or social welfare management and community practice.

Clinical Social Work Practice: The clinical social work practice concentration focuses on students developing expertise in clinical social work practice with client systems including individuals and small groups, particularly with clients from high-risk and vulnerable groups. The concentration emphasizes theoretical and empirical knowledge and practice skills in differential assessment, clinical interventions and practice evaluation. The concentration also emphasizes knowledge and skills directed toward (1) amelioration of complex psychosocial, interpersonal problems; (2) ethically sound and culturally sensitive practice; and (3) influencing the development of services and programs that are responsive to the needs of vulnerable, high-risk clients and groups.

Required courses:

- 521 Clinical Social Work Practice with Individuals (3 hours)
- 526 Evaluating Clinical Practice (3 hours)
- 582-83 Field Practice (12 hours)

One or more from a pool of advanced clinical practice courses.

Social Welfare Management and Community Practice: The social welfare 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.

Required courses:

- 541 Leadership and Management in Human Services (3 hours)
- 543 Financial Management and Resource Development (3 hours)
- 547 Evaluation Research (3 hours)
- 582-83 Field Practice (12 hours)

Minimum of three (total of 9 hours) advanced course electives as follows:

One course in advanced policy (3 hours).

Two courses from a pool of advanced general courses (6 hours).

Field Practice

Field instruction is a critical component of the student’s first-and second-year programs. Through cooperation with a wide range of social agencies and human service programs throughout Tennessee, the college is able to provide field placements in a variety of social work practice areas. The faculty works closely with the placement agencies and the field instructors to ensure that students have quality field practice experiences that meet the objectives of the core curriculum and the concentration.

The college uses a concurrent class and field plan. Students are in field two days per week during the first year and three days per week during the 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 program.
Students have the opportunity to work in the Children's Mental Health Services Research Center as part of their training. The Center focuses on services to children who have experienced mental health problems associated with abuse, neglect, violence, and a variety of psychosocial problems.

Admission Requirements

The Ph.D. program is designed for students who have completed a master's degree in an accredited school of social work and have post-master's social work/social welfare experience. Applicants who do not meet these requirements, but believe they have equivalent credentials should contact the Chair of Ph.D. program for further information regarding admissions criteria.

Applications may be downloaded at www.csw.utk.edu/phd/.

General Requirements

1. A minimum of 66 hours beyond the master's degree including: a) completion of 27 hours of required coursework, b) completion of 15 credits of advanced electives, at least 12 of which are taken outside the department, and 9 of those 12 related to the dissertation, and c) completion of at least 24 credit hours of dissertation research.
2. Successful completion of qualifying and comprehensive examinations.
3. Completion and defense of the dissertation.

Curriculum

The curriculum of the Ph.D. program consists of foundation coursework, electives, and dissertation research. The foundation curriculum consists of 27 hours of coursework in the history and philosophy of social work, issues in direct service and administration and planning, areas of practice, and research methodology and statistics. Upon this foundation, students and their academic committees develop a plan of study consisting of coursework in Social Work and other departments of the University. Typically, the 24 hours of foundation curriculum are completed and elective coursework begun during the first year of study. Social Work 670 and the elective requirement are completed and dissertation research begun in the second year of study, and dissertation research is continued in the third year of study. While it is generally expected that the coursework will be completed on a full-time basis, dissertation research can be completed on a planned part-time basis.

Specific courses required are 601, 602, 612, 613, 640, 650, 670, and Statistics 531 and 532 or any two graduate level statistics courses approved by the Doctoral Program Chair.

Examinations

All doctoral students are required to pass a qualifying examination and a comprehensive examination. The qualifying examination covers the foundation curriculum. The comprehensive examination is administered by members of the comprehensive exam committee and is designed for the student to demonstrate comprehensive knowledge of the major and cognate areas and the dissertation topic. In case of failure of either examination, the student may request a retake. The result of the second examination is final.

Financial Aid

Financial aid is available to qualified students in the form of fellowships, scholarships, and teaching and research assistantships. Graduate assistantships and other forms of assistance are awarded on the basis of merit and interest to applicants who are accepted into the Ph.D. program.

MINOR IN GERONTOLOGY

Graduate students in the College of Social Work, at the Knoxville location, may pursue a specialized minor in gerontology. This interdepartmental/interdisciplinary minor gives the student an opportunity for combining the knowledge about aging in American society with his/her major concentration. Please refer to Human Ecology for specific requirements.

POST-MASTER'S CERTIFICATE IN MANAGEMENT AND COMMUNITY PRACTICE

The College of Social Work offers a 15-credit hour post-master's certificate program designed for social workers desiring supervisory, management, administration and community practice training and education to enhance career advancement or career redirection. A master's degree in social work or a closely related field is required for admission.

Course requirements are 541, 543, 547, and two courses selected from 550, 551, 552, 555.

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.

501 Foundations of Social Work Practice I (3) Survey of history, mission, and identity of profession. Basic theory, professional values and ethics, and methods generic to social work practice at various systems levels. Assessment, planning, communication, intervention, and evaluation skills.

502 Registration for Use of Facilities (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.

503 Foundations of Social Work Practice II (3) A generalist practice with family and small group systems. Ecological theory to frame understanding of such systems and their adaptation to environments. Various social work roles and intervention strategies pertinent to client systems.

504 Foundations of Social Work Practice III (3) Basic theory, methods, problems, and strategies in implementing planned change within and among larger social systems: task groups, human service organizations, and community systems. Various practice roles: planner, program developer, supervisor, administrator, advocate and task group leader.

506 Social Work Research (3) Research methodologies with respect to evolution and application to social work theory and practice. History and philosophies of science; problem formulation; research design; ethics; instrument use and construction; data collection; analysis and reporting; and evaluation and utilization of research.
508 Practicum in Social Work Research (3-6) Supervised practice in application of research methods to social work. May be repeated. Maximum 6 hrs. S/NC only.

509 Graduate Seminar in Public Health (1) (Same as Public Health 509, Exercise Science 509, Nutrition 509, and Nursing 509.)

514-15 Human Behavior in the Social Environment II (3,3) Major social science theories that inform social work profession’s understanding of human behavior and social processes. Interactions among biological, social, psychological, and cultural systems on development across life cycle. Family, social, cultural, economic, gender, and sexual orientation variables. 514—Life cycle from infancy through adolescence. 515—From young adulthood through senescence.

516 Social Welfare Policy and Services (3) Development of contemporary social policy at local, state, national, and international levels. Contribution of social work professionals to formal policy-making process through which macro-social change is effected and through which aggregate social welfare services are proposed, authorized, financed, and programmed. Theories of complex organizations applied to social welfare service delivery settings.

518 Social Work and Oppression (3) Sources, dynamics, and impact of oppression in U.S. society as manifested in both social/ecological/economic systems and personal experience. Connections among various forms of oppression: racism, sexism, classism, and heterosexism, and forces that perpetuate such conditions.

521 Clinical Social Work Practice with Individuals (3) Theories, knowledge, and skills for clinical practice with individuals from ecological perspective. Therapeutic process and intervention strategies, incorporating content from psychodynamic and cognitive practice models, and specific client problems.

523 Clinical Social Work Practice with Families (3) Concepts related to understanding and analyzing family dynamics and interactional patterns from perspective of major family therapy models. Techniques of intervention in terms of application to families with varied system and individual problems and to families from varied social and cultural backgrounds.

524 Psychopathology and Social Deviance (3) Assessment of psycho-social functioning of individuals. Examination of mental disorders: clinical presentation of major family therapy models. Techniques of intervention in terms of application to families with varied system and individual problems and to families from varied social and cultural backgrounds.

525 Clinical Social Work Practice with Groups (3) Theoretical and historical approaches to social work with groups and clinical principles supporting specific types of group work used in clinical practice and associated leader interventions.

526 Evaluating Clinical Practice (3) History and philosophy, conceptual approaches, techniques and methods in the practice and use of practice research as applied to implementation and evaluation of direct services to clients.

530 Seminar in Clinical Social Work (2-3) Topics in theory and practice of clinical social work with individuals, couples, families and groups. May be repeated. Maximum 6 hrs.

532 Short-Term Interventions (3) Theory and practice of planned short term, emergency, and crisis interventions.

533 Social Work Interventions with Couples (3) Theories regarding contemporary marital/partnering lifestyles, problem areas in relationships, methods and skills for problem resolution.

534 Social Work Interventions with Children and Adolescents (3) Theories and practice models for assessing and intervening with children and adolescents.

535 School Social Work (3) Place of school as community institution and resource. Methods, processes, and techniques employed in school social work.

540 General Topics in Social Work (3) Current topics in advanced social work. May be repeated. Maximum 6 hrs.

541 Leadership and Management in Human Services (3) Management practices and leadership skills required in development and management of human services delivery systems. Issues regarding human resources management, resource allocation, strategic planning, and organizational dynamics.

543 Financial Management and Resource Development (3) Administrative decision-making related to financial planning and resource allocation in human service organizations. Knowledge and skills in budgeting, allocating, expenditure control, fundraising, grant writing, marketing, and evaluation.

547 Evaluation Research (3) History and philosophies, conceptual approaches, techniques and methods, and issues in practice and utilization of evaluation research as applied to development and evaluation of social welfare programs and policies. Issues pertaining to strengths and limitation of various evaluation methods, microcomputer application of data, and measurement of program goals and objectives.


552 Community Organization (3) Locality development, social policy, philosophical bases, and practice models for development of resources to meet human needs.

561 Supervision and Consultation in Social Work (3) Roles, techniques, and practices of social work supervision and consultation.

564 Substance Abuse (3) Survey and analysis of social, cultural, medical and psychological factors contributing to alcoholism and addiction; recent research and practice innovations.

566 Social Gerontology (3) Physical, psychological and social aspects of aging, and major social policies and programs.

580 Field Practice (3) Instruction and supervision in social work practice. S/NC only.

581 Field Practice (3) Instruction and supervision in social work practice. S/NC only.

582 Field Practice (6) Instruction and supervision in clinical social work practice or management and community practice. S/NC only.

583 Field Practice (6) Instruction and supervision in clinical social work practice or management and community practice. S/NC only.

584 Field Practice (2-6) Instruction and supervision in social work practice. May be repeated. S/NC only.

585 Seminar in Gerontology (1) (Same as Educational Sociology 585, Educational Psychology 585; Exer. and Social Work 585; Nursing 585; Public Health 585; Sociology 585.)

593 Independent Study (1-6) Individualized study, student selects, designs, and completes examination of special issue or problem. May be repeated. Maximum 6 hrs.

594 Doctoral Research and Dissertation (3-15) P/N only.

601 Research for Social Work Practice I (3) Epistemological and methodological considerations for both qualitative and quantitative research for social work practice.

602 Research for Social Work Practice II (3) Epistemological and methodological considerations for both qualitative and quantitative research for social work practice.

604 Research in Social Service Settings (3) Advanced research, under faculty supervision, of practice, policies in community agencies. Prerequisite: First year required. May be repeated. Maximum 9 hrs.

605-06 Analysis of Social Work Data I, II (3.3) Techniques for quantitative analysis of social work data: unique data analysis problems encountered in social work research.
THE DOCTORAL PROGRAM

Coursework
Twenty-four hours of coursework beyond the master’s degree are required. The M.A. degree (521, 531, 533, 560) requires coursework in Sociology at the 600 level are required. Students who enter the program without the courses required for the M.A. degree (521, 531, 533, 560) or their equivalents must take them as remedial work which does not apply to their residence. Students must complete Sociology 622; 534, 563, 532, or 636; and Statistics 532 or another advanced course in statistics. Completion of 9 hours in each of two concentrations is encouraged. A student who cannot achieve his/her educational goals within the department’s concentrations may construct an individualized course of study subject to the approval of the student’s doctoral committee and the Curriculum Committee. Sociology courses at the 400 level may not be taken without the consent of the student’s advisor and the Curriculum Committee. Six hours may be taken in related fields without petitioning 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 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 Graduate Student Services.

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 special minor in gerontology. This interdisciplinary/interdisciplinary minor gives the student an opportunity for combining the knowledge about aging in American society with his/her major concentration.

GRADUATE COURSES

405 Sociology of Sport (3) Social meaning, organization, and process of sport. Prereq: 291 or consent of instructor.
414 Sociology of Health Care (3) Organization of health care facilities, staff-patient relationships, demographic characteristics, and prevalence of disease.
415 Sociology of Aging (3) How roles and statuses change with age in relation to major social institutions; impact that rapidly increasing number of older people has on society, effect of society on older people.
446 The Modern World System (3) Critical examination of capitalism 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.
455 Society and Law (3) How laws and legal processes are affected by social change, social impact of legal sanctions, relations between law and social justice. (Same as Legal Studies 455.)
459 White-Collar Crime (3) Distinctive nature and dynamics of white-collar crime, victims and costs of white-collar crime, organizations as white-collar offenders, causal theories, and dynamics of responses to white-collar crime by private and public parties.
462 Population (3) Demographic factors and social structure; trends in fertility, mortality, population growth, migration, distribution, and composition; population policy.
464 Urban Ecology (3) Relation of humans to their urban environment: conservation and use of appropriate technology. (Same as Urban Studies 464.)
465 Social Values and the Environment (3) Human dimensions of ecosystem management and public policy. Applied focus on social values activated within specific physical and social settings. Prereq: 110 Social Problems and Social Change or 120 General Sociology or consent of instructor.
471 Sociolinguistics (3) (Same as English 471 and Linguistics 471.)
500 Thesis (1-15) P/NP only.
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 Sociological Foundations of Political Economy (3) Survey of contemporary sociological theories of political economy, sources of political and economic power and conflict.
505 Foundations of Criminology (3) Critical overview of contemporary developments in criminology, theories of crime causation and theories of responses to crime. Prereq: 350 or equivalent.
507 Foundations of Social Psychology (3) Current and classical theoretical perspectives in social psychology.
510 Teaching Sociology (3) Art and craft of teaching sociology from curricular considerations through teaching techniques. May be repeated. Maximum 6 hrs.
521 Sociological Theory I (3) Assessment of what sociological theory is; its major figures and their approaches to understanding society.
531 Research Methods in Sociology (3) Research design, measurement, sampling, quantitative and qualitative data collection techniques, data, reduction, and analysis.
534 Advanced Sociological Analysis (3) Underlying assumptions and logical procedures used by sociologists in formulating explanations; foundations of sociological research strategies and techniques.
541 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.
543 Sociology of Development (3) Sociological theories of development: modernization, colonialism, dependency; comparative impact of various development paths upon selected aspects of social structure and change.
Historical and contemporary studies of the social structure of American society. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

Environmental Sociology (3) Systematic treatment of current research in environmental sociology. Social impact analysis and conflicts over environmental issues. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

Demographic Techniques (3) Standard rates and measures of demographic variables, life table analysis, increment-decrement models, and survey techniques of population analysis. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

Advanced Rural Sociology (3) (Same as Rural Sociology 585.)

Seminar in Gerontology (1) (Same as Counselor Education 585, Educational Psychology 585; Exercise Science 585; Health 585; Nursing 585; Public Health 585; Social Work 585.)

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

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

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

Readings (3) Selected topics. May be repeated. Maximum 6 hrs.

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

Sociological Theory II (3) Distinct schools of sociological theory and contributions of their principal exponents. Prereq: 521 or consent of instructor.

Supplementary Readings in Sociological Theory (3) Individual guidance. Preparation for comprehensive examination. Prereq: Consent of instructor. S/NC only.

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.)

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.

Supplementary Readings in Methodology (3) Individual guidance. Preparation for comprehensive examination. Prereq: Consent of department. S/NC only.

Political Sociology (3) Critical examination of theories of state and political processes.

Advanced Studies in Political Economy (3) Topical seminar. Prereq: 504 or consent of instructor. May be repeated. Maximum 6 hrs.

Advanced Studies in Methodology (3) Preparatory readings for comprehensive examination. Prereq: Consent of department. S/NC only.

Sociology of Law (3) Intensive examination of selected topics in sociology of law. Prereq: 505 or consent of instructor.

Advanced Studies in Criminology (3) Intensive examination of selected topics in criminology. Recommended prereq: 505. May be repeated. Maximum 6 hrs.

Environmental Theory (3) Systematic treatment of current research in environmental sociology. Social impact analysis and conflicts over environmental issues. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

Advanced Special Topics (3) Topic of special interest or student-initiated courses that will not be regularly offered. Prereq: Consent of department. May be repeated. Maximum 6 hrs.


Spanish

See Modern Foreign Languages and Literatures

Sport and Leisure Studies

(College of Education, Health, and Human Sciences)

MAJORS DEGREES

Education ........................................ Ph.D.
Recreation and Leisure Studies ............... M.S.
Sport Studies .................................... M.S.

J.T. DeSensi, Head

Professors:
J. T. DeSensi, Ph.D. .................................... North Carolina (Greensboro)
G. A. Hayes, Ph.D. ............................ North Texas State
Joan Paul, Ed.D. .................................... Alabama
C. A. Wrisberg, Ph.D. ......................... Michigan

Associate Professors:
R. E. Jones, Ph.D. .............................. Toledo
D. R. Kelley, Ph.D. .............................. Georgia State
K. L. Krick, Re.D. ............................... Indiana

Assistant Professors:
R. Chen, Ph.D. .............................. North Carolina State
L. A. Fisher, Ph.D. ............................ Berkeley
R. L. Hardin, Ph.D. ............................ Tennessee
M. G. McCutchen, Ed.D. ........................ North Carolina (Greensboro)
T. M. Stratta, Ph.D. ............................ Southern Illinois

Adjunct Assistant Professors:
J. Bemiller, J.D.; J. Bietner, M.S.;
J. Cronan, M.S.; H. Denton, M.S.;
P. Fain M.S.; T. Irwin, J.D.; W. Myers, M.S.;
E. Schlesiman, Ph.D.; P. Summit, M.S.;
C. Tegano, Ed.D.; J. Whitney, Ph.D.

Adjunct Instructors:
M. Brown, M.S.; E. Catignani, M.S.;
D. Jennings, B. S.; D. Thomas, M.S.;
K. White, B.S.

Internship Coordinator:
L. Y. Brown, M.S.

Lecturers:
S. Causey, M.S.; L. Y Brown, M.S.

Artist in Residence—Dance
P. Burke

The Department of Sport and Leisure Studies is committed to excellence in research, teaching, practice, and service within the multifaceted contexts of sport, leisure, and recreation. We are dedicated to providing superior and innovative programs of study and applied experiences that will enable students to become effective and imaginative professionals, scholars, and citizens. The Department is also committed to the principles of diversity and social justice and to the provision of positive sport and leisure experiences for all people.

The Department of Sport and Leisure Studies offers graduate programs leading to degrees, majors and concentrations in:

- Master of Science
  - Recreation and Leisure Studies
    - Therapeutic Recreation
  - Sport Studies
  - Doctor of Philosophy
  - Education

Recreation and Leisure Studies

THE MASTER’S PROGRAM

1. Recreation Administration Concentration

Thesis Option

Recreation and Leisure Studies 415 or 440, 510, 515, 540, 541, 590
Safety Education 443
Sport Management 512
Research Methods 3
Statistics 3
Thesis 6
Total 33

Non-Thesis Option

Recreation and Leisure Studies 415 or 440, 510, 515, 540, 541, 590
Safety Education 443
Sport Management 512
Research Methods 3
Statistics 3
Elective 3
Total 33

2. Therapeutic Recreation Concentration

Thesis Option

Recreation and Leisure Studies 420 or 425, 510, 515, 520, 521, 522
Research Methods 3
Statistics 3
Elective 3
Thesis 6
Total 33
Leisure Studies or outside the department. A total of 580.

Thesis and Non-Thesis Options

Graduate Assistantships. Graduate assistantships are available to qualified candidates. Students should contact directly the area in which they are pursing an assistantship. A limited number of graduate teaching assistantships are available in the Physical Education and Activity Program for sport management students. Please contact Glenda Dills at gdills@utk.edu or 865-974-1272 for more information regarding these assistantships.

THE MASTER’S PROGRAM

Project Option

SM 511 3
SM 532 3
SM 535 3
Sport Management Electives 6
Cultural Foundations of Sport 3
Electives 12
SM 501 - Project 3
Total Hours 33

Thesis Option

SM 511 3
SM 532 3
SM 535 3
Sport Management Electives 6
Cultural Foundations of Sport 3
Electives 6
Thesis 6
Total Hours 30

These courses may be repeated

Students may select additional courses relevant to their professional and career goals from other departments.

THE PH.D. PROGRAM

The Ph.D. in Education offers a concentration in Sport Studies with areas of specialization in Sport Sociology and Sport Psychology. The program stresses an interdisciplinary approach to course work and research and expects its students to become proficient in qualitative and quantitative research methods. Students are expected to obtain a significant grounding in the allied, parent disciplines. The program prepares students to teach in higher education and/or to conduct work within applied educational and sport settings. The program usually takes 4 years (2 years of coursework and year for the dissertation) and includes 15 credits in the concentration, 15 credits in research, 11 core credits, 9 credits in a specialization, 6 credits in a cognate area, and 24 dissertation credits.

Recreation and Leisure Studies

GRADUATE COURSES

415 Development and Maintenance of Recreation and Athletic Facilities (3) Principles of designing, planning, equipping, operating and maintaining various facilities. Elements of risk management and safety in design process. Prereq: 310 Development and Evaluation of Recreation and Tourism Programs and consent of instructor. (Same as Sport Management 415.)

430 Organization and Administration of Leisure 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.

440 Dimensions of Commercial Recreation and Leisure Enterprises (3) Prereq: 201, junior standing or consent of instructor.

450 Special Topics in Leisure Education (1-6) Development of special topics in recreation, therapeutic recreation and leisure. May be repeated. Maximum 6 hrs.

470 Tourism and Leisure Industries (3) Symbiotic relationship between tourism and various sectors of leisure industry. Use of resources, both natural and developed, and economic impacts of ventures. Social-cultural impacts on venue as well as venues impact on local population.

500 Thesis (1-15) P/NP 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.

515 Philosophical and Conceptual Foundations of Leisure (3) Philosophy of leisure and recreation; nature of philosophy, concepts of leisure, recreation, play, work, and other factors, history of field, and relationship of ideas to contemporary society and to professional practice.

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.

521 Facilitation Techniques in Therapeutic Recreation (3) Role of therapeutic recreation in clinical and non-clinical settings; application of life-style planning, self-awareness, values clarification and assertiveness training in therapeutic recreation, relationship of leisure education to therapeutic recreation. Prereq: 520 or consent of instructor.

522 Clinical Aspects in Therapeutic Recreation (3) Concepts and techniques utilized by experienced and advanced therapeutic recreation specialist: clinical issues, comprehensive program concerns, administrative and staff management and personnel issues, comprehensive program concerns, administrative and staff management and personnel issues, comprehensive program concerns, administrative and staff management and personnel issues.

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.

541 Management and Operation of Recreation and Sport Related Facilities (3) Research for making program and management decisions, process of cost analysis, and basic design and maintenance of recreation and sport related facilities. Prereq: Consent of instructor.

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.

591 Directed Study in Leisure and Recreation (1-6) Detailed study of theme, issue, or concern. Designed to meet needs of individual students. May be repeated. Maximum 6 hrs.

592 Special Topics in Recreation and Leisure Studies (1-6) May be repeated. Maximum 6 hrs.

Sport Management

GRADUATE COURSES

415 Development and Maintenance of Recreation, Tourism and Athletic Facilities (3) (Same as Recreation and Tourism Management 415.)
440 Sport Marketing (3) Application of fundamental marketing concepts to sport industry. Marketing research, promotions, fund raising, advertising, and assessment of marketing programs specific to sport. Historical development of sport marketing. Prereq: Marketing or consent of instructor.

460 Development and Revenue Generation in Sport (3) Designed to provide overview of theories, strategies, and techniques used in the production of revenue for sport organizations and through sporting events. Emphasis on developing balanced, multifaceted programs that target a variety of constituencies in the sport industry.

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

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 (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.


510 Trends and Issues in Services Management (3) (Same as Hotel and Restaurant Administration 510.)

511 Administration/Supervision in Sport (3) Development of knowledge and analytic skills desirable for managers/administrators in sport business/organization: organizational, administrative, and supervisory strategies related to sport in profit and non-profit settings.

512 Application of Legal Concepts to Sport Settings (3) Application of contract law, breach of contract, and monetary damages within sport settings: risk assessment and development of effective risk management strategies; development of contracts in sports; and analysis of cases involving discrimination based upon gender, race, and age as well as protection of rights at amateur and professional levels of sport.

530 Sport and Media Issues (3) Gender and race issues within context of media and sport. Development of sport media and media influence on sport.

532 Research Techniques in Sport (3) Evaluate, compare, and contrast research techniques in sport with consideration for and experiences in appropriate review, design, analysis procedures, and proposal development.

533 Ethics in Sport Management (3) Development of analytical skills and knowledge desirable of middle and upper management in sport business organizations. Social issues and ethics in sport administration.

540 Sport Economics and Finance (3) Principles of economics and finance as applied to sport organizations. Market structures of sport finance and political economics that form those structures.

544 Theories of Leadership and Leader Behavior in Sport (3) Integration of various theoretical approaches to leadership styles in sport administration within cultural contexts, research, and field experiences.

553 Case Studies in Sport Management (3) Current issues and problems in sport administration at all levels of amateur and professional sport. May be repeated under different topic. Maximum 9 hrs.

554 Readings in Sport Management (3) Survey of pertinent literature in refereed and applied journals and texts.

555 Evaluation Techniques for Sport Managers (3) Review and application of techniques of evaluation appropriate for sport programs, facilities, and personnel.

570 Event Management (3) Review of current research related to theory and practice in event management and involvement in management capacity with one or more special events.

575 Seminar in Sport Management (1) Selected topics in sport management. May be repeated with consent of instructor. Maximum 3 hrs. S/NC only.

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

590 Practicum (3) Practical experience in areas of major interest. May be repeated. Maximum 6 hrs. S/NC only.

593 Independent Study (1-3) May be repeated. Letter grade only.

595 Internship (3) Full-time application of previous theoretical and applied knowledge and skills in appropriate sport setting. S/NC only.

Sport Studies

GRADUATE COURSES

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

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 (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.


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


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

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

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

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

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

539 Research Development in Sport Psychology: Idea Formation to Data Collection (3) First of a two-semester sequence designed to familiarize students with research process in applied sport psychology. Includes idea formation, critical review of related literature, development of a research question and methodology, and data collection.

540 Research Development in Sport Psychology: Data Analysis to Manuscript Submission (3) Second of a two-semester sequence designed to familiarize students with research process in applied sport psychology. Includes data analysis, manuscript preparation and manuscript submission.

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

543 Women, Sport, and Culture (3) Critical examination of experiences of girls/women in American sports from a socio-cultural perspective with particular emphasis on the construction of gender, race, class, and sexuality. Explores theories from sport, feminist, race, and cultural studies.

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

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

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

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

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

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

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

694 Supervised Reading (1-3) May be repeated. S/NC or letter grade.

695 Special Topics (1-3) Study for doctoral students in selected aspects of cultural studies. May be repeated. Maximum 9 hrs. S/NC or letter grade.

Dance

GRADUATE COURSES

415 Teaching Creative Dance for Children (2) Theory, methods, materials and practical experience in presentation and integration of creative dance in grades K-6. Mini-teaching experience.

480 Dance Through the 19th Century (3) Dance of various societies and culture from pre-history through 19th century.

490 Dance in the 20th Century (3) History and philosophy of dance.

495 Dance Pedagogy (3) Principles and methods of teaching dance with practical application in mini-teaching experience. Prereq: Upperclass or graduate standing and consent of instructor.

510 Ballet: Level IV (2) Instruction and practice in advanced classical ballet techniques. Prereq: Consent of instructor. May be repeated. Maximum 8 hrs.

520 Jazz: Level IV (2) Instruction and practice in advanced jazz styles and techniques. Prereq: Consent of instructor. May be repeated. Maximum 8 hrs.

530 Modern: Level IV (2) Instruction and practice in advanced modern dance techniques. Prereq: Consent of instructor. May be repeated. Maximum 8 hrs.

550 Dance Composition IV (3) Independent study applying choreographic and production skills, culminating in presentation of two works. Prereq: 440 Composition I and 445 Composition II or consent of instructor.

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

MAJORS DEGREES
Statistics ........................................... M.S.
Business Administration .......................... Ph.D.

Robert W. Mee, Head

Professors:
Bozdogan, Hamparsum, Ph.D. .......... Illinois
Guess, Frank M., Ph.D. ........ Florida State
Mee, Robert W., Ph.D. ........ Iowa State
Parr, William C., Ph.D. ........ Southern Methodist

Associate Professors:
Leitnaker, Mary G., Ph.D. ............ Kentucky
León, Ramón V., Ph.D. ........ Florida State
Seaver, William L., Ph.D. .......... Texas A&M
Walker, Esteban, Ph.D. ............ VPI
Younger, M. S. (Laion), Ph.D. .... VPI

Assistant Professors:
Bensmail, Halima, Ph.D. .......... Paris
Kim, Hyunjoong, Ph.D. .......... Wisconsin

Additional Intercollegiate Program Faculty:
Aikens, Charles, Engineering; Bates, Ben, Communications; Bunting, Dewey, Arts and Sciences; Carney, Paula, Human Ecology; Chang, Hui, Business Administration; Chatterjee, Arun, Engineering; Eastwood, David, Agricultural Sciences and Natural Resources; Gant, Michael, Arts and Sciences; Glisson, Charles, Social Work; Gross, Louis, Arts and Sciences; Huck, Schuyler, Education; James, Lawrence, Business Administration; Ladd, R. T., Business Administration; Lounsbury, John, Arts and Sciences; Lounsbury, John, Arts and Sciences; Lounsbury, John, Arts and Sciences; Lounsbury, John, Arts and Sciences; Schmidhammer, James, Business Administration; Singletary, Michael, Communications; Smith, Julius, Arts and Sciences; Wagner, Carl, Arts and Sciences; Xiong, Jie, Arts and Sciences.

Emeriti Faculty:
McLean, Robert A., Ph.D. .......... Purdue
Phipot, John W., Ph.D. ............ VPI
Sanders, Richard D., Ph.D. .......... Texas
Sylwester, David L., Ph.D. ........ Stanford
Thigpen, Charles C., Ph.D. ......... VPI

THE MASTER'S PROGRAM

The M.S. program in Statistics provides students with the foundations in theory and practice required for careers in applied statistics. In addition to the education traditionally offered in such a program, the department offers a concentration in industrial statistics, which provides unique opportunities for experiences in practical applications of statistics. Through involvement in the University of Tennessee Practical Strategies for Process Improvement Institute and related programs, department faculty participate in a variety of consulting and research projects in industry. Students may supplement their classroom study with an industrial internship and participation in research projects dealing with industrial problems. Department faculty also collaborate with researchers from many academic disciplines. Statistics graduate students may gain consulting experience by working with faculty involved in these consulting activities. All students are encouraged to participate in supervised internship or consulting activities as part of their graduate program.

Individuals with undergraduate or graduate degrees in other disciplines are encouraged to enter the program. The candidate's mathematics background should include differential and integral calculus of several variables. Individuals with limited mathematics background should seek departmental guidance regarding specific ways in which they may prepare themselves for the program by taking coursework as non-degree students. Requests for application forms and further information may be sent to the Director of Graduate Studies, Department of Statistics, Stokely Management Center, University of Tennessee, Knoxville, Tennessee 37996-0532 or mleitnaker @utk.edu or http://www.bus.utk.edu/stat.

Admission Requirements

General admission requirements for graduate study are stated beginning on page 12. Applicants for Statistics must submit results of the Graduate Record Examination (GRE) general portion, although GMAT exam scores may be substituted. Applicants for the statistics program must have completed at least two years of college-level mathematics, including the calculus of several variables and matrix algebra, and be proficient in a computer language. Applicants whose native language is other than English must submit results of the Test of English as a Foreign Language (TOEFL).

Curriculum

A minimum of 33 credit hours must be completed for the master's degree. Required of all students are 6 hours in statistical methods, 6 hours in statistical theory and 1 hour in statistical computing. Students must complete a minimum of 21 hours in approved statistics courses, exclusive of consulting, internship, independent study, or thesis.

Thesis or Independent Study

The thesis option for the master's degree requires the student to complete 6 hours for the thesis. Alternatively, the non-thesis option requires a minimum of 3 hours for an independent study project.

Comprehensive Examination

Students must pass a two-part written comprehensive examination covering 1) theory and 2) methods. Upon failing either part of the examination, the student may retake it. The result of the second examination is final. For students writing a thesis, this examination must be passed before the thesis is defended.

INTERCOLLEGIATE GRADUATE STATISTICS PROGRAM

The Intercollegiate Graduate Statistics Program (IGSP) is a formal University of Tennessee academic program established to enable students to earn either a minor or an M.S. in Statistics simultaneously with a master's or doctoral degree in another department. Approved coursework taken to meet doctoral requirements in the student's home department may also be credited toward the M.S. in Statistics. Similarly, approved coursework in statistics taken to meet the requirements for a master's or doctoral degree in another department may also count toward the minor in Statistics. The program is open to graduate students in all departments which have an approved minor and/or M.S. joint major curriculum offered through the program. The program is administered by an Executive Committee, consisting of college representatives from all colleges with approved programs, with advisory input from the program faculty.

Degree Program Hours in Approved IGSP Courses

Master's in home department, minor in Statistics

Master's in home department, M.S. in Statistics

24

Doctorate in home department, minor in Statistics

15

Doctorate in home department, M.S. in Statistics

24

*The M.S. in Statistics requires 33 hours.

Course options consist of courses in statistics, offered either by the Department of Statistics or by other departments, which have been reviewed and approved by the IGSP Executive Committee. Students taking an M.S. in Statistics must pass the two-part comprehensive examination covering statistical theory and methods. Students taking a minor in Statistics in conjunction with a doctorate in another field must pass a written comprehensive examination in Statistics, constructed and evaluated by the student's Examination Committee. No formal comprehensive examination is required of students earning a Statistics minor along with a master's in another field beyond questions which the home department wishes to include as part of the comprehensive examination for the master's degree.

General Admissions and Degree Requirements

1. The student's home department must have approved a program of courses with the Executive Committee. That program will specify the sequences of statistics courses, chosen from the IGSP approved list, that are considered appropriate by the home department. Students who wish to participate in this program should contact their college representative or the Chair of IGSP in the Department of Statistics.
2. The student's graduate committee must include a member of the IGSP faculty. For students seeking doctoral degrees or the M.S. in Statistics, the committee member must be a faculty member in the Statistics Department.
3. The student’s Admission to Candidacy form must contain all courses required for the chosen degree program set off in a group and labeled “Statistics Courses Required for the Minor or M.S. in Statistics.” Should the student not decide to apply for admission to the program until after completion of some of the courses, the student’s major professor should file a program change with the cooperating departments and assist the student in obtaining a Department of Statistics faculty member to serve on the student’s graduate committee.

GRADUATE COURSES


500 Thesis (1-15) P/NP 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.

531 Survey of Statistical Methods I (3) Univariate and bivariate data collection and organization, statistical estimation and hypothesis testing; basic terms and their relationships for categorical and numerical data, including Chi-square tests and simple linear and quadratic regression. Use of computing facilities required. Prereq: 531 and 537. Prereq: 1 yr college mathematics.

532 Survey of Statistical Methods II (3) Multiple linear regression, including use of dummy variables; single and multiple factor analysis of variance and covariance; issues in experimental design and analysis. Use of computing facilities required. Prereq: 531.

537 Statistics for Research I (3) Principles and application of statistical methodology, integrated with considerable use of major statistical computing software. Probability and probability distributions, forming and testing hypotheses using parametric and non-parametric inference methods. Matrix-based simple linear regression and correlation. Credit not given for both 531 and 537. Prereq: 1 yr undergraduate mathematics and 1 undergraduate statistics course.

538 Statistics for Research II (3) General linear model as applied to multiple regression and analysis of variance. Diagnostic and influence techniques: One-way, factorial, blocking, and nested designs, preplanned versus post-hoc contrasts. Random factors and repeated measures. Prereq: 537 or 531.

561 Introduction to Computing for Data Management and Analysis (1) UT computing environment for beginning statistics graduate students. Use of operating system command prompt, utility programs and SAS statistical package for data entry and editing, file management and statistical analysis. Use of UTCC computing facilities required. Coreq: 531, 537 or 571, or consent of instructor.

563 Introduction to Mathematical Statistics (3) Basic probability models and theory of distributions of random variables. Prereq: Mathematics 421.

564 Theory of Statistical Inference (3) Introductory theory underlying common statistical procedures of hypothesis testing and estimation. Prereq: 533.

566 Statistical Techniques in Industrial Processes (3) Applications of control charts and other statistical techniques in industrial setting. Attributes and variables control charts, process capability analysis, aspects of sampling, statistical tolerancing, estimation of variance components, problems of measurement, special industrial applications. Prereq: 571 or equivalent.


571 Statistical Methods (3) Data collection strategies. Descriptive statistics. Probability distributions, simulation of random variables, sampling distributions. Estimation and hypothesis testing, regression, Chi-square test for categorical data, simple design of experiments, nonparametric methods. Use of statistical software. Prereq: 1 yr of calculus and a statistics course.


573 Design of Experiments (3) One-way ANOVA, multiple range tests, equal and unequal variances, transformations; factorial experiments, completely randomized designs, analysis of covariance, split-plot and nested designs, fractional factorials, sequential designs. Prereq: 571.

574 Data Mining Methods and Applications (3) Understanding and application of data mining methods. Data preparation; exploratory data analysis and visualization; cluster analysis; logistic regression; decision trees; neural networks; association rules; model assessment; and other topics. Applications to real world data. Use of standard computer packages. Prereq: Stat 532 or Stat 538 or Stat 571, or consent of instructor.

575 Applied Time Series (3) Fundamental concepts of time series analysis: Box-Jenkins approach, stationary and nonstationary models, forecasting model identification, seasonal models, transfer function models, and spectral theory. Prereq: 538 or 572 or consent of instructor.


582 Special Topics in Applied Statistics (1-3) May be repeated. Maximum 9 hrs.

585 Principles of Statistical Process Management (1-3) Statistical and other techniques applied to management of organizational processes. Prereq: Consent of instructor.

587 Graduate Seminar (1) Directed readings and active participation in colloquium program of Department of Statistics and of student’s minor program. Prereq: Consent of statistics department director of graduate studies. May be repeated. Maximum 2 hrs. S/NC only.

592 Internship (1-6) Supervised off-campus experience in application of statistical principles and methods in business, industry, or government. Written and oral report. Prereq: 4 courses in graduate level statistics or consent of statistics department director of graduate studies. May be repeated. Maximum 6 hrs. S/NC only.

593 Independent Study (2-6) Faculty directed reading and investigation of specified basic probability or statistics. Written report and oral presentation. Prereq: 2 courses in statistics and consent of the statistics department director of graduate studies. May be repeated. Maximum 6 hrs. S/NC or letter grade.

595 Statistical Consulting Practicum (1-6) Supervised experience helping on-campus researchers plan, manage data, and develop and perform analyses specific to designs and hypotheses. Discussion of activities in regular seminar meetings. Final written report or detailed diary. Prereq: 572 or 538. May be repeated. Maximum 6 hrs.

600 Doctoral Research and Dissertation (3-15) P/NP only.
Theatre (College of Arts and Sciences)

MAJOR DEGREE
Blake Robison, Head

Professors:
Black, W., M.F.A. ....................... Illinois
Custer, M., M.F.A. ..................... Wisconsin

Associate Professors:
Craven, E. H., M.A. ..................... Tennessee
Gould, B. K., M.F.A. ................... Catholic
Weber, T., M.F.A. ....................... Alabama

Assistant Professors:
Heil, M., M.F.A. ....................... Texas
Speas, B., M.F.A. ...................... Virginia
Van den Berg, Klaus, Ph.D. .......... Indiana
Yeager, K., B.F.A. ..................... Penn State

The Department of Theatre offers the Master of Fine Arts degree with a major in Theatre, concentrations in costume design, lighting design, scene design, and performance. Not all areas of concentration accept applicants every year.

UT Theatre maintains an active presence on the international theatre scene through the engagement of distinguished guest artists, touring to foreign theatre festivals, participa-
tion in international conferences, and other educational initiatives.

Applicants must have completed undergraduate degrees approximately equivalent in requirements to those specified for degrees conferred by The University of Tennessee.

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 performance applicants.

For detailed information about the graduate program, contact the Director of Graduate Studies, Department of Theatre.

THE MASTER OF FINE ARTS PROGRAM

At least 60 semester hours, 40 of which must be at the 500 level or above, are required for the degree of Master of Fine Arts with a major in Theatre, which is normally to be completed in three consecutive years of full-time residence. Theatre 501 is required in the first year of residence. Three additional hours at the 500 level are required from history, literature, or dramaturgy. Students in the M.F.A. degree program are evaluated annually by jury 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

Required courses are at least 12 hours of Theatre 580, Design Seminar, and at least 6 hours in the projects courses. Theatre 503 Elements of Design for Theatre is required in the first year of residence.

Performance

At least 12 hours each of 520 Master Class in Performance: Acting; 523 Master Class in Performance: Movement; and 525 Master Class in Performance: Voice. Coursework in this concentration is conducted in a conservatory environment. In the third year, students are expected to intern with either the resident professional Clarence Brown Theatre Company or another regional professional theatre.

REQUIREMENTS FOR SECOND MASTER'S DEGREE

Students admitted to the MFA program who have already earned a master's or a doctoral degree may apply up to 12 credit hours from the previous graduate program to the MFA degree with approval of the student's committee, the Dean of the College of Arts and Sciences, and the Dean of Graduate Studies.

Any such credits applied from a previous graduate program would be from courses that are directly relevant to the student's MFA curriculum and must have been earned within the time limit (6 years) established for completion of the MFA degree.

GRADUATE COURSES

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 styles, technique, acting, etc., Shakespeare, movement, humor. Prereq: Advanced Acting and consent of instructor. May be repeated. Maximum 9 hrs.

425 Selected Musical Theatre Techniques (3) Study and practice of musical theatre material: dance and vocal work. May be repeated. Maximum 4 hrs.


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 (3) Draping patterns for period costumes. forfeiture and study of historic patterns 1500-1900. Prereq: 345 or consent of instructor.

450 Advanced Scenery Technology I (3) Study and practice of theatre woodworking, production participate-
tion required. Prereq: 250. Graduate credit to theatre M.F.A. students only.

451 Advanced Scenery Technology II (3) Study and practice of metalworking and plastics for theatrical productions, production participation required. Prereq: 250. Graduate credit to theatre M.F.A. students only.

452 Advanced Scenery Technology III (3) Study and practice of stage rigging for theatrical productions; production participation required. Prereq: 250. Graduate credit to theatre M.F.A. students only.

454 Scenery Painting (2) Introduction to materials, techniques, and principles of craft. Gaining 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 lighting deployment for stage and screen. Lab and project intensive. Prereq: Theatre 362 or consent of instructor.


470 Playwriting (3) Advanced 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 (1-15) Required for student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

503 Elements of Design for the Theatre (3) Analysis of the principles of design through visual, structural, and emotional relationships.

510 Studies in Theatre History (3) Intensive study of selected topics in theatre history. May be repeated. Maximum 9 hrs.

512 Dramatic Literature Analysis (3) Dramaturgical strategies of major playwrights, using variety of analytical approaches from Aristotelian to deconstruction.

520 Master Class in Performance: Acting (3) Master class in acting techniques. Theatre MFA students only. May be repeated. Maximum 18 hrs.

523 Master Class in Performance: Movement (3) Master class in movement techniques. Theatre MFA students only. May be repeated. Maximum 18 hrs.

525 Master Class in Performance: Voice (3) Master class in voice and speech techniques. Theatre MFA students only. May be repeated. Maximum 18 hrs.

536 Projects in Play Directing (3) Practical work in play direction involving various lengths and kinds of scripts. May be repeated. Maximum 9 hrs.

542 The Social History of Costume (3) Study and analysis of costume as related to society’s manners and mores, architecture and furniture.


545 Millinery for the Stage (2) Pattern making and construction techniques for hats from antiquity to present. Prereq: Consent of instructor.

546 Advanced Costume Patterning (3) Advanced studies in patterning period costume. Development of historic patterns through flat pattern method. Prereq: 446.

547 Painting and Dyeing for the Theatre (3) Fibers, dyes and dye processes; color matching and distressing.

549 Projects in Costume Technology (1-3) Individualized studies in costume technology in theatre production. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.


551-552 Structural Design for Stage (3-3) Application of advanced theatre technology and analysis of common building materials to design of safe stage scenery. Must be taken in sequence.

553 Projects in Scenic Design (1-3) Conception and completion of major projects, both hypothetical and actual, in scene design. May be repeated. Maximum 9 hrs.

554 Studies in Scenic Design (3) Advanced scene design techniques and approaches to design for complex dramas and varied dramatic forms. May be repeated. Maximum 6 hrs.

555 Model Building (3) Techniques of model building for scenic designer. Theatre MFA students only. Prereq: 401 and one semester of 580.

556 Drafting (3) Drafting techniques for scenic designer. Theatre MFA students only.

560 Lab Analysis of Realized Lighting Design (3) Realized lighting design projects from concept meeting through opening night. Prereq: Consent of instructor. May be repeated. Maximum 18 hrs.

562 Special Problems in Lighting Design (3) Advanced problems in lighting design and theory, problems in Broadway production and touring. Prereq: 452 or consent of instructor.

564 Computer Aided Drafting for the Theatre (3) Computer drafting programs and their use in theatre design and production. Prereq: Consent of instructor.

580 Design Seminar (1-6) Analysis, research, interpretation, and design of plays in a cross-disciplinary environment. May be repeated. Maximum 18 hrs.

584 Photography for the Theatre (3) Photographic techniques for shooting live performance events under challenging lighting environments. Prereq: Consent of instructor.

585 Production Workshops (1-6) Directed experience in production collaborations. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

587 Computer Aided Rendering for the Theatre (3) Computer rendering programs and their use by theatrical designers. Prereq: Consent of instructor.

593 Independent Study (1-3) Individual or group projects. Available to Theatre MFA students only. Prereq: Consent of instructor. May be repeated. Maximum 15 hrs.

599 Project in Lieu of Thesis (1-6) Available to theatre MFA students only. Prereq: Minimum of 30 hrs toward MFA degree and consent of advisor. May be repeated. Maximum 9 hrs.

Theory and Practice in Teacher Education

(College of Education, Health, and Human Sciences)

MAJORS DEGREES

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

L. Knight, Head

Professors:


Associate Professors:


Assistant Professors:


Emeriti Faculty:


The Department of Theory and Practice in Teacher Education offers graduate programs leading to degrees, majors, and concentrations in:

Master of Science

Teacher Education

Track 1 (for previously licensed teachers and does not result in a teaching license).

Art education Early childhood special education

Education of the deaf and hard of hearing Elementary education English education Foreign language/ESL education Mathematics education Modified and comprehensive special education Reading education Science education Social science education

Track 2 (for individuals who are seeking an initial teaching license.)

Art education Early childhood special education Education of the deaf and hard of hearing Elementary teaching Modified and comprehensive special education Secondary teaching

Educational Specialist

Teacher Education

Elementary education English education Foreign languages education Mathematics education Reading education
The urban/multicultural teacher education area offers programs for students interested in teaching children of all ability levels in K-8 urban and multicultural settings. Faculty promote innovation in education through alternative approaches to instructional delivery, curriculum development, assessment, and program evaluation. The area also provides preparation in early childhood special education for special educators working in classroom, home-based, and community settings. The content feature teaching area’s mission is the preparation of teachers for instruction in art, ESL, English, foreign language, mathematics, social science and science. The emphasis is on how these disciplines are taught in context of different cultures. For admission, most programs except the Track 2 Initial Licensure/MS degree require current scores from the GRE general section, and all require a departmental application form and letters of recommendation. For additional information about the various programs of study and admission, write to the Student Services Center in the College of Education, health and Human Sciences, Claxton Complex A332. http://www.utk.edu/departments/advising

THE MASTER’S PROGRAMS

The master’s degree in Teacher Education has two tracks. Track 1 is intended for students who are licensed to teach art, English, elementary education, foreign language, mathematics, natural science, reading education, social science, early childhood special education, or education of the deaf and hard of hearing. (Non-licensed applicants to Track 1 will be reviewed on a case-by-case basis and must have a strong disciplinary background and professional goals which can be fostered through participation in the non-licensure program.) Track 2 is designed for students seeking initial teacher licensure in one of the above fields. Both Track 1 and Track 2 offer thesis and non-thesis options and require students to submit to a written comprehensive examination. In addition, students completing theses must sit for an oral examination on their thesis.

TRACK 1 (NON-LICENSURE)

Concentrations Offered Track 1
Art education
Early childhood special education
Education of the deaf and hard of hearing
Elementary education
English education
Foreign language/ESL education
Mathematics education
Modified and comprehensive special education
Reading education
Science education
Social science education

Admission Requirements Track 1
Hold a Bachelors Degree; minimum 2.80 GPA (3.0 in major);
Hold a valid teaching license.
Present acceptable scores on the Praxis II: National Teachers Examinations (information about these exams and exemptions to them is available in the College’s Student Services Center, A332 Claxton Complex).

The College of Education, Health and Human Sciences offers the Master of Science, Educational Specialist, Doctor of Education, and Doctor of Philosophy degrees through the Department of Theory and Practice in Teacher Education. The College also offers initial teacher licensure programs at the graduate level. The program features a professional year internship with accompanying coursework which may lead to a masters degree with a major in Education.

The department also houses programs for students seeking licensure in early childhood, primary, and middle school education (Grades K-8), reading endorsement, special education, secondary social studies, and licensure in the education of the deaf/hard of hearing. Early childhood licensure and degree programs are also available in the college. The department houses four Program Areas: (1) education of the deaf/hard of hearing/educational interpreting; (2) holistic/teaching/learning; (3) content fields teaching; and (4) urban/multicultural teacher education.

The deaf/hard of hearing/educational interpreting program area focuses on preparing teachers for deaf and hard of hearing children and youth Pre-K-12. Preparation emphasizes the ability to teach children with a hearing loss using all modes of communication (eg. aural/oral, sign systems, American Sign Language) and in residential or inclusive settings. Educational interpreting is a concentration under the undergraduate special education program. Courses are designed to prepare interpreters to work in mainstream (K-12) settings with deaf and hard of hearing students. Educational interpreters facilitate communication between deaf and hard of hearing students and other non-signing members of the school community, including teachers and learning classmates.

The holistic teaching/learning area’s central emphasis is on holistic, integrative, and interdisciplinary teaching/learning as opposed to teaching discipline subject content (e.g., science, mathematics, language arts) as separate entities. The focus on integration is similar to how children learn and how language is central to the teaching/learning process. The faculty believe that students should be prepared as teachers who can facilitate learning rather than merely dispense content. Central to the philosophy of holistic teaching and learning is knowing each individual child’s learning skills, abilities, and interests. The holistic teaching/learning program area houses programs in elementary education, reading education, and special education.

Submit a Post-Baccalaureate Teacher Education Program of Study (i.e., a written plan resulting from transcript analysis that addresses possible course deficiencies; see the College’s Student Services Center, A332 Claxton Complex).

Post-baccalaureate candidates seeking to teach in a field apart from their undergraduate major must complete 30 semester hours, to include 15 at the 300 level or higher, in addition to the requirements described above. Enrollment may begin in any academic term after notification of admission by letter, both from the Office of Graduate Studies and the College of Education, Health and Human Sciences.

Completing Degree Requirements
Meet each semester with a faculty advisor to assess progress and to discuss next semester courses. Admitted candidates will complete a prescribed set of courses:
Core Area - Education Foundations, Trends and Issues, Research (9 hours minimum); Major Area - Specialization Courses (12 hours minimum); and Related Studies - (6 hours minimum)
Completion of thesis or non-thesis option:
Thesis: 30 semester hours of Education, satisfactory completion of written thesis, comprehens ive written examination, and oral defense of thesis; 2/3 of total hours for MS must be 500-level or above.
Non-Thesis: 33 semester hours (36 semester hours for early childhood special education, modified and comprehensive special education and education of deaf and hard of hearing) and satisfactory completion of written comprehensive examination; 2/3 of total hours for MS must be 500 level or above.

PROGRAMS OF STUDY

TRACK 1: Non-Licensure

- Art Education (Track 1)

<table>
<thead>
<tr>
<th>Concentration</th>
<th>Core</th>
<th>Electives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core</td>
<td>TPTE 517</td>
<td>ITCE 580</td>
</tr>
<tr>
<td>Concentration (Non-Thesis Option)</td>
<td>21</td>
<td>18</td>
</tr>
<tr>
<td>Thesis option</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Art Education 510</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Art Education 520</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Art Education 530</td>
<td>3</td>
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<tr>
<td>Art Education 540</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Art History 4 - 5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Art Studio 4 - 5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>TPTE 593 or 595 (Non-Thesis)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Electives (Non Thesis Option)</td>
<td>6</td>
<td>33</td>
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<tr>
<td>500 Level Electives</td>
<td>6</td>
<td>30</td>
</tr>
<tr>
<td>Thesis Option Only</td>
<td>TPTE 500 Thesis</td>
<td>6</td>
</tr>
</tbody>
</table>

Total Hours
- Non-Thesis Option 33
- Thesis Option 30
Advising Note:
1. The Track I M.S. serves those students who have a BS, BA, or BFA Degree and desire a Master’s Degree, but do not wish to pursue certification to teach art, or who already have certification to teach art and wish to pursue a Master's.
2. An exhibition offered instead of a Thesis toward graduation must be of work directed by art and art education faculty, and the artwork completed while pursuing the Master’s Degree. A written paper must accompany the exhibition. The paper includes: (a) philosophical statement, (b) process and media explanation (demonstration of knowledge); (c) compositional analysis of each work; and (d) how the work relates to one personal artist statement.
3. For both tracks, a comprehensive written examination is required during the final semester of work. An oral exam is given over the thesis, Students are expected to read and meet requirements of the Graduate School with regard to admission applications, candidacy forms, scheduling comprehensive exam, as well as meeting all the unit requirements regarding the courses in their graduate program.

### Content Fields Teaching (Track 1)
(Concentrations in English Education, English as a Second Language Education, Foreign Language Education, Mathematics Education, Science Education, Social Science Education)

#### Credit Hours

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Area (12 hours, minimum)</td>
<td>12</td>
<td>12</td>
<td>3</td>
<td>6 Electives (3 hours, minimum)</td>
</tr>
<tr>
<td>Related Studies (6 hours, minimum)</td>
<td></td>
<td></td>
<td>6</td>
<td>6 Determined by student and advisor (3)</td>
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<tr>
<td>Thesis Option Only</td>
<td></td>
<td></td>
<td>3</td>
<td>TPTE 500 Thesis</td>
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<tr>
<td>TOTAL HOURS (Thesis Option)</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
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### Early Childhood Special Education (Track 1)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>Child and Families Studies 530</td>
<td>3</td>
</tr>
<tr>
<td>Instructional Technology 580</td>
<td>3</td>
</tr>
<tr>
<td>(Other approved research design class may be substituted)</td>
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</tr>
<tr>
<td>Electives</td>
<td>9</td>
</tr>
<tr>
<td>(Advisor approval required)</td>
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<tr>
<td>Total Hours</td>
<td>36</td>
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</table>

#### Education of the Deaf and Hard of Hearing (Track 1)

Contact the department head for information on this concentration.

#### Elementary Education (Track 1)

<table>
<thead>
<tr>
<th>Core</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Non-Thesis Option)</td>
<td>12</td>
</tr>
<tr>
<td>(Thesis Option)</td>
<td>9</td>
</tr>
<tr>
<td>ITCE 580</td>
<td>3</td>
</tr>
<tr>
<td>TPTE 517</td>
<td>3</td>
</tr>
<tr>
<td>Determined by student and advisor 3-6</td>
<td></td>
</tr>
<tr>
<td>Concentration</td>
<td></td>
</tr>
<tr>
<td>(Non-Thesis Option)</td>
<td>15</td>
</tr>
<tr>
<td>(Thesis Option)</td>
<td>12</td>
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<tr>
<td>Choose from at least three areas:</td>
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</tr>
<tr>
<td>Related Studies</td>
<td></td>
</tr>
<tr>
<td>(Non-Thesis Option)</td>
<td>6</td>
</tr>
<tr>
<td>(Thesis Option)</td>
<td>3</td>
</tr>
<tr>
<td>Determined by student and advisor</td>
<td></td>
</tr>
<tr>
<td>Thesis Option only</td>
<td>6</td>
</tr>
<tr>
<td>Total Hours</td>
<td>33</td>
</tr>
<tr>
<td>Non-Thesis Option</td>
<td></td>
</tr>
<tr>
<td>Thesis Option</td>
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### Modified and Comprehensive Special Education (Track 1)

<table>
<thead>
<tr>
<th>Core</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>Special Educ. 587 or TPTE 51</td>
<td>9</td>
</tr>
<tr>
<td>Special Educ. 586</td>
<td>3</td>
</tr>
<tr>
<td>Special Educ. 590</td>
<td>3</td>
</tr>
<tr>
<td>Concentration</td>
<td></td>
</tr>
<tr>
<td>Select (with major advisor) from:</td>
<td>15-27</td>
</tr>
<tr>
<td>Affective Motivational Disorders</td>
<td>6-9</td>
</tr>
<tr>
<td>General Special Education</td>
<td>6-9</td>
</tr>
<tr>
<td>Elementary Education</td>
<td>6-9</td>
</tr>
<tr>
<td>Reading Education</td>
<td>6-9</td>
</tr>
<tr>
<td>Cognitive Education</td>
<td>6-9</td>
</tr>
<tr>
<td>Gifted Education</td>
<td>6-9</td>
</tr>
<tr>
<td>Modified Programs</td>
<td>6-12</td>
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<tr>
<td>Comprehensive Programs</td>
<td>6-12</td>
</tr>
<tr>
<td>Others by Committee approval</td>
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<tr>
<td>Thesis Option</td>
<td>24</td>
</tr>
<tr>
<td>Courses</td>
<td>24</td>
</tr>
<tr>
<td>Thesis</td>
<td></td>
</tr>
<tr>
<td>TPTE 500 Thesis</td>
<td>6</td>
</tr>
<tr>
<td>OR</td>
<td></td>
</tr>
<tr>
<td>Problem Courses in Lieu of Thesis</td>
<td>30</td>
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<tr>
<td>Additional Problems Courses</td>
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</tr>
<tr>
<td>Oral Exam over Problems Courses</td>
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</tr>
<tr>
<td>Total Hours</td>
<td>36</td>
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<tr>
<td>Non-Thesis Option</td>
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<tr>
<td>Thesis Option</td>
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### Reading Education (Track 1)

<table>
<thead>
<tr>
<th>Core</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Non-Thesis Option)</td>
<td>12</td>
</tr>
<tr>
<td>ITCE 580, TPTE 517</td>
<td>9</td>
</tr>
<tr>
<td>Determined by student and advisor</td>
<td></td>
</tr>
<tr>
<td>(Thesis Option)</td>
<td></td>
</tr>
<tr>
<td>ITCE 580, TPTE 517</td>
<td></td>
</tr>
<tr>
<td>Determined by student and advisor</td>
<td></td>
</tr>
<tr>
<td>Concentration</td>
<td></td>
</tr>
<tr>
<td>(Non-Thesis, Thesis Options)</td>
<td></td>
</tr>
<tr>
<td>Choose from Reading Education</td>
<td>12</td>
</tr>
<tr>
<td>Related Studies</td>
<td>9</td>
</tr>
<tr>
<td>(Non-Thesis Option)</td>
<td></td>
</tr>
<tr>
<td>(Thesis Option)</td>
<td></td>
</tr>
<tr>
<td>Choose 3/hrs from Language Arts Education, English Education, Early Childhood Education, Elementary Curriculum Elementary Education, Middle School Curriculum, Special Education, or Educational Psychology Thesis (Option only)</td>
<td></td>
</tr>
<tr>
<td>Total Hours</td>
<td>30</td>
</tr>
<tr>
<td>Non-Thesis Option</td>
<td>33</td>
</tr>
<tr>
<td>Thesis Option</td>
<td>30</td>
</tr>
</tbody>
</table>

### Track 2: Initial Licensure Programs

The Track 2 Masters is intended for individuals desiring to earn teacher licensure. Applicants to this program must first be admitted to Teacher Education and complete the equivalent of an undergraduate minor in either Elementary, Middle School, or Secondary Education. Post-baccalaureate students interested in seeking licensure in Art Education, Special Education, or in other fields that require students to earn an undergraduate major would be expected to complete an equivalent undergraduate program of study. Please refer to The University of Tennessee’s Undergraduate Catalog for complete details. Individuals are encouraged to contact the College’s Student Services Center, A332 Claxton Complex, for a diagnostic interview and to develop a tentative course of study and time line.

#### MS Track 2 Common Course Requirements

Master’s Track 2 programs are 36 credit hour, non-thesis (42 credit hour thesis) programs; students, regardless of teaching area (e.g., Elementary, Secondary, etc.), complete a common, teacher licensure, core of 24 credit hours during the Professional Year (see below):

### Professional Year Courses

<table>
<thead>
<tr>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education 574: Analysis of Teaching for Professional Development</td>
</tr>
<tr>
<td>Education 575: Professional Internship</td>
</tr>
<tr>
<td>Education 591: Clinical Studies</td>
</tr>
<tr>
<td>Specialty Studies</td>
</tr>
</tbody>
</table>
Early Childhood Special Education
Early Childhood Education 554, 566, 567, 568 12

Education of the Deaf and Hard of Hearing
Research Elective 3
Non-Specified Elective 9

Elementary Teaching
TPTE 517: Trends and Issues in Education 3
Educational Electives (chosen from at least three areas): 9
History, Educational Foundations, Instructional Technology, Reading, Education, Language Arts, Education, Science education, Social Science Education, Elementary Education, Middle School Curriculum

Modified and Comprehensive Special Education
Special Education 553: Assessment of Special Students 3
Special Education 590: Application of Microcomputer Technology in Special Education and Vocational Rehabilitation 3
Electives (see advisor) 6

Secondary Teaching
TPTE 517: Trends and Issues in Education 3
ITES 535, 541, 558, or an elective in the history of, sociology of, or philosophy of education 3
Specialty Area Elective (see faculty advisor) 6

THE SPECIALIST IN EDUCATION PROGRAM
The Educational Specialist degree program with a major encompasses concentrations in:
- Elementary education
- English education
- Foreign language/ESL education
- Mathematics education
- Reading education
- Science education
- Social science education
- Special education

The instructional and curricular concentrations require completion of a minimum of 30 hours of coursework beyond the master’s degree, including 6 hours in core courses, 18 hours in specialized courses, and 6 hours to be determined by the student’s committee. Both thesis and non-thesis options are available.

Degree Program Requirements
An MS/MA is required for admission; most programs in Theory and Practice in Teacher Education also require a minimum of three years of professional experience.

- MS Track: Additional Course Requirements
  In addition to the above common core of courses, students must complete an additional 12 credit hours of course work that is unique to their particular teacher preparation field (see below):

  Early Childhood Special Education
  Education also require a minimum of three programs in Theory and Practice in Teacher Degree Program Requirements be determined by the student’s committee.

  Education of the Deaf and Hard of Hearing
  Research Elective 3
  Non-Specified Elective 9

  Elementary Teaching
  TPTE 517: Trends and Issues in Education 3
  Educational Electives (chosen from at least three areas): 9
  History, Educational Foundations, Instructional Technology, Reading, Education, Language Arts, Education, Science education, Social Science Education, Elementary Education, Middle School Curriculum

  Modified and Comprehensive Special Education
  Special Education 553: Assessment of Special Students 3
  Special Education 590: Application of Microcomputer Technology in Special Education and Vocational Rehabilitation 3
  Electives (see advisor) 6

  Secondary Teaching
  TPTE 517: Trends and Issues in Education 3
  ITES 535, 541, 558, or an elective in the history of, sociology of, or philosophy of education 3
  Specialty Area Elective (see faculty advisor) 6

THE DOCTOR OF EDUCATION PROGRAM
The Ed.D. is offered with a major in Teacher Education and concentrations and specializations in the following areas:

  Literacy, language, and ESL education (literacy, English education, ESL education)
  Teacher education (elementary education, social science education, mathematics education, science education)

The program requirements are:

  The Ed.D. program is an individualized program. As such, it is tailored to meet the doctoral candidate’s graduate coursework, life experience, background and future career plans. Program of study must include a minimum of 47 graduate hours beyond the MS/MA plus 24 dissertation hours.
  A minimum of 9 credit hours in 600-level courses, excluding 600-level doctoral dissertation hours, and Theory and Practice in Teacher Education 604 Seminar in Curriculum and Instruction (1) is required.

  Language Proficiency in a second language or instructional computing is recommended; not required.
  A minimum of 24 dissertation hours must be taken over at least two consecutive semesters (TPTE 600: Doctoral Research and Dissertation) must be earned over at least two consecutive semesters. A student who will not be using faculty services and/or university facilities or a period of time may request leaves of absence from dissertation research up to a maximum of six terms (including summers). The request, approved by the major professor, will be submitted by the student and filed in the Registrar’s Office.

  The doctoral candidate must be in full-time enrollment (minimum of 9 hours fall and spring, 6 hours summer; half-time GAS must take a minimum of 6 and 3 hours, respectively). TPTE 604 Seminar in Curriculum and Instruction is taken during the residency for two consecutive semesters.

  A written comprehensive examination and an oral examination on the dissertation are required.

Concentration in Literacy, Language and ESL Education (Literacy, Foreign Language Education, English Education and English as a Second Language)

<table>
<thead>
<tr>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concentration Elementary Education 504 Studies in Language Development 3</td>
</tr>
<tr>
<td>TPTE 595 Teaching English Grammar 3</td>
</tr>
<tr>
<td>FL/ESL 578 Teaching English as a Second Language 3</td>
</tr>
<tr>
<td>TPTE 595 Teaching Adolescent Literature 3</td>
</tr>
<tr>
<td>FL/ESL 678 Advanced Studies in English as a Second Language 3</td>
</tr>
<tr>
<td>Cognate 1: in a related field in CEHHS, outside Literacy, Language and ESL Education programs, selected by the candidate and major professor, e.g., Instructional Technology, School Administration. Plus: TPTE 604 Doctoral Seminar 2</td>
</tr>
<tr>
<td>Cognate 2: outside CEHHS, in a related field selected by the candidate and major professor; e.g., English/Language Arts, Reading, Speech, Drama, Communication 6</td>
</tr>
<tr>
<td>Research: to include ITCE 561 Statistics ITCE 671 Advanced Statistics CS 560 Introduction to Qualitative Research 9</td>
</tr>
<tr>
<td>Plus: 6 hours selected from Research and/or Survey Techniques: ITCE 823 3</td>
</tr>
<tr>
<td>Sociology 531, 534 or 633 3</td>
</tr>
<tr>
<td>Concentration in Teacher Education Contact the department head for information on concentrations in elementary education, social science education, mathematics education, science education.</td>
</tr>
</tbody>
</table>
Doctor of Education (Ed.D.) students who are cohort members of the National Science Foundation (NSF) funded Appalachian Collaborative Center for Learning Assessment and Instruction in Mathematics (ACCLAIM) complete a program of study totaling 51 to 63 credit hours, depending on mathematics background, which includes an alternative approach to doctoral residence. Specifically, residency incorporates four terms of continuous enrollment, beginning with the second summer term and continues through the third summer term. During this 14-month period, students are enrolled in a total of 30 credit hours (i.e., 9 credit hours each summer and 6 credit hours each fall and spring). Courses originate from The University of Tennessee, the University of Kentucky, the University of Louisville, and Ohio University; instruction is through either traditional or web modalities. Students are on campus at one of the participating institutions throughout each summer term. Students sit for comprehensive examinations during the fourth summer term (i.e., typically, their tenth term of enrollment) and then complete a dissertation. Interested students should contact Dr. Vena M. Long, Department of Theory and Practice in Teacher Education, University of Tennessee (vlong@utk.edu).

THE DOCTOR OF PHILOSOPHY PROGRAM
Faculty from the department participate in the delivery of the Ph.D. in Education. Concentrations and specializations are available in the following areas:

Early Childhood education (early childhood special education)

Literacy, language, and ESL education (literacy, English education, ESL education)

Teacher education (elementary education, gifted and talented education, mathematics education, science education, social science education)

Information on admission and common program of study elements (e.g., core courses, research courses, etc.) appear in the Fields of Instruction: Education section of this catalog and at http://www.cehhs.utk.edu

Concentration Courses
The following constitute the courses typically taken by students enrolled in the above cited concentrations:

Early Childhood Education (Early Childhood Special Education)

Concentration: ECE (minimum credits)
TPTE 604 Seminar in Curriculum and Instruction
TPTE 610 Internship in Teaching and Supervision
SPED 620 Internship in Research in Special Education
SPED 630 Internship in Institutional Leadership
TPTE 640 Theoretical Analysis and Theory Construction
ECE 650 Advanced Studies in Early Childhood Education
TPTE 679 Special Topics
TPTE 689 Internship
TPTE 693 Independent Study
TPTE 694 Supervised Readings
TPTE 695 Special Topics

Specialization: ECE or ECSE (minimum 9 credits)
ECE 554 Assessment in ECSE
ECE 566 Curriculum in ECE
ECE 567 Application of Theory in Early Childhood Education
ECE 568 ECSE: Theories and Interventions
TPTE 579 Special Topics
SPED 584 Seminar in Early Childhood Education
SPED 504 Clinical Experience in Teaching and Supervision of Exceptional Children
TPTE 593 Independent Study
TPTE 594 Supervised Readings
TPTE 595 Special Topics
SPED 564 Psychosocial Development of Gifted and Talented
SPED 565 Instructional Systems for the Gifted and Talented
SPED 575 Creative Problem Solving for Special Education Teachers

Note: Contact the department head for information on the Literacy, Language, ESL Education concentration and the Teacher Education concentration.

CERTIFICATE IN URBAN EDUCATION
The Department of Theory and Practice in Teacher Education offers a certificate program in urban education for experienced urban teachers. A cohort group is competitively selected each year. Participants complete a 12-credit, four-course program of study over a two-year period. First-year courses are Theory and Practice in Teacher Education 595 Special Topics (Trends and Issues in Urban Education) and 540 Topics in Improvement of Instruction (Improving Teaching and Learning in Urban Schools). Second-year courses are Theory and Practice in Teacher Education 595 Special Topics (Accommodating Diverse Student Needs in Urban Classrooms) and 550 Action Research and Practical Inquiry in Education.

Art Education

GRADUATE COURSES

510 History and Philosophy of Art Education (3) United States from 1860’s to present. Prereq: Consent of instructor.
520 Studies in Art Education (3) Issues and topics current to the field of art education. Prereq: Consent of instructor.
530 Production and Critical Analysis of Art (3) Relationship of production and critical analysis of works of art to discipline-based art education.
540 Use and Construction of Instructional Materials for Teaching Art (3) Examination and construction of curriculum and instructional aids related to teaching strategies in art education.

Early Childhood Education

GRADUATE COURSES

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.
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.
554 Assessment in Early Childhood Special Education (3) Development of knowledge and skills in appropriate formal and informal assessments of handicapped infants and young children: screening, identification, diagnosis, placement and programming assessment issues. Prereq: 553 or consent of instructor.
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. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.
567 Application of Theory in Early Childhood Education (K-3) (3) Principles and practices from selected theoretical orientations. Prereq: Course in early childhood education or consent of instructor. May be repeated. Maximum 6 hrs.
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.
650 Advanced Studies in Early Childhood Education (3) Prereq: 2 graduate courses in early childhood education and consent of instructor. May be repeated. Maximum 6 hrs. S/NC only.

Education of the Deaf and Hard of Hearing

GRADUATE COURSES

415 Language Development of Deaf/Hard of Hearing I (3) Language problems of hearing impaired contrasted with those of normal language development. Formal linguistic systems used to describe language development problems.
416 Language Development of Deaf/Hard of Hearing II (3) Developmental and remedial systems of teaching language to hearing impaired children. Comprehension and production differences, idiomatic and figurative structures. Prereq: 415 or consent of instructor.
419 Speech Development of Deaf/Hard of Hearing (4) Theories of speech development, approaches in training perception and production of speech, and aural habilitation. Praticum experiences.
424 Nature of Hearing Impairments (3) Basic principles of audiology: anatomy and physiology of hearing; nature and causes of hearing loss; methods and instrumentation for assessment of hearing level; interpretation of audiologic services to medical and other rehabilitative disciplines.
Educational Interpreting

GRADUATE COURSES

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.

Elementary Education

Note: See Mathematics, Reading, Science, and Social Science Education for additional Elementary Education courses.

GRADUATE COURSES

421 Elementary and Middle School Science and Social Studies Instruction (3) Methods and materials for teaching science and social studies. Development of functional relationships and entities of new fields. Not open to students with recent course or background in teaching science and/or social studies. Prereq: Admission to teacher education.

429 Language Arts/Reading Instruction in Elementary and Middle Schools (3) Language and language development as applied to teaching of oracy (listening-speaking) and aspects of literacy (reading process/reception and writing). Not open to students with recent course in language arts methods. Prereq: Admission to teacher education.

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.

505 Elementary and Middle School Teaching Methods II (6) Applied methods of teaching reading, language arts, science, social studies and mathematics; accommodation strategies for students with diverse needs. Prereq: Elementary and Middle School Teaching Methods I. Coreq: 575.

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


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

579 Special Topics (1-3) Prereq: Admission to graduate program. May be repeated. Maximum 9 hrs. S/NC or letter grade.

English Education

GRADUATE COURSES


460 Teaching Reading and Literature in the Secondary School (3) Approaches for teaching basic reading skills and ways of teaching literature.

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.

509 Teaching Fiction in the Secondary School (3) Teaching of novels and short stories.

521 Interdisciplinary Aesthetics (3) Discussions, visual and audio presentations concerned with aesthetic considerations of areas of study: geography, history, physics, literature, languages, music, visual arts and drama.

590 Seminar in Teaching English in Secondary Schools (3) Content varies. Theoretical and practical approaches to teaching English in secondary school. May be repeated.

592 Linguistics and the Teaching of English (3) Grammar, usage, semantics, dialectology, history of language, and lexicography.

597 Teaching Drama Grades 7-13 (3) Strategies and materials for teaching creative dramatics, enacting and writing of plays, reading of scripts.

598 Developing Speaking and Listening Skills, Grades 7-12 (3) Teaching approaches to nonverbal communication, integrated instruction, public address and listening. Review of tests and materials.

601 Studies in English Education (3) Issues and research in teaching of English.

Foreign Language/ESL 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 languages and Latin. Prereq: Completion or near completion of foreign language hours for certification and Admission to teacher education.

555 Foreign Language in the Elementary Schools Practicum (3) Experiences designing, implementing and assessing second language instruction in elementary school setting. Prereq: 587 or consent of instructor.

556 English as a Second Language Practicum (3) Experiences designing, implementing and assessing English instruction to non-native English speakers. Required course for ESL certification. Prereq: 578 or consent of instructor.

578 Teaching English as a Second Language (3) Instructional methods; utilization of assessment procedures to diagnose English linguistic proficiency; materials for non-native speaker in K-12 classroom. Required for Tennessee ESL (K-12) licensure. Prereq: 576 or consent of instructor.


678 Advanced Studies in English as a Second Language (3) Research, curricula, assessment, trends and issues in English as a second language. Prereq: 578 or consent of instructor.

687 Advanced Studies in Foreign Language Education (3) Research, curricula, assessment, trends and issues in foreign language education. Prereq: 587 or consent of instructor.

Mathematics Education

GRADUATE COURSES

485 Teaching Mathematics, Grades 7-12 (3) Preparation of teaching plans, evaluation, materials for teaching mathematics; teaching simulation and directed observation in schools. Prereq: Admission to teacher education.

522 Programs and Materials in School Mathematics (3) Examination, development and use of materials for creating an active learning environment for learning mathematics for all ages. Prereq: 485, 530, 543, or equivalent.

530 Teaching Mathematics to Young Children: K-4 (3) Unit planning, daily planning, grouping and other strategies of teaching mathematics. For those with little preparation in teaching elementary school mathematics.

543 Teaching Mathematics in Middle School: 5-8 (3) Unit planning, daily planning, grouping and other strategies of teaching mathematics. For those with little preparation in teaching middle school mathematics.


581 Mathematics Curriculum (3) Past, present and future issues influencing mathematics curriculum in schools, elementary through college. Teacher’s role in curriculum development and implementation. Rations for curriculum decisions. Prereq: 485, Elementary Education 505, or equivalent.
583 Teaching Mathematics in Senior High Schools and Community Colleges (3) Topics appropriate for high school and community/junior college mathematics curricula. Techniques for teaching problems related to enrichment, problem solving, and use of microcomputers. Opportunities for special projects. Prereq: 485 or equivalent.

622 Research Trends in Mathematics Teacher Education (3) Analysis of current research trends in mathematics teacher education and impact of such research on development of teachers both preservice and inservice. Prereq: Minimum 9 hrs of 500-level Mathematics Education courses.

683 Advanced Studies in Mathematics Education (3) Analysis of current research in mathematics education and implications of research for classroom practice. Prereq: Two graduate courses in mathematics education.

Reading Education

GRADUATE COURSES

434 Topics in Reading Education (1-6) Prereq: Admission to teacher education and course in reading education. May be repeated. Maximum 6 hrs.

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 school and high school.

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.

533 Reading in Community College: Research and Theory (3) Analysis of components of effective community college reading programs. Attention to research bases. Prereq: Course in reading education or consent of instructor.

534 Seminar in Reading Education (1-6) May be repeated. Maximum 6 hrs.

536 Psychology of Reading (3) Reading act, relationship between learning theory and reading, role or reading in child’s overall intellectual development. Affective and cultural factors. Prereq: 500-level course in reading or consent of instructor.

537 Diagnosis and Correction of Classroom Reading Problems (3) Procedures, methodologies and materials for diagnosing and correcting classroom reading problems. Prereq: Course in reading education, or equivalent teaching experience, or consent of instructor.

538 Practicum in Diagnosis of Reading Problems (3) Theoretical and practical applications of specific reading diagnostic instruments; testing of elementary and/or secondary school students, preparing case study reports, and conducting parent conferences. Prereq: Course in diagnosis and correction of classroom reading problems or consent of instructor.

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.

540 Teaching the Struggling Adolescent Reader (3) Methods of teaching middle and high school students who do not have sufficient reading skill to successfully function in the reading process. Prereq: Course in reading education, or equivalent teaching experience, or consent of instructor.

554 Developmental Reading Practicum (3) Diagnosis and teaching children having developmental and corrective reading needs in regular classroom. Prereq: Course in diagnosis and correction of reading problems or consent of instructor.

602 Seminar in Reading Education (1-6) May be repeated. Maximum 6 hrs.

603 Advanced Studies and Theoretical Models of Reading (3) Research on reading processes. Current theoretical models related to how learners process print. Prereq: 500-level courses in reading education or consent of instructor.

605 Organizing and Administering Reading Programs (3) Diagnosing and teaching children having developmental and corrective reading needs in the regular classroom. Prereq: Course in diagnosis and correction of reading problems or consent of instructor.

Science Education

GRADUATE COURSES

496 Teaching Science Grades 7-12 (3) Methods, materials, recent trends in science and environmental education programs for secondary schools. Prereq: Admission to teacher education.


531 Teaching Science in Elementary and Middle Schools (3) Recent trends in methods, materials and content in teaching elementary school science. Prereq: Course in teaching elementary school science or consent of instructor.

565 Instructional Trends and Issues in Science Education (3) Analysis of current trends in science instruction, instructional issues facing elementary, secondary, and community college science teachers, and application of learning theory to teaching biological, physical, and environmental sciences. Prereq: 496, teaching methods, or equivalent.

572 Nature of Mathematics and Science Education (3) Teaching and assessment of mathematics and science based upon student conceptions of nature of mathematics and science.

596 Curriculum Trends in Science Education (3) Analysis of elementary and secondary curriculum projects for biological, physical and environmental sciences. Impact of current learning theories on future curriculum development projects. Prereq: 496, or Early Childhood/Elementary Education 422 Early Childhood Teaching Methods, or equivalent. Prereq: or coreq: 565 or consent of instructor.


696 Research Trends in Science Education (3) Analysis of current research trends in science education and relationship of such trends within broader educational community. Prereq: 628.

Social Science Education

GRADUATE COURSES

454 Teaching Strategies and Issues in Social Studies Education (3) Goals, objectives, techniques, materials, and evaluation; directed observation in public schools, preparation of teaching plans and materials; simulated teaching experiences. Prereq: Admission to teacher education.

521 Teaching Social Studies in Elementary and Middle Schools (3) Planning and techniques. Trends in curriculum, development of concepts and generalizations, integration of social sciences. Prereq: Course in teaching of social studies or consent of instructor.

525 Strategies, Programs and Materials for Teaching Elementary Social Studies (3) Analysis of new and innovative social studies program materials and techniques. Exploration of current trends in social studies education. Prereq: Previous course in teaching of social studies or consent of instructor.

585 Teaching Secondary School Social Studies (3) Strategies, projects, materials, and programs in social studies education; Undergraduate course in teaching of social studies.

599 Seminar in Social Studies Education (3) Research, trends, and issues in secondary social studies.

621 Seminar in Social Studies Research and Theory (3) Status of research and theory. Needed research, related research from other fields, and application of research. Prereq: Recent course in teaching of social studies or consent of instructor.

Special Education

GRADUATE COURSES

419 Psychology and Education of Students with Mild Disabilities (6) Nature and characteristics of persons with mild handicaps and educational strategies appropriate for these persons. Prereq: 402 and admission to Teacher Education Program.

420 Field Experience in Modified Programs (3) Practicum in teaching in modified programs: planning, developing, implementing and evaluating instruction. Prereq: 402 and admission to Teacher Education Program. Coreq: 419. S/NC only.

431 Field Experience in Comprehensive Programs (3) Prereq: 402 and admission to Teacher Education Program. Coreq: 432. S/NC only.


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.

456 Speech and Language Basis of Learning Disabilities in the Classroom (3) Normal communication development; understanding of speech and language impairments in school-age students; integration of oral/written curriculum, especially for high incidence special education students.

470 Psychology of the Exceptional Child (3) Varieties 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.

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.)

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/NC only.

553 Assessment of Exceptional Students (3) Current issues related to assessment; advanced study of evaluation models for special education; dynamic and other innovative assessment approaches; advanced study of application to educational programming, basic statistics and application in assessment.

555 Characteristics of Affective/Motivational Functioning in Children with Disabilities (3) Definition, methods, identification and symptoms of children with affective/motivational development in disabled youngsters. Comparison to normal development and that of children labeled disturbed or behavior disordered.
556 Instructional Systems for Affective/Motivational Education for Children with Disabilities (3)
Education strategies and models of instruction; simulation, demonstration, and media. Teaching techniques, materials, and teacher/pupil/family interactions. Therapeutic forms of education through art, music, role play, puppetry, bibliotherapy, and group interactions. Prereq or coreq: 555 or consent of instructor.

557 Positive Preventive Discipline (3)
Instructional, classroom and preventive/proactive strategies for use in classroom which positively effects efficiency of classroom. Research on how curriculum can encourage age appropriate interactions of children and youth. Prereq: Admission to graduate program.

558 Neuromuscular and Health Disorders: Educational Implications (3)
Neurological impairments and physical disabilities and their effects on health concerns. Autism. Investigation of instructional techniques and adaptations.

564 Psychosocial Development of Gifted and Talented Children (3) Phenomena of talent development in context of home, school, and society. Implications of maladjustment. Practices for promoting social and emotional development. Prereq: 451 and 452 or equivalent or consent of instructor.

565 Instructional Systems for the Gifted and Talented (3) Instructional methods and systems evaluated in terms of effectiveness in various educational environments. Prereq or coreq: 564 or consent of instructor.

575 Creative Problem-Solving Strategies for Special Educaters (3) Techniques for solving problems encountered by special educators in any setting.

586 Seminar in Research Techniques in Special Education (3) Evaluation of appropriate research methodologies with handicapped populations.


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 functional age ranges. Microcomputer adaptive software, special switch access, authoring systems, telecommunication, and strategies for cognitive development.

620 Internship in Research in Special Education and Rehabilitation (3-9) Placement with professional engaged in theoretically-based research: public school, institutions, agencies or university settings. Prereq: 9 hrs in statistical and research methods. May be repeated. Maximum 9 hrs. S/N/C 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/N/C only.

526 Drama and Story Telling in Teaching (3) Use of techniques of drama and storytelling to improve impact of teaching and to teach more effectively. Prereq: Classroom experience or admission to teacher education program.

535 Inquiry Teaching and Learning (3) Use of children’s and adolescent literature. Exploration of ways to create setting that invite learners to engage in inquiry learning and teaching.

540 Topics in Improvement of Instruction (1-3) Special conferences, workshops, and inservice programs. May be repeated. Maximum 6 hrs. S/N/C or letter grade.

550 Action Research and Practical Inquiry in Education (3) Principles of action research and practical inquiry for practitioners in early childhood and school settings and methods for conducting such inquiries in professional role. Prereq: Admission to graduate program.

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

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

595 Special Topics (1-3) May be repeated. S/N/C or letter grade.

596 Clinical Experience in Assessment and Instruction (3) Academic remediation applied in lab/field setting; tasks related to teaching: assessment, preparation of lessons, and delivery of instruction. Coreq: 553. S/N/C or letter grade.

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

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

610 Internship in College Teaching and Supervision (3-9) Supervised practice in college teaching and supervision. Prereq: Admission to doctoral program or consent of instructor. May be repeated. Maximum 9 hrs. S/N/C only.

617 Trends and Issues in Teacher Education—An Interdisciplinary Perspective (3) Current trends and issues in field of teacher education: elementary education, mathematics education, science education and social science education. Prereq: Admission to doctoral program or consent of instructor.

620 Research in Literacy, Language, and ESL Education (3) Recent trends and historical traditions in language and literacy research: analysis of nature of research methods used, questions asked and topics studied. Prereq: Admission to doctoral program or consent of instructor.

630 College Teaching and Professional Roles in Human Ecology (3) Instructional effectiveness, techniques, organization and evaluation in college teaching. Systems and ecological theoretical framework. Professional roles and responsibilities related to higher education programs in human ecology.


689 Internship (1-3) Experiences in application of principles and practices of curriculum development and instructional improvement. Prereq: Program prerequisites and consent of instructor. May be repeated. Maximum 9 hrs. S/N/C only.

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

694 Supervised Reading (1-3) May be repeated. S/N/C or letter grade.

695 Special Topics (1-3) May be repeated. S/N/C or letter grade.

Transportation
See Marketing, Logistics and Transportation

Theory and Practice in Teacher Education

GRADUATE COURSES

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

503 Problems in Lieu of Thesis (2-3) May be repeated. Maximum 9 hrs. S/N/C only.

517 Trends and Issues in Education (3) Examination of contemporary trends and issues in education.

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

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

Urban and Regional Planning

(Majors)

DEGREE

MAJOR

Planning

C. W. Minkel, Head

Professors:

Minkel, C. W., Ph.D. ................. Syracuse
Spencer, James A. (Liaison),
M.C.P. .................................. Ohio State
Tonn, Bruce, Ph.D. .................. Northwestern

Assistant Professors:

Jepson, Edward, Ph.D. .............. Wisconsin
Shupp, Teresa, M.S.P. .............. Tennessee
Zanetta, Maria C., Ph.D. .......... Ohio State

The Department of Urban and Regional Planning offers a program of courses 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 or related fields. Graduates are candidates for positions in regional, city, county, and metropolitan planning agencies; in local, state, and federal agencies concerned with physical, economic, and administrative planning; in private business and organizations dealing with development problems; and in private consulting.

The Master of Science in Planning program is accredited by the Planning Accreditation Board, a joint undertaking of the American Institute of Certified Planners and the Association of Collegiate Schools of Planning.

THE MASTER’S PROGRAM

Admission Requirements

Applicants are to submit an application for admission to the Office of Graduate Admissions, and two letters of reference from faculty familiar with their prior academic work and a statement describing personal career objectives directly to the department. If the applicant has prior work experience in planning, a reference letter should also be provided by the work supervisor. Graduate Record Examination scores are requested of all applicants whose undergraduate GPA is below 3.0. Other applicants are encouraged to submit them. Students who have not taken an appropriate undergraduate or graduate statistics course will be required to do so.

Degree Requirements

The M.S.P. requires completion of at least 48 hours of graduate credit, at least 30 of which must be in planning. The following courses are the core curriculum required of all students: 510, 515, 520, 521, 530, 531, 532, 534 and 540. Students should plan to enter the program in the fall term to take core courses in the proper sequence.

Each student is required to develop an area of concentrated competence beyond the core curriculum. After selecting the area of concentration, usually by the end of the
second semester, the student takes courses from a prescribed set in the subject area. Further enhancement of the concentration is gained by focusing the thesis or major study on the subject. Concentration courses are drawn from the planning curriculum and from other departments in the University. Concentration courses are available in land use planning, environmental planning, real estate development planning, and transportation planning. Students have the latitude to propose an alternate specialization consisting of at least 9 hours of coursework, subject to approval of a faculty committee.

Each student is required to demonstrate competence in individual research. This may be done in one of two ways:

**Thesis Option:** Complete a thesis for 6 hours credit.

**Non-Thesis Option:** Complete a major study with acceptable documentation. To be eligible for the major study option, the student must have completed at least 12 hours of graduate coursework in planning with at least a 3.5 cumulative grade-point average. The student must meet these criteria may present a proposal to his/her committee for a major study that will include at least 6 hours of subsequent coursework. The proposal must justify the selection of the topic, describe the approach to the study, and describe the nature of the final product. The topic will normally be expected to reinforce or complement the student’s concentration. Successful completion of a comprehensive exam is required before graduation. The exam will normally be taken after completion of the core requirements in the second year. Based on the material generally used by the American Institute of Certified Planners (AICP), this requirement provides an additional capstone experience as well as preparation for meeting AICP professional certification requirements. Student academic progress is monitored by the faculty. A student failing to maintain an acceptable grade-point average may be placed on probation or dismissed from the program.

**MINOR IN ENVIRONMENTAL POLICY**

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

**Planning**

**GRADUATE COURSES**

401 The City in the U.S. (3) Development and character of U.S. cities. Contemporary issues and selected case studies. (Same as Urban Studies 401.)

402 Survey of Planning (3) History of city development and of planning; U.S. experience in urban and other levels of planning. State of the art, process, comprehensive plan, implementation devices. Planning issues in society. Not for credit for M.S.P. degree.

446 Housing (3) Nature and demand for housing in U.S. and abroad, U.S. experience. Private market processes and influences. Problems in housing supply, impact of new technology, and governmental programs to improve supply and quality of housing.

500 Thesis (1-15) P/NP 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 lab space. May not be used toward degree requirements. May be repeated. S/NC only.

510 Fundamentals of Planning (3) History of planning, structure and development of urban areas, operations of contemporary planning, trends and issues.

515 Theory of Planning (3) Analysis of nature and objectives of planning process; role of planner and planning function in public decision-making. Prereq: 510 or consent of instructor.

520 Planning Research Methods (3) Overall 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 global networks in planning and public management. Development of practical skills in design of planning-decision support systems, data-bases, Internet based tools and geographic information systems (GIS). Prereq: Basic experience with computer software and hardware or consent of instructor.


530 Planning Policy Analysis (3) Basic methods of policy analysis and planning. Economic factors underlying the dynamics of change in cities and regions. Coreq: 520 or consent of instructor.

531 Land Use Analysis (3) Concept and framework for land-use analysis. Population, employment, economic-base studies and forecasting techniques.

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, 520, 530 and 531 or consent of instructor.

537 Planning and Transportation (3) (Same as Civil Engineering 558.)

538 Urban and Site Design (3-6) Principles of design of residential subdivisions and some components of physical community, shopping centers, institutional complexes, central business districts. 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 role 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 national 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 redevelopers. 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 tourism, tourism development and planning of tourist attractions and services. Application of techniques in selected area.


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.)

553 International Planning (3) Alternative development models. Comparative analysis of planning practices and policies around world. Population growth, urbanization, environmental degradation, and economic development in developing countries.

555 Environmental Planning (3) Role of planners and planning in maintaining balance between natural and built environment. (Same as Ecology and Evolutionary Biology 555.)

556 Futures Planning (3) Overview of world and community futures literature. Skills in trends assessment, scenario writing, and other futures planning techniques.

560 Strategic Planning and Policy Development (3) Models of strategic planning and process of policy development in applied decision making. Qualitative approaches, program evaluation and impact assessment.

590 Practicum (3) Prereq: Consent of instructor. S/NC 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.

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**Veterinary Medicine**

*(College of Veterinary Medicine)*

**MAJOR**

**DEGREE**

Veterinary Medicine .............................. D.V.M.

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

**THE PROFESSIONAL PROGRAM**

**Admission Requirements**

To qualify for admission to the professional program of the College of Veterinary Medicine, a candidate must have completed at least the minimum preveterinary course requirements listed below. These may be completed at any accredited college or university that offers courses equivalent to those at The University of Tennessee. Preveterinary course requirements must be completed by the end of spring term of the year in which the applicant intends to enroll. Biochemistry requirements must have been satisfactorily completed within five years of the time the applicant wishes to enter the program.

<table>
<thead>
<tr>
<th>Subject Area</th>
<th>Semester Hours</th>
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</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>
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Veterinary Medicine 199
Biochemistry**  4
General Biology  8
Genetics  3
Cellular Biology***  3
** Total  66

*May include, for example, courses in English literature, speech, music, art, philosophy, religion, language, history, economics, anthropology, political science, psychology, sociology and geography.

**Exclusive of laboratory.

***It is expected that this requirement will be fulfilled by a course in cellular or molecular biology.

Admission Procedures

Admission of new students is for the fall semester, with first priority given to residents of Tennessee.

The College of Veterinary Medicine utilizes the Veterinary Medical College Application Service (VMCAS) for all applicants. Forms and instructions for making application for admission may be obtained beginning June 1, 2002 from the Office of the Associate Dean, The University of Tennessee, College of Veterinary Medicine, 2407 Piver Drive, Room A102, Knoxville, Tennessee 37996-4550.

Note: The deadline for receipt of the completed application materials is November 1. NON-TENNESSEE APPLICANTS MUST HAVE A MINIMUM CUMULATIVE GRADE-POINT AVERAGES OF 3.2 ON A 4.0 SCALE FOR APPLICATION TO BE CONSIDERED.

Applications are accepted only from U.S. citizens or permanent residents of the U.S.

D.V.M. Curriculum

The curriculum of the College of Veterinary Medicine is a nine-semester, four-year program. Each class begins in August and graduates four years later in May. The first three years generally follow the traditional fall and spring semesters with the summer break following years one and two. The final year of the professional curriculum begins immediately following semester six and is a continuous clinical rotation experience extending over 54 weeks.

Development of a strong basic science foundation is emphasized in the first year. Courses consist mostly of preclinical subjects of anatomy (gross and microscopic), physiology, immunology, bacteriology, virology and parasitology. Also included in the first year are clinical subjects of physical diagnosis and epidemiology. Considerable integration of subject matter is incorporated during this year.

The second and third years include the study of diseases, their causes, diagnosis, treatment and prevention, and courses are team-taught on an organ system basis.

The final year (three semesters) is devoted to intensive education in solving animal disease problems involving extensive clinical experience in the Veterinary Teaching Hospital. Each student will participate exclusively in clinical rotations in the Veterinary Teaching Hospital and in required externships (preferably off-campus).

Innovative features of this curriculum include: six weeks of student centered, small group, applied learning exercises in semesters one through five; three weeks of dedicated clinical experiences in the Veterinary Teaching Hospital in semesters three through five; and elective course opportunities in semesters four, five and six which allow students to focus on individual educational/career goals. Students enrolled in the D.V.M. program may register for up to 10 credit hours of graduate courses and these hours will be credited toward the D.V.M. degree. Elective study offers a unique educational alternative for students in the CVM and is intended to enhance professional growth, concentration in an area of interest and career opportunities.

In addition to education in the science and art of veterinary medicine, students receive instruction in paramedical subjects such as animal behavior, medical communication, professional ethics, jurisprudence, economics, and practice management.

The curriculum requires successful completion of 164 semester credits.

THE GRADUATE PROGRAM

The College also administers a graduate program involving all departments which leads to the Master of Science and the Doctor of Philosophy degrees. Because of the interdisciplinary departmental administration of the College of Veterinary Medicine, the faculty have opportunities in the graduate programs of other instructional units, including Animal Science (nutrition, physiology, genetics and animal management) Microbiology (bacteriology, virology and immunology), Ecology and Evolutionary Biology (environmental toxicology), Public Health, and Comparative and Experimental Medicine. (Refer to other sections of this catalog for a full description of these programs.) The majority of the graduate 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 research careers in the health sciences.

PROFESSIONAL COURSES

801-02 Application Based Learning Exercise (ABLE), II, (1,2) Small group, student-centered learning sessions with faculty facilitator for self discovery of new information. Varies based on specific clinical case or problem, and integration of basic science and clinical material. S/NC only.

804-05-06 Application Based Learning Exercise (ABLE) and Clinical Exposure I, II, III (2,2,2) Week-long small group, student-centered learning sessions with faculty facilitator for self discovery of new information; based on specific clinical case or problem; integration of basic science and clinical material. One week of clinical experience through participation in specific clinical rotations in Veterinary Teaching Hospital. S/NC only.

811 Infection and Immunity I—Bacteriology and Mycology (3) Fundamental aspects of microbiology and cell biology relative to pathogenesis of bacterial and fungal diseases of animals: antimicrobial actions and mechanisms of bacterial resistance. General approaches to diagnosis, treatment and prevention.

813 Infection and Immunity II—Immunology (2) Basic biology and practical aspects of immunology: cells of immune system, immune function and dysfunction, immunophrophylaxis, diagnostic testing and specific diseases involving immune system.

814-16 Clinical Correlations and Ethics I, II (1,2) Correlations between basic science material from concurrent courses and practice of veterinary medicine. Thoughts on the spectrum of current veterinary ethical issues. 816—Student-led discussions follow faculty presentations.


821-22 Veterinary Anatomy I, II (6,6) Integrated approach to study of developmental, macroscopic (gross), and microscopic anatomy of common domestic animals. Dissections of embalmed specimens of common domestic species for comparative purposes. Microscopy relates structure with function. Study of developmental anatomy related to normal anatomy to inherited anomalies.

823-24 Physiology I, II (4,4) Introduction to concepts and problems in physiology which form basis for clinical applications and for formal training in pharmacology, medicine, pathology, and surgery. Cellular, neural, cardiovascular, renal, respiratory, digestive, endocrine, and reproductive physiology.

827 Special Problems in Animal Science (1-8) Extramural and specially designed study for students interested in select topics in anatomy, histology, and physiology.

831 Physical Diagnosis (1) Basic care, feeding, restraint, and handling domestic animals. Introduction to physical examination and diagnostic techniques used by veterinarian.

832 Anesthesiology (2) Principles of anesthesiology; pharmacology of anesthetic agents, and introduction to anesthetic techniques in veterinary medicine.

833 Epidemiology and Evidence Based Medicine (2) Study of distribution and determinants of disease in animal populations. Use of knowledge (evidence) gained from management of clinical patients in past to improve future clinical decision making processes.

834 Hematopoietic System (2) Pathophysiology and diagnosis of disorders involving bone marrow and blood cells, platelets, and blood coagulation in domestic, laboratory, and economically important laboratory species.

835 Principles and Practice of Surgery (2) Principles of veterinary surgery; aseptic technique, patient and surgeon preparation, control of surgical hemorrhage and infection, and general operating room procedures. Proper methods of tissue handling, surgical instrumentation, and selection of suture materials and suturing patterns. Pathophysiology of surgical and accidental wounds: wound healing and management.

836 Toxicology (2) Principles of toxicology, molecular mechanisms, pathologic processes and clinical features of animal diseases caused by common toxic agents.

837 Food Hygiene and Zoonoses (2) Host-agent relationships, public health aspects of veterinary medicine and role of veterinarians in ecology and food hygiene.

840 Integumentary System (3) Pathophysiology, special pathology, medicine and surgery of diseases of integumentary system. Laboratory examination, pathology, diagnosis and treatment.

841 Reproductive System (3) Pathophysiology, special pathology, medicine and surgery of diseases of male and female reproductive systems and mammary glands.

842 Alimentary System (4) Pathophysiology, special pathology, medicine and surgery of diseases of alimentary systems.

843 Musculoskeletal System I (3) Pathophysiology, clinical description of basic treatment modalities of common diseases and conditions of skeletal system of small animals: development of basic diagnostic and treatment skills.

844 Musculoskeletal System II (3) Pathophysiology, special pathology, medicine and surgery of diseases of muscular and skeletal systems. Advanced principles, radiographic interpretation and surgical procedures.

845 Veterinary Nutrition (2) Principles of nutrition, and nutrition-related disease. Applied nutrition relating to individual small or large animal patient or to herd situations.